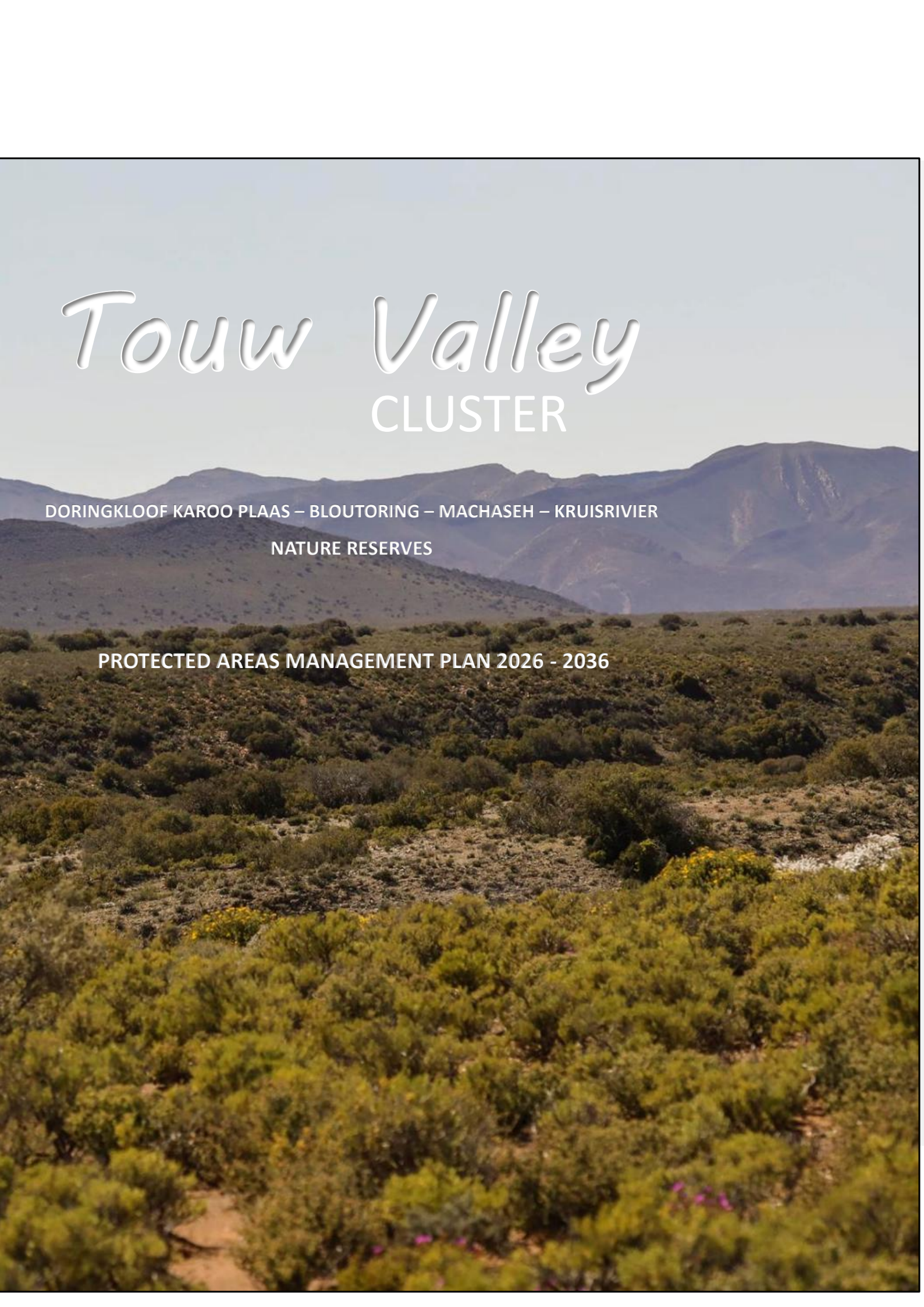




Touw Valley CLUSTER

DORINGKLOOF KAROO PLAAS – BLOUTORING – MACHASEH – KRUISRIVIER
NATURE RESERVES

PROTECTED AREAS MANAGEMENT PLAN 2026 - 2036

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STATUS

The Doringkloof Karoo Plaas Nature Reserve has been declared as a Section 23 Nature Reserve (3(1)(a)(i)).

Declaration Date:	Government Gazette Notice:
2025-11-14	REF NO. P.N. 9162/2025

The Machaseh Nature Reserve has been declared as a Section 23 Nature Reserve (3(1)(a)(i)).

Declaration Date:	Government Gazette Notice:
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The Bloutoring Nature Reserve has been declared as a Section 23 Nature Reserve (3(1)(a)(i)).

Declaration Date:	Government Gazette Notice:
2026-02-13	REF NO. P.N. 9190/2026

The Kruisrivier Nature Reserve has been declared as a Section 23 Nature Reserve (3(1)(a)(i)).

Declaration Date:	Government Gazette Notice:
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Abbreviations

APO	Annual Plan of Operation
CARA	Conservation of Agricultural Resources Act
CBA	Critical Biodiversity Area
CBD	Convention on Biological Diversity
CEO	Chief Executive Officer
CoAE	Certificate of Adequate Enclosure
CFR	Cape Floristic Region
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMA	Catchment Management Authority
CR	Critically Endangered
DEA&DP	Department of Environmental Affairs and Development Planning
DEA	National Department of Environmental Affairs
DAFF	Department of Agriculture, Forestry and Fisheries
DoA	Department of Agriculture Western Cape
DWA	National Department of Water Affairs
EIA	Environmental Impact Assessment
EMF	Environmental Management Framework
EMP	Environmental Management Plan
EN	Endangered
ESA	Ecological Support Area
EWT	Endangered Wildlife Trust
FEPA	Freshwater Ecosystem Priority Area
FPA	Fire Protection Association
GIS	Geographical Information System
IDP	Integrated Development Plan (Municipal)
IUCN	International Union for the Conservation of Nature
LC	Least Concern
LT	Least Threatened
LUPA	Western Cape Land Use Planning Act
MA	Management Authority
MAB	Man and the Biosphere Programme
MCA	Mountain Catchment Area
MCM	National Department of Marine and Coastal Management
MEC	Member of the Executive Council
METT	Management Effectiveness Tracking Tool
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MPA	Marine Protected Area
NBA	National Biodiversity Assessment
NEM:BA	National Environmental Management: Biodiversity Act
NEM: PAA	National Environmental Management: Protected Areas Act
NEMA	National Environmental Management Act

NFEPA	National Freshwater Ecosystem Priority Area
NGO	Non-governmental Organisation
NN	No Natural
NPAES	National Protected Area Expansion Strategy
NR	Nature Reserve
NSBA	National Spatial Biodiversity Assessment
NWA	National Water Act
ONA	Other Natural Area
PA	Protected Area
PAMP	Protected Area Management Plan
PBSAP	Western Cape Provincial Biodiversity Strategy and Action Plan
SACNASP	South African Council for Natural Scientific Professions
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SANParks	South African National Parks
SDF	Spatial Development Framework
SMP	Strategic Management Plan
SOB	State of Biodiversity Report
SPLUMA	Spatial Planning and Land Use Management Act
SDF	Municipal Spatial Development Framework
SEA	Strategic Environmental Assessment
SMME	Small, Micro and Medium Enterprises
SMP	Strategic Management Plan
SWOT	Strengths, weaknesses, opportunities and threats analysis
TMF	Table Mountain Fund
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNFCC	United Nations Framework Convention on Climate Change
VU	Vulnerable
WCBB	Western Cape Biodiversity Bill
WCBF	Western Cape Biodiversity Framework
WCBSP	Western Cape Biodiversity Spatial Plan
WCPAES	Western Cape Protected Area Expansion Strategy
WWF-SA	World Wildlife Fund for Nature South Africa

BACKGROUND □



STRATEGIC MANAGEMENT PLAN

1. Background

1.1 Purpose of the plan

A Protected Area Management Plan (PAMP) is a strategic document that provides the framework for the development and operation of a nature reserve and informs management at all levels. The purpose of the management plan is to:

- Provide the primary strategic tool for management of the Touw Valley Cluster of Nature Reserves, informing the need for specific programmes and operational procedures.
- Provide for capacity building, future thinking and continuity of management.
- Enable the landowners to develop and manage the Touw Valley Cluster of Nature Reserves in such a way that its values and the purpose for which it has been established are protected.

1.2 Structure of the plan

Section 1:	Background. Provides an overview of the guiding legislation, an introduction to protected area management planning centred on the adaptive management cycle with a focus on implementing the management support framework.
Section 2:	Site Description. Provides an introduction of the site and ownership as well as the administrative structure. This section looks to establish the context of the biodiversity stewardship site, including the regional and local planning, zonation plan as well as management units. These all provide the basis for the strategic management framework that follows.
Section 3:	Strategic Management Framework. Lays out the management authority's high-level strategic decisions that guide the operational management of the reserve.
Section 4:	Best Practice Guidelines. Provides guiding principles and factors to be considered for coordinated actions.

1.3 Guiding Legislation

A large body of environmental legislation is relevant to the management of nature reserves, but the primary legislation guiding the management of protected areas is the National Environmental Management: Protected Areas Act, Act No. 57 of 2003 (NEMPA). NEMPA aims to provide a representative network of protected areas on state, private and communal land, and to promote the sustainable utilisation of protected areas.

The Protected Areas Act establishes the platform for biodiversity stewardship by creating a legal framework for cooperation between the state and landowners for the declaration and management of protected areas. NEMPA establishes the legal basis for the creation and administration of protected areas in South Africa, as its objectives include provisions "for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural

landscapes". NEMPA further sets out the mechanisms for the declaration of protected areas and the requirements for their management.

Descriptions of integral environmental legislation which are pertinent to protected area managers are given below:

- National Environmental Management Act, Act No. 107 of 1998 (NEMA): the statutory framework to facilitate the enforcement of Section 24 of the Constitution of the Republic of South Africa which provides that everyone has the right to an environment that is not detrimental to their health or well-being. NEMA is intended to promote co-operative governance and ensure that the rights of people are upheld while recognising the necessity of economic development. NEMA replaces the Environmental Conservation Act (Act No. 73 of 1989), which was inadequate to deal with enforcement, administration, and governance.
- National Environmental Management Biodiversity Act, Act No. 10 of 2004 (NEMBA): provides planning instruments for various aspects of biodiversity conservation. The planning tools provided for in NEMBA are aimed at assisting provincial authorities and conservation agencies in identifying biodiversity priorities and addressing threats. The identified tools include the National Biodiversity Framework, bioregional plans, biodiversity management plans, the listing of threatened and protected species or ecosystems, and the control and enforcement of species and organisms posing a potential threat to biodiversity. Section 76(1) of the Biodiversity Act states that the management authority of a protected area must incorporate into the management plan an invasive species control and eradication strategy.
- National Veld and Forest Fire, Act No. 101 of 1998: the purpose of the act is to prevent and combat veld, forest, and mountain fires throughout South Africa. The Act specifies the responsibilities of landowners and puts in place a range of requirements. This includes the preparation of firebreaks; having equipment, protective clothing, and trained personnel.
- The National Environmental Management: Protected Areas Act 57 of 2003 (NEM:PAA): aims to protect and conserve ecologically viable areas that represent South Africa's biological diversity and natural landscapes. It establishes a national register of all national, provincial, and local protected areas and manages these areas according to national norms and standards. The Act also emphasizes intergovernmental cooperation and public consultation in matters concerning protected areas, ensuring the continued existence, governance, and functions of South African National Parks.
- The Western Cape Biodiversity Act (Act 6 of 2021) establishes a modern framework for the conservation, management, and sustainable use of biodiversity in the Western Cape Province. The Western Cape Biodiversity Act was signed into law in 2021 and aims to modernize biodiversity governance in the province, aligning with national and international environmental policies and frameworks. It replaces and repeals several older laws, including

the Nature Conservation Ordinance, the Mountain Catchment Areas Act, and the Western Cape Biosphere Reserves Act, providing a unified legal framework for biodiversity protection. The Act is being implemented in phases. Key governance, planning, and reporting sections came into effect on 15 November 2022, with subsequent regulations to enable conservation and sustainable use of biodiversity still under development. Once fully promulgated, it will provide a modern environmental management framework that balances biodiversity protection with economic growth and job creation.

1.3.1 Purpose of Protected Areas

One of the key priorities in securing protected areas is to allow for the formal protection of sites that conserve key ecosystems and threatened species assemblages, promote landscape scale conservation measures, and ensure the ecological integrity and resilience of these important areas are ensured in perpetuity. The formal protection of sites that meet these criteria is important for provincial, national, and international conservation targets and commitments.

Section 23(1) of the NEMPA is the mechanism for securing critical biodiversity through formal proclamation as a nature reserve on private land in South Africa. The formal proclamation of nature reserves provides a valuable contribution to the protected area network, ensures that reserves are managed according to recognised standards, and secures important habitats and a variety of threatened and endemic species.

The following steps must be completed during the proclamation process:

- Biodiversity Site Assessments undertaken on site and presented to the CapeNature Stewardship Review Committee to ensure that nature reserve qualification is met;
- Legal vetting of site by CapeNature and finalisation of Trust Resolution, Memorandum of Agreement and Protected Area Management Agreement which were then signed by all parties;
- Management Authority assigned to the nature reserve by the responsible provincial minister;
- Development and registration of Surveyor General Diagram indicating portions of property proclaimed as nature reserve;
- Protected Area Management Plan (PAMP) developed and approved by the Management Authority, Provincial Conservation Authority and the responsible provincial minister;
- Notarial Deed with surveyor diagram and title deed restrictions are executed by the Notary and registered at the Deeds Office;
- The nature reserve must be rezoned to appropriate conservation zoning;

- Implementation of PAMP Annual Plan of Operation (APO) which is reviewed annually with report submitted to CapeNature.

According to Section 17 of the National Environmental Management: Protected Areas Act, Act No 57 of 2003 (NEMPA), the purpose of declaring a protected area is to:

- I. to protect ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes in a system of protected areas;
- II. to preserve the ecological integrity of those areas;
- III. to conserve biodiversity in those areas;
- IV. to protect areas representative of all ecosystems, habitats and species naturally occurring in South Africa;
- V. to protect South Africa's threatened or rare species;
- VI. to protect an area which is vulnerable or ecologically sensitive;
- VII. to assist in ensuring the sustained supply of environmental goods and services;
- VIII. to provide for the sustainable use of natural and biological resources;
- IX. to create or augment destinations for nature-based tourism;
- X. to manage the interrelationship between natural environmental biodiversity, human settlement and economic development;
- XI. generally, to contribute to human, social, cultural, spiritual and economic development; or
- XII. to rehabilitate and restore degraded ecosystems and promote the recovery of endangered and vulnerable species.

All properties that qualify for inclusion in the South African Protected Area Network must meet the above criteria and the process for proclamation must be implemented as described in the NEMPA.

1.3.2 Declaration status of the Touw Valley Cluster Nature Reserve

All four properties (Doringkloof Karoo Plaas, Bloutoring, Machaseh and Kruisrivier) is declared under Section 23(1) of the National Environmental management: Protected Areas Act (Act 57 of 2003) for the protection of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes in a system of protected areas.

1. Doringkloof Karoo Plaas Nature Reserve was proclaimed on 14 November 2025 in Government Gazette Notice 9162.
2. Machaseh Nature Reserve was proclaimed on 12 December 2025 in Government Gazette Notice 9173.
3. Bloutoring Nature Reserve was proclaimed on 13 February 2026 in Government Gazette Notice 9190.

4. Kruisrivier Nature Reserve was proclaimed on 24 July 2026 in Government Gazette Notice 9271. All of the Nature Reserves comprising the Touw Valley Cluster have finalised the proclamation process.

Annexure 8 – Copy of each individual Nature Reserve's Declaration Notice.

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1.4 Adaptive management

The preparation of this management plan has been undertaken based on the guiding principles of adaptive management, which is a structured, iterative process in which decisions are made using the best available information, with the aim of obtaining better information through monitoring of performance (Figure 1). In this way, decision making is aimed at achieving the best outcome based on current understanding, whilst accruing the information needed to improve future management. Adaptive management can lead to revision of a part or, if necessary, the whole management plan.

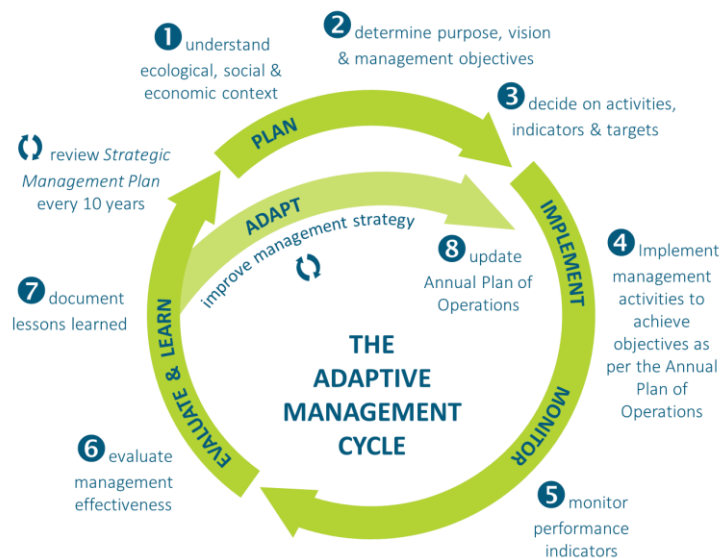


Figure 1 – The adaptive management cycle

Adaptive management enables landowners and managers to:

- Learn through experience.
- Take account of, and respond to, changing factors that affect the biodiversity stewardship site.
- Develop or refine management processes.
- Adopt best practices and new innovations in biodiversity conservation management.
- Demonstrate that management is appropriate and effective.

1.5 Management Support Framework

The National Environmental Management of Protected Areas (NEMPA) Act of 2003 mandates that a management plan must be prepared by the management authority, as outlined in Sections 39 and 41. This plan

must include a program for implementation and its associated costs (APO and budget). Section 43 further requires the management authority to monitor and report annually.

To support effective Protected Area management, a range of tools and a structured support system have been developed. These tools provide meaningful assistance and guidance from the provincial conservation authority to landowners. Key components include:

- **Integrated Management Plans:** A template that integrates with the Protected Area (PA) management system.
- **APO Implementation:** An Annual Plan of Operation (APO) that serves as both a management tool and a reporting mechanism based on the PA management plan.
- **Monitoring & Management Solutions:** Identified management gaps from the Management Review, METT Assessments, and PAMP are addressed in the APO, with customized monitoring and implementation strategies.
- **Effective Data Collection, Storage & Analysis:** Development of efficient, secure, and robust data platforms can be tailored to the needs of the PA.

These have all helped contribute towards effective management where improved management decisions can be made from the combined use of these tools. The Management Support Framework, Figure 2, provides for an overview on where these tools and structures integrate. In this framework, the Protected Area Management Plan is at the centre. This Management Plan is developed according to the relevant Key Performance Areas (KPAs) and the associated objectives. The APO then translates the Management Plan into prioritized and scheduled actions. Monitoring and evaluation tools, such as the Management Review and METT assessment, are provided to management authorities to help enable focused management and technical support.

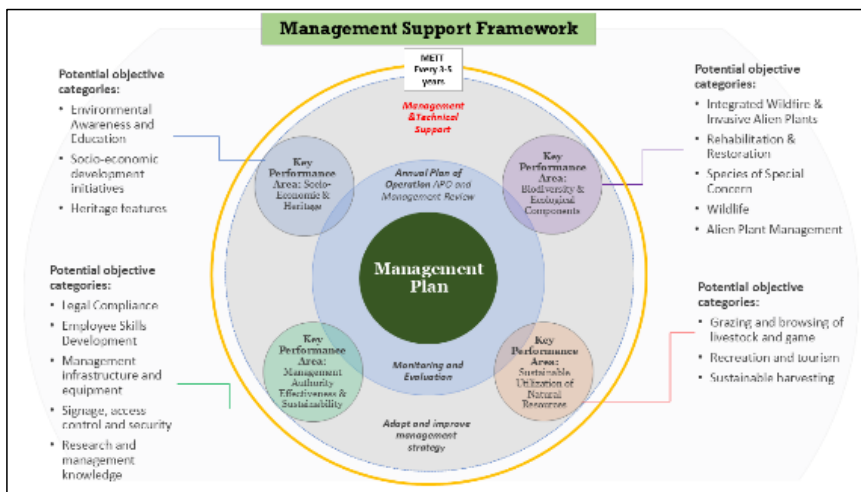


Figure 2 – The Management Support Framework

The Annual Plan of Operation

The Annual Plan of Operation (APO) forms an integral part (Part B) of the Protected Area Management Plan. The APO is documented within an associated excel spreadsheet (as shown in **Appendix E**) and enables the synthesizing of the Protected Area Management Plan. The following reasons enable better tracking of management progress which leads to better management support for landowners. This APO process allows for:

- for ease of use as a management tool;
- to facilitate updates and changes;
- to simplify the annual audit process;
- to simplify the drafting of subsequent versions of the APO after the annual review and planning workshop.

The Annual Plan of Operation template, or APO as it is commonly referred to, was developed and now maintained through a partnership between Conservation Outcomes, Conservation Management Solutions, and CapeNature with funding made available by the Table Mountain Fund. The initial development of the APO template was made possible by a WWF Nedbank Green Trust grant, and a partnership with Conservation Outcomes. The original template has further been customised specifically for the needs of CapeNature and their Stewardship Program.

This APO tool is intended to be used, firstly, as a tool to facilitate the management of day-to-day tasks of the protected area. Secondly, to provide a platform to compile and submit the Annual Report, and lastly, to provide a structure to undertake an Annual Review of management interventions carried out for the year. The APO links directly to the protected area management plan's Key Performance Areas and Objectives. In essence, the APO is a work plan or a short-term schedule for implementing the Operational Plan of the protected area management plan (PAMP). It typically lists tasks required, who will be responsible for each task, when each task will need to be undertaken, and the budget required to implement the work plan.

In the APO, specific Management Activities under each Objective are assigned to a staff member and a time period for completion of the task agreed to. Performance and progress of each assigned staff member's tasks can be tracked monthly throughout the year and problems addressed at regular team meetings. The intention is that if the Management Activities are completed under each Objective and KPA, then the overall Objectives of the protected area will be met, and management effectiveness of the protected area will improve.

The second function of the APO tool is its ability to automatically generate an Annual Report based on the contents of the APO. This report can be used to inform the Provincial Conservation Authority, the protected area board, or donor organisations on progress of management of the protected area for the year.

The third function is the ability to undertake an Annual Review of the management effectiveness of the protected area. This can either be in the form of a self-assessment by the management team on the ground, or as a facilitated self-assessment carried out with the guidance and support of an extension officer, or an assessment carried out in the presence of a CapeNature official.

1.7 Monitoring and Evaluation

Monitoring and evaluation are essential components of the adaptive management process. Long-term monitoring and evaluation form a clear management baseline and enables the reserve management team to determine if the implemented management activities are achieving the intended outcomes in terms the identified Objectives within each Key Performance Area (KPA).

Management effectiveness evaluation is the assessment of how well a protected area is being managed, primarily the extent to which management is protecting targets and values and achieving objectives (Hockings et al. 2015). The following questions underpin management effectiveness evaluation (Leverington & Hockings 2004):

- Is the protected area effectively conserving the targets and values for which it exists?
- Is management of the area effective and how can it be improved?
- Are specific projects, interventions and management activities achieving their objectives, and how can they be improved?

1.7.1 Annual Management Review

It is recommended that the Protected Area undertakes an Annual Management Review which is built into the APO tool. Additional ecological indicators may be required to effectively monitor species and ecosystem health. Every action in the APO has a Key Performance Indicator (KPI) and target. The Key Performance Indicator reflects whether an action has been identified as being completed, on track, major issues, minor issues, abandoned or planned. The target is the evidence that has been identified as necessary to complete the activity. Monitoring and reporting on these targets enable the assessment of management effectiveness. The KPIs and targets can also be used to measure the performance of personnel responsible for implementing the different aspects of the management plan. During the annual review and planning workshop, performance against KPI targets must be assessed to accurately inform the actions in the following year's APO.

1.7.2 Protected Area Management Effectiveness

Management effectiveness can then be further assessed over time using the Management Effectiveness Tracking Tool (METT). METT-SA has been adapted for South Africa and further to Biodiversity Stewardship sites. It is based on the six elements of good management:

- It begins with understanding the context of existing targets, values and threats;
- Progresses through planning;
- Allocation of resources (inputs);
- and because of management actions (processes);
- eventually produces products and services (outputs);
- that result in impacts or outcomes.

A METT workshop will be held for each CapeNature Landscape, alternating every 4 years for willing biodiversity stewardship sites. A METT-Intervention Report is then produced with indicates the overall METT scores over the years, Summary graph of the METT Assessment based on the Management Spheres, priority interventions, Management sphere comparisons, Threats and finally the Management Sphere Summary.

1.8 The Annual Review and Planning Workshop

1.8.1 Management Review

An annual review of the implementation of the PAMP will be undertaken in order to determine how effectively the management plan has been implemented and assist in determining the focus for the subsequent APO and the associated time frames and budgets. The annual review should promote effective adaptive management by identifying changes and modifying management interventions. The Annual Audit will form the basis of the management plan review. The APO is in a similar format to the Annual Audit, allowing for a seamless transition of information from Audit to new APO.

The purpose of undertaking an annual management review of the protected area management plan will be to:

- Determine how effectively the management plan has been implemented.
- Assist in determining the focus for the annual plan of operation and the setting of appropriate time frames and budgets.
- Enable effective adaptive management by identifying changes and modifying management interventions.

This Management Review enables insights for more focussed discussion when the Stewardship Facilitator undertakes a site visit. This annual review and APO Annual Report will form the basis of the management plan review. This should include records of recommendations for update/changes to the annual revision of the management schedules as well as the ten-year plan (**Section 1.9**).

The Touw Valley Cluster PAMP is adopted for the period 1 July 2026 through 30 June 2036 Legislation stipulates a maximum of a ten-year management period prior to the revision of the management plan. The annual reviews and audits will be utilised to review and where necessary, revise, the PAMP every ten years to ensure that legislation compliance is maintained.

1.8.2 Drafting the next year's APO

The Annual Plan of Operation (APO) is an integral component of the Protected Area Management Plan. The 2026 – 2027 Touw Valley Cluster APO is provided in (attached). As preparation for the Annual Audit, the Management Authority should compile the list of management actions for the following year's APO as well as allocating responsibility for management activities and setting timeframes for delivery of targets. CapeNature recommends that the following steps are undertaken during the review process:

- Review the performance in achieving the preceding year's APO under each Management Objective. Determine actual performance relative to the targets set. Identify challenges experienced and determine methods to overcome them.
- Revise targets, activities, responsibilities, and timeframes for each Management Objective. Allocate budget to achieve targets accordingly.

The activity provides planning essential to the effective management of the nature reserve while ensuring that legislative compliance with respect to the NEMPA Act is maintained.

Either as part of the review process or directly after the review, the reserve management team should compile the list of management actions for the following years APO.

1.9 Ten-year revision of the Strategic Management Plan

Legislation stipulates a maximum of a ten-year management period prior to the revision of the (Part A) Strategic Management Plan (SMP). The SMP can be revised after a shorter management period, and this is recommended for a newly establish Nature Reserve where significant management outcomes and infrastructure development are taking place.



PART B

2. Site Description

2.1 Introduction

The Touw Valley Cluster comprises four Nature Reserves, namely the Bloutoring Nature Reserve, the Doringkloof Karoo Plaas Nature Reserve, the Kruisrivier Nature Reserve, and the Machaseh Nature Reserve. The Touw Valley Cluster is situated within the Klein Karoo of the Western Cape Province of the Republic of South Africa. The Klein Karoo is an intermontane plateau basin which lies between the east west oriented Great Swartberg mountain range, the southwest oriented Langeberg mountain range, and the south-east oriented Outeniqua mountain range. The region is separated from the coastal belt to the south by the Langeberg and Outeniqua mountains and the Great Karoo to the north by the Great Swartberg range. The region is approximately 245 kilometres long (east to west) and averages 48 kilometres in width (north to south). The four nature reserves cover more than 7 000 hectares in extent and border directly on the Anysberg World Heritage Site and Nature Reserve, a provincial nature reserve managed by the Western Cape provincial nature conservation authority, CapeNature.

The Touw Valley Cluster is located approximately 32 kilometres (km) to the southeast of the town of Touwsrivier and northeast of the town of Montagu (Figure 3). The cluster falls within the Cape Winelands district municipality and in two local municipalities, namely the Breede Valley and Langeberg local municipalities.

The nature reserve lies to the south of the N1 national route, to the north of the R62 provincial road, and to the east of the R318 provincial road. The nature reserves may be accessed by divisional gravel roads which pass directly through the Touw Valley Cluster.

The four nature reserves are owned privately and have been proclaimed in terms of Section 23 of the National Environmental Management: Protected Areas Act (Act 57 of 2003) in partnership with the Endangered Wildlife Trust and the CapeNature Biodiversity Stewardship Programme. The Endangered Wildlife Trust (EWT) is a registered non-profit, non-governmental, and public benefit organisation. Since its establishment in 1973, the EWT has become a leading, well-known, and trusted conservation role player, committed to conserving threatened species and ecosystems. To achieve this, the EWT focuses on three strategies: Saving Species, Conserving Habitats, and Benefitting People.

The CapeNature Biodiversity Stewardship Programme aims to set up positive, proactive partnerships with private landowners to support the management and protection of biodiversity and ecosystems on private land by creating a network of formally protected areas or other effective area-based conservation measures.

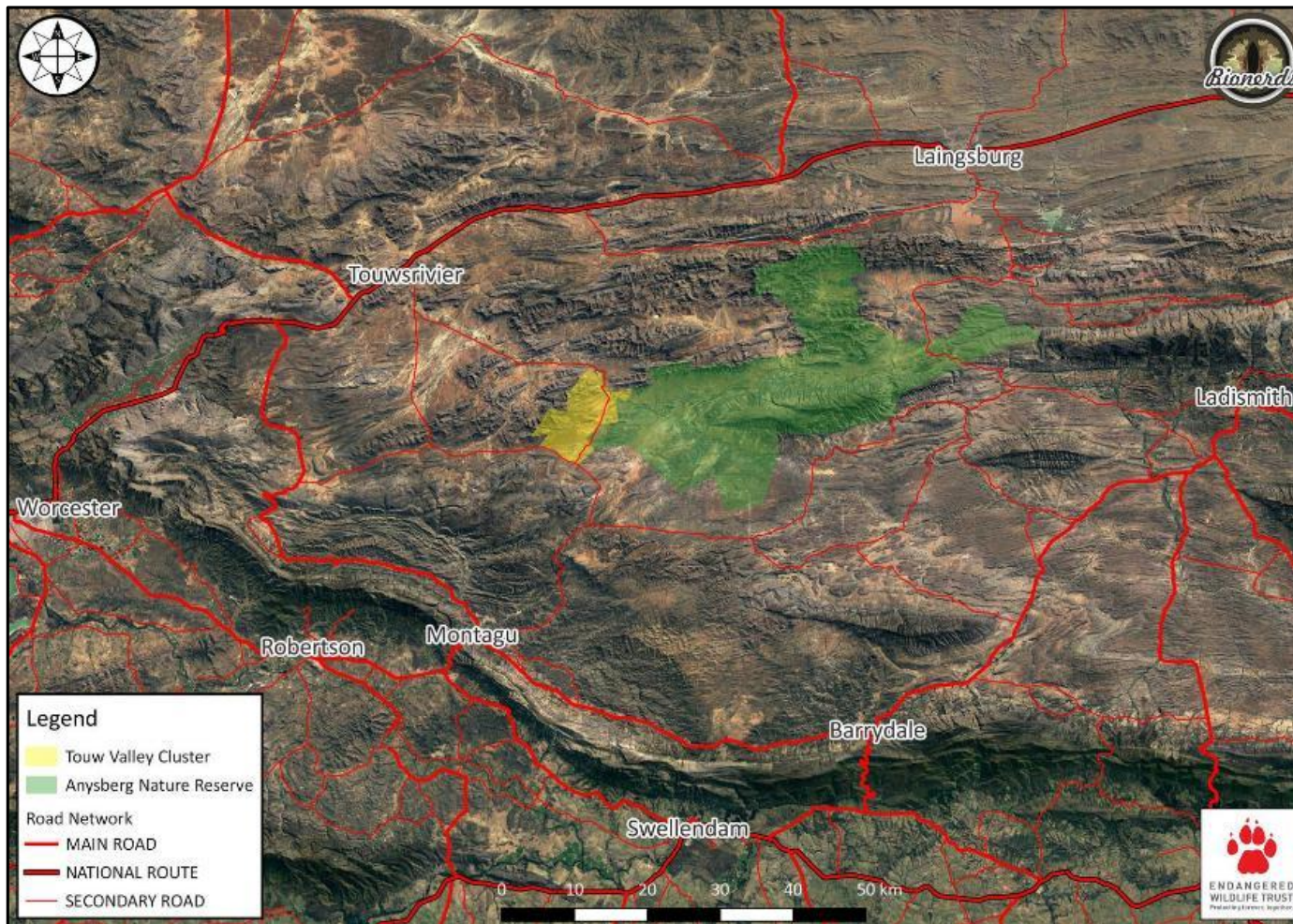


Figure 3 – The location of the Touw Valley Cluster in the Klein Karoo region

2.2 Property Details

The Touw Valley Cluster comprises reserves, namely the Bloutoring, Doringkloof Karoo Plaas, Kruisrivier and Machaseh Nature Reserve, which are made up of seven farm portions. The nature reserves and associated farm portions are given below in Table 1 and illustrated in Figure 4.

Table 1 - The Touw Valley Cluster Farm Portions.

BLOUTORING NATURE RESERVE			
Contact H Bell and J. Bell 076 957 8549 (admin@bloutoring.co.za)			
Portion 0 of Farm Number 18, Geen Bedrog. Declared in Gov gazette 9190 on 13 Feb 2026			
Registration Division	Montagu	Owner Name	Bloutoring Plase CC
Diagram Deed	ROQ3-27/1881	Registration Number	2008/136666/23
Extent	1 738.8728 Hectares	Title Deed Number	T1922/1987
LPI Code	C05000000000001800000	Registration Date	1987/01/19
Portion 2 of Farm Number 162, Lettas Kraal. Declared in Gov gazette 9190 on 13 Feb 2026			
Registration Division	Worcester	Owner Name	Bloutoring Plase CC
Diagram Deed	T15002/1953	Registration Number	2008/136666/23
Extent	2 068.2900 Hectares	Title Deed Number	T1922/1987
LPI Code	C08500000000016200002	Registration Date	1987/01/19
Portion 0 of Farm Number 163, Elands Hoek. Declared in Gov gazette 9190 on 13 Feb 2026			
Registration Division	Worcester	Owner Name	Bloutoring Plase CC
Diagram Deed	WOQ16-27/1881	Registration Number	2008/136666/23
Extent	798.0566 Hectares	Title Deed Number	T1922/1987
LPI Code	C08500000000016300000	Registration Date	1987/01/19
DORINGKLOOF KAROO PLAAS NATURE RESERVE			
Contact Shellie Roodt: Tel: 082 852 2005 (shellie.roodt@iwesco.co.za); Cherith Swanepoel Tel: 082 413 3249 (Cherith@iwesco.co.za)			
Portion 2 of Farm Number 20, Kruis Rivier. Declared in Gov gazette 9162 on 14 Nov 2025			
Registration Division	Montagu	Owner Name	Doringkloof Karoo Plaas PTY Ltd.
Diagram Deed	T1849/1946	Registration Number	202076871107
Extent	43.3433 Hectares	Title Deed Number	T31092/2021
LPI Code	C0500000000002000002	Registration Date	2021/06/28
Portion 5 of Farm Number 20, Kruis Rivier. Declared in Gov gazette 9162 on 14 Nov 2025			
Registration Division	Montagu	Owner Name	Doringkloof Karoo Plaas PTY Ltd.
Diagram Deed	T8717/1958	Registration Number	202076871107
Extent	165.8594 Hectares	Title Deed Number	T31092/2021
LPI Code	C0500000000002000005	Registration Date	2021/06/28
KRUISRIVIER NATURE RESERVE			
Contact Deon Roodt Tel: 082 573 4603 (deon@dfreng.co.za)			
Portion 3 (Remaining Extent) of Farm Number 20, Kruis Rivier. Declared in Gov gazette 9271 on 24 July 2026			
Registration Division	Montagu	Owner Name	Kruisrivier Game Lodge CC
Diagram Deed	T1850/1946	Registration Number	2002/056856/23
Extent	1 996.9563 Hectares	Title Deed Number	T80863/2002
LPI Code	C0500000000002000003	Registration Date	2002/09/25

MACHASEH NATURE RESERVE			
Contact Mitzi Knipe Tel: 083 312 7271 (makadasadventures@gmail.com)			
Portion 1 of Farm Number 17, Eilands Fontein. Declared in Gov gazette 9173 on 12 Dec 2025			
Registration Division	Montagu	Owner Name	Makadas Ondernemings PTY Ltd.
Diagram Deed	T17422/2019	Registration Number	201739551707
Extent	844.8371 Hectares	Title Deed Number	T17422/2019
LPI Code	C05000000000001700001	Registration Date	2019/05/03



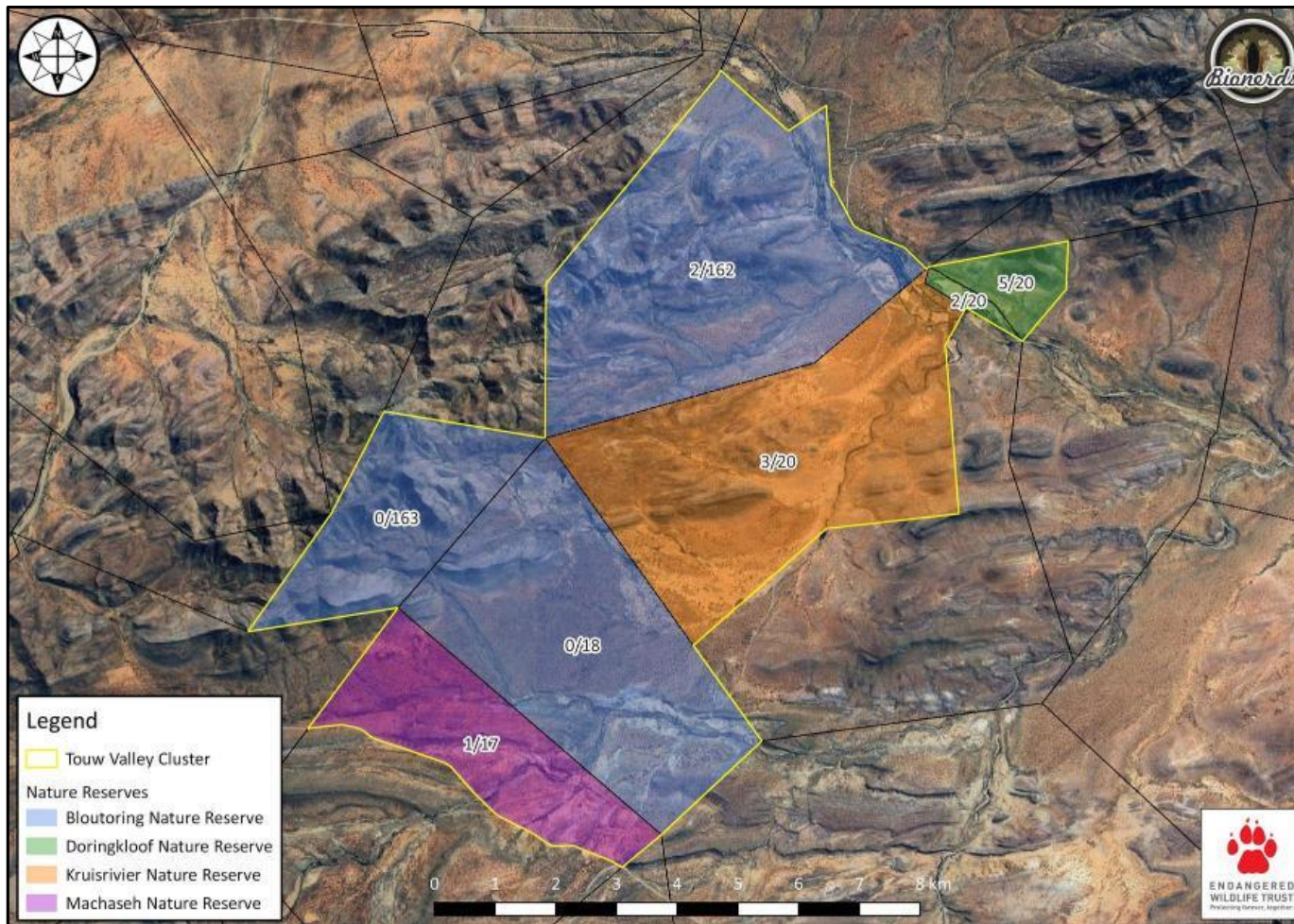


Figure 4 – The Nature Reserves and Farm Portions that comprise the Touw Valley Cluster

2.3 Administrative Structure

The Touw Valley Cluster comprises four Nature Reserves which are privately owned. Each private landowner is assigned as the Management Authority for the respective Nature Reserve. The Bloutoring Plase CC (2008/136666/23) is the management authority for the Bloutoring Nature Reserve (responsibility for management decisions), the Doringkloof Karoo Plaas PTY Ltd. (2020/768711/07) is the management authority for the Doringkloof Karoo Plaas Nature Reserve (responsibility for management decisions), the Kruisrivier Game Lodge CC (2002/056856/23) is the management authority for the Kruisrivier Nature Reserve (responsibility for management decisions), and the Makadas Ondernemings PTY Ltd. (2017/395517/07) is the management authority for the Machaseh Nature Reserve (responsibility for management decisions). The Management Authority is delegated by the Minister of Local Government, Environmental Affairs and Development Planning and empowered in terms of the NEMPA to make administrative and management decisions on the Nature Reserves.

The Management Authority's responsibilities include managing the respective Nature Reserves within the overarching Touw Valley Cluster Management Plan to ensure the purposes of each of the Protected Areas are maintained, making informed decisions regarding management actions according to the PAMP, making necessary internal rules to govern the management of the Protected Area and producing an Annual Plan of Operations and Protected Area review.

2.4 Key Attributes

The values of a nature reserve are those remarkable attributes that led to it being identified as a priority for conservation and protected area expansion. The values are important in conservation planning and natural resource management, as they are the aspects of the nature reserve that must be protected.

The Protected Area Management Agreements, concluded between the landowners of the respective nature reserves and CapeNature, identify the specific values that have been considered when identifying the areas as worthy of being declared a Nature Reserve, as per Section 23(2) of the NEMPA. The declaration may only be issued to protect the areas if they have significant natural features or biodiversity; are of scientific, cultural, historical, or archaeological interest; need long-term protection for the maintenance of biodiversity or provision of ecosystem services; provide for a sustainable flow of natural products and services; enable the continuation of traditional consumptive uses; and provide for nature-based recreation and tourism opportunities.

The values of the Nature Reserves comprising the Touw Valley Cluster include natural, ecosystem service, cultural and socio-economic values and are given in Table 2 below. All four reserves are declared under Section 23(1)(b) of the National Environmental management: Protected Areas Act (Act 57 of 2003) for the protection of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes in a system of protected areas

Table 2 - The values of the Nature Reserves comprising the Touw Valley Cluster.

Natural Values	a. Landscape Connectivity – the properties border directly on the Anysberg World Heritage Site and Nature Reserve Complex, thereby providing an extension of the Anysberg World Heritage Site and Nature Reserve and creating a larger contiguous formally protected area. b. Ecosystem Conservation – several SA Veg Map (2018) ecosystems are represented across the properties, namely Klein Karoo Quartz Vygiveld, Western Klein Karoo, Matjiesfontein Shale Renosterveld, and Matjiesfontein Quartzite Fynbos. c. Rare and Threatened Species - numerous rare, threatened, and endemic species assemblages are conserved on the properties. The Critically Endangered Riverine Rabbit, <i>Bunolagus monticularis</i>, has been recorded on the properties which therefore provide important habitat connectivity at a landscape level for this species. d. Biodiversity Pattern – the properties contribute to the protection of an ecologically viable area representative of South Africa's biological diversity and natural landscapes with the ecological integrity and biodiversity conserved. e. Falls within an area where three globally recognised. f. Biodiversity hotspots converge (Fynbos, Maputoland Tongoland-Albany Subtropical Thicket, Succulent Karoo). g. Forms part of a larger protected area network.
Ecosystem Service Values	a) Purification and Detoxification – filtration, purification and detoxification of air, water, and soils. Part of an important water catchment area, contributing to improved water flow regulation, infiltration, quality and quantity. b) Cycling Processes – nutrient cycling, nitrogen fixation, carbon sequestration, soil formation. c) Regulation and Stabilisation – erosion control, rainfall and water supply, climate regulation, mitigation of storms and floods. d) Habitat Provision and Pollination Services – a refuge for animals and plants, a storehouse for genetic material is provided. e) Provision of scenic landscapes and solitude for tourism.

Cultural Values	The properties contribute to human, social, cultural, and spiritual development with the representation of ecological, cultural, historical, archaeological, and paleontological values. Richness in archaeological and marine palaeontological sites.
Socio-Economic Values	The properties contribute to the local economy in the form of job creation through the creation of a nature-based tourism destination as well as creating opportunities through the implementation of natural resource management interventions.

2.5 Environmental Sensitivity

The National Screening Tool of the Department of Environmental Affairs (DEA) highlights environmental sensitivities for specific sites that should be investigated in the event of any development application. While no development application has been made for the site, the data provide a starting point for further biodiversity data sampling. A screening report to determine the environmental sensitivity for the Nature Reserves comprising the Touw Valley Cluster was generated on the 3rd of September 2023. The environmental screening results and assessment outcomes are given in Table 3 below.



Table 3 - Environmental sensitivity screening results for the Touw Valley Cluster.

Theme	Sensitivity	Feature
Agriculture	Very High	Predominantly moderate to low land capability, with very high agricultural sensitivity applied for potential horticulture and pivot irrigation along major riparian systems.
Animal Species	High	Numerous sensitive species (mammal, reptile, avifaunal and invertebrate) are highlighted: Riverine Rabbit, <i>Bunolagus monticularis</i> , CR; Karoo Dwarf Tortoise, <i>Chersobius boulengeri</i> , EN; Martial Eagle, <i>Polemaetus bellicosus</i> , EN; Ludwig's Bustard, <i>Neotis ludwigii</i> , EN; Secretarybird, <i>Sagittarius serpentarius</i> , VU; Southern Black Korhaan, <i>Afrotis afra</i> , VU; Verreaux's Eagle, <i>Aquila verreauxii</i> VU; Caledon Russet, <i>Aloeides caledoni</i> , Rare.
Aquatic Biodiversity	Very High	Aquatic Critical Biodiversity Areas, Ecological Support Areas, BAs, Rivers, Wetlands and Seeps are represented.
Archaeological and Cultural Heritage	Low	Low archaeological and cultural heritage sensitivity.
Bat Sensitivity	High	High bat sensitivities are represented on site and include the location of large bat roosts within 20 to 50 kilometers of the properties as well as important river and wetland habitats.
Paleontology Sensitivity	Very High	Features with very high paleontology sensitivity are represented.
Plant Species	Medium	Numerous sensitive species recorded: <i>Adromischus mammillaris</i> EN, <i>Amphithalea spinosa</i> VU, <i>Asparagus mollis</i> VU, <i>Brunsvigia josephinae</i> VU, <i>Calobota elongata</i> VU, <i>Crassula congesta</i> subsp. <i>laticephala</i> Rare, <i>Diosma passerinoides</i> VU, <i>Drosanthemum giffenii</i> VU, <i>Drosanthemum lavisii</i> EN, <i>Erica glandulipila</i> Endemic, <i>Eriocephalus grandiflorus</i> Rare, <i>Euphorbia pseudoglobosa</i> VU, <i>Gibbaeum nebrownii</i> CR, <i>Heliophila elata</i> VU, <i>Ixia parva</i> VU, <i>Lotononis argentea</i> VU, <i>Lotononis comptonii</i> EN, <i>Lotononis gracillifolia</i> EN, <i>Lotononis rigida</i> VU, <i>Muraltia karroica</i> VU, <i>Octopoma nanum</i> VU, <i>Octopoma octojuge</i> VU, <i>Octopoma quadresepalum</i> VU, <i>Oedera resinifera</i> Rare, <i>Ornithogalum perpavum</i> VU, <i>Pelargonium fergusoniae</i> EN, <i>Phyllica comptonii</i> Endemic, <i>Protea convexa</i> CR, <i>Restio aridus</i> VU, <i>Restio esterhuyseniae</i> Rare, <i>Trichodiadema burgeri</i> VU, <i>Tritonia securigera</i> subsp. <i>watermeyeri</i> Rare.
Terrestrial Biodiversity	Very High	Critical Biodiversity Areas and Ecological Support Areas are represented on site. The area is included in the Cape Floral Region of Protected Areas and borders directly on the Anysberg Nature Reserve Complex.

2.6 Management Challenges and Opportunities

Identifying management challenges and opportunities is crucial for the Management Authority of a Nature Reserve as it directly influences the effective conservation and sustainability of protected areas. By recognizing challenges such as habitat degradation or alien vegetation, targeted strategies to mitigate these threats can be implemented. Simultaneously, identifying opportunities, such as potential collaborations with conservation partners, allows for the enhancement of conservation efforts and the overall resilience of the reserve. A proactive approach to management challenges ensures the preservation of biodiversity, ecosystem structure and function, and the delivery of ecosystem services. Additionally, staying attuned to opportunities enables the manager to optimize resource allocation and foster positive relationships with stakeholders, contributing to the long-term success of the Nature Reserve. In essence, a keen awareness of both challenges and opportunities is fundamental for effective and adaptive management in the dynamic context of protected areas.

A summary of the key natural resource management challenges and opportunities which will be addressed in detail in Operational Management Framework section of this Protected Area Management Plan are highlighted in Table 4.

Table 4 - Management challenges and opportunities for the Touw Valley Cluster.

Key Performance Area: Biodiversity and Ecological Components	
Management Objective	Challenges and Opportunities
Fire Management	<i>Opportunity:</i> Fire prone ecosystems will respond positively to fire disturbance as long as the ecological principles of fire regime, frequency and intensity are adhered to. Adopting a natural fire regime will increase biodiversity patterns and promote a mosaic of veld ages and a diversity in ecosystem structure and function. <i>Challenge:</i> Historical land use practices that have degraded habitat should be excluded from a natural fire regime as these systems are in a state of rehabilitation, a process which should be facilitated and not adversely affected.
Alien Vegetation Management	<i>Opportunity:</i> The extent of invasive alien plants is low and predominantly limited to old agricultural lands around riparian habitat and/or old grazing camps. Mechanical clearing and follow-up operations will ensure that invasive plants are kept in a maintenance phase. <i>Challenge:</i> As invasive alien plants are largely limited to old agricultural lands it is necessary to couple mechanical clearing with rehabilitation measures to ensure that soil surface capping and accelerated soil erosion is prevented.

Key Performance Area: Biodiversity and Ecological Components (Continued)	
Management Objective	Challenges and Opportunities
Soil Erosion Prevention and Control	<i>Opportunity:</i> Soil conservation is a critical objective in dryland habitat where historical overgrazing combined with flash flooding can lead to serious soil erosion and associated habitat degradation. However, the causal factors of soil erosion can be determined and adaptive management principles implemented thereby ensuring that management practices that promote accelerated soil loss are halted and reversed timeously. <i>Challenge:</i> Soil erosion on the Touw Valley Cluster, while not extensive, has the opportunity to be the greatest threat to ecological resilience. Soil erosion prevention and control on sheet erosion sites, and the stabilisation of gully erosion sites is a time consuming and very expensive management practice.
Terrestrial Habitat Management	<i>Opportunity:</i> A fine-scale understanding of the plant communities on the Touw Valley Cluster will highlight the diversity of flora and the distribution of threatened species across the reserve, which should form the basis for management interventions. Monitoring of plant community health will indicate when thresholds of potential concern are in danger of being triggered allowing for adaptive management principles to be applied. <i>Challenge:</i> While vegetation maps are in place for the region, there are no fine-scale plant community maps which have been developed for the Touw Valley Cluster. Developing a plant community map may be a time consuming, and potentially expensive, management intervention.
Wildlife Management	<i>Opportunity:</i> Wildlife populations on the Touw Valley Cluster are low and should allow for the rehabilitation of ecosystems from historical overgrazing to continue without promoting habitat degradation. Working with CapeNature in managing dispersing Cape Mountain Zebra (CMZ) or Hartmann's Mountain Zebra that is observed on the stewardship cluster to ensure collaboration and the implementation of the CMZ BMP. <i>Challenge:</i> The movement of wildlife in response to seasonal patterns and drought is limited in the modern world. Associated impact on habitat quality is therefore a critical concern, especially where wildlife numbers are artificially maintained with supplementary feeding during drought, which will promote habitat degradation and should be actively avoided. Alternative mechanisms of controlling animal numbers during drought should be investigated and implemented to ensure that thresholds of potential concern are not triggered.
Biodiversity Security	<i>Opportunity:</i> Access control of road networks with CCV monitoring is in place and will mitigate the threat of poaching. <i>Challenge:</i> A regional security plan that promotes further road access restrictions and increased security monitoring must be implemented to further mitigate poaching threat. The poaching of floral species is a constant threat in the region, and biodiversity security is an expensive management intervention.
Species of Conservation Concern	<i>Opportunity:</i> Species of Conservation Concern across the Touw Valley Cluster highlight the importance of the area for biodiversity conservation and will provide opportunities to fundraise and secure the long-term viability and resilience of threatened, rare and endemic species. <i>Challenge:</i> Monitoring protocols must be developed for all threatened, rare and endemic species designated as Species of Conservation Concern. Monitoring should prioritise the determination of thresholds of potential concern that ensure management interventions are implemented prior to irreversible impact.

Baseline Data Collection and Monitoring	<i>Opportunity:</i> Floral and faunal, especially invertebrate, species diversity is the reason for the inclusion of the Succulent Karoo biome as a global biodiversity hotspot. Biodiversity surveys (baseline and targeted) and the compilation of a floral and faunal database will highlight the value provided by the Touw Valley Cluster in the conservation of threatened, rare and endemic species. <i>Challenge:</i> The ongoing ecological surveying and monitoring of floral and faunal biodiversity is time intensive and require specialist knowledge and input which will require support from conservation partners.
Research and Management Knowledge	<i>Opportunity:</i> The diversity of threatened, rare and endemic species, as well as management interventions in a global biodiversity hotspot, provide opportunities for the Touw Valley Cluster to contribute the provincial, national and international body of conservation management knowledge. <i>Challenge:</i> Research projects should be implemented to inform and revise management objectives of the reserves which will require the establishment of relationships with academic institutions.
Key Performance Area: Management Effectiveness and Sustainability	
Management Objective	Challenges and Opportunities
Formal Proclamation as a S23 Nature Reserve	<i>Opportunity:</i> The proclamation of the Nature Reserves comprising the Touw Valley Cluster as a Section 23 Nature Reserves in terms of the National Environmental Management: Protected Areas Act provides the highest level of protection available in South African environmental legislation. The status of the reserve is internationally recognized and contributes towards national nature conservation commitments on international treaties. <i>Challenge:</i> The formal proclamation process is a time-consuming and expensive process.
Management Infrastructure and Equipment	<i>Opportunity:</i> Management infrastructure and equipment facilitate the achievement of conservation targets and objectives across the Touw Valley Cluster. <i>Challenge:</i> Infrastructure and equipment can be very expensive and will depreciate with time.
Responsible Tourism	<i>Opportunity:</i> Nature-based tourism provides opportunities for job creation in impoverished rural communities, as well as promoting the conservation of threatened, rare and endemic species and nature conservation as a viable alternative to agricultural development. <i>Challenge:</i> Nature-based tourism should never supersede the primary nature conservation vision and mission of the organization, where decisions are made at the expense of ecosystem structure and function.
Legal Compliance	<i>Opportunity:</i> Compliance with national and provincial legislation ensures that potential legal action or expensive administrative notices are avoided. <i>Challenge:</i> Compliance with national and provincial legislation may be restrictive and expensive when emergency management interventions are required.

Zonation	<i>Opportunity:</i> Zonation provides a blueprint for meeting the vision and mission for the Nature Reserves comprising the Touw Valley Cluster by spatially capturing the management recommendations and guidelines across the reserve. The monitoring of implemented management interventions will allow for an audit of rehabilitation success and a benchmark for assessing the improvement of habitat quality. <i>Challenge:</i> Adequately capturing habitat quality and assigning spatial zones is a specialist process which is time consuming and requires the development of a Past, Present and Future plan for the Touw Valley Cluster.
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2.7 Ecological Context

2.7.1 Climate and Weather

The Touw Valley Cluster is situated in the region which has a bimodal rainfall, which is transitional between the summer and winter rainfall regions. Snowfall may occur in July, August and occasionally September, while mist may occur on the high-altitude peaks throughout the year. The prevailing winds are north-westerly, with occasional south-easters. Rain mostly follows south-westerly cold fronts. Berg winds occur in winter signalling the approach of cold fronts.

To adequately capture climatic data on the Touw Valley Cluster with respect to long-term rainfall and temperature data, upland and lowland climate data points were created in GIS spatial software for each Nature Reserve (Figure 4), where upland data points were categorised as above 800 meters above sea level (masl), while lowland data points were lower in elevation than 800 masl. The data points were imported into Cape Farm Mapper version 2.5 (<https://gis.elsenburg.com/apps/cfm/>) and average monthly temperatures, maximum monthly temperatures, minimum monthly temperatures, and median monthly rainfall values were plotted for each point. All variables are from long term climatic data collected by the SA Atlas of Climatology and Agrohydrology between 1950 and 2000. The data collated for each point is given as Table 5.

The climatic data for each point was separated to capture seasonal, summer (October through March) and winter (April through September) variation across upland and lowland sites (Table 6). The data indicated marginal variation in average temperatures between upland and lowland sites. The average temperatures were collated for all sites to calculate average, minimum and maximum temperatures and then averaged for the entire Touw Valley Cluster (Figure 5). The data indicates that the coldest month of the year is July with an average minimum of 2.5°, an average maximum of 16.1°, and an average of 9.3°C. The hottest month of the year is January with an average minimum of 13.7°, an average maximum of 28.0°, and an average of 20.8°C.

Median rainfall data indicates that while there is minimal variation between winter and summer seasonal rainfall, there is a slight winter rainfall peak across higher elevations, while summer rainfall in the lowlands reaches its peak in December (Table 6). Median rainfall calculated as a percentage indicates that seasonal rainfall variation peaks in winter (60%) with an average of 101.3 mm, while summer (40%) is slightly drier with an average of 68.2 mm. The annual median rainfall across the Touw Valley Cluster is 169.5 mm, with the wettest month of the year in June, recording an average of 21 mm, while summer rainfall reaches its peak in December, with an average of 18.7 mm being recorded (Figure 5).

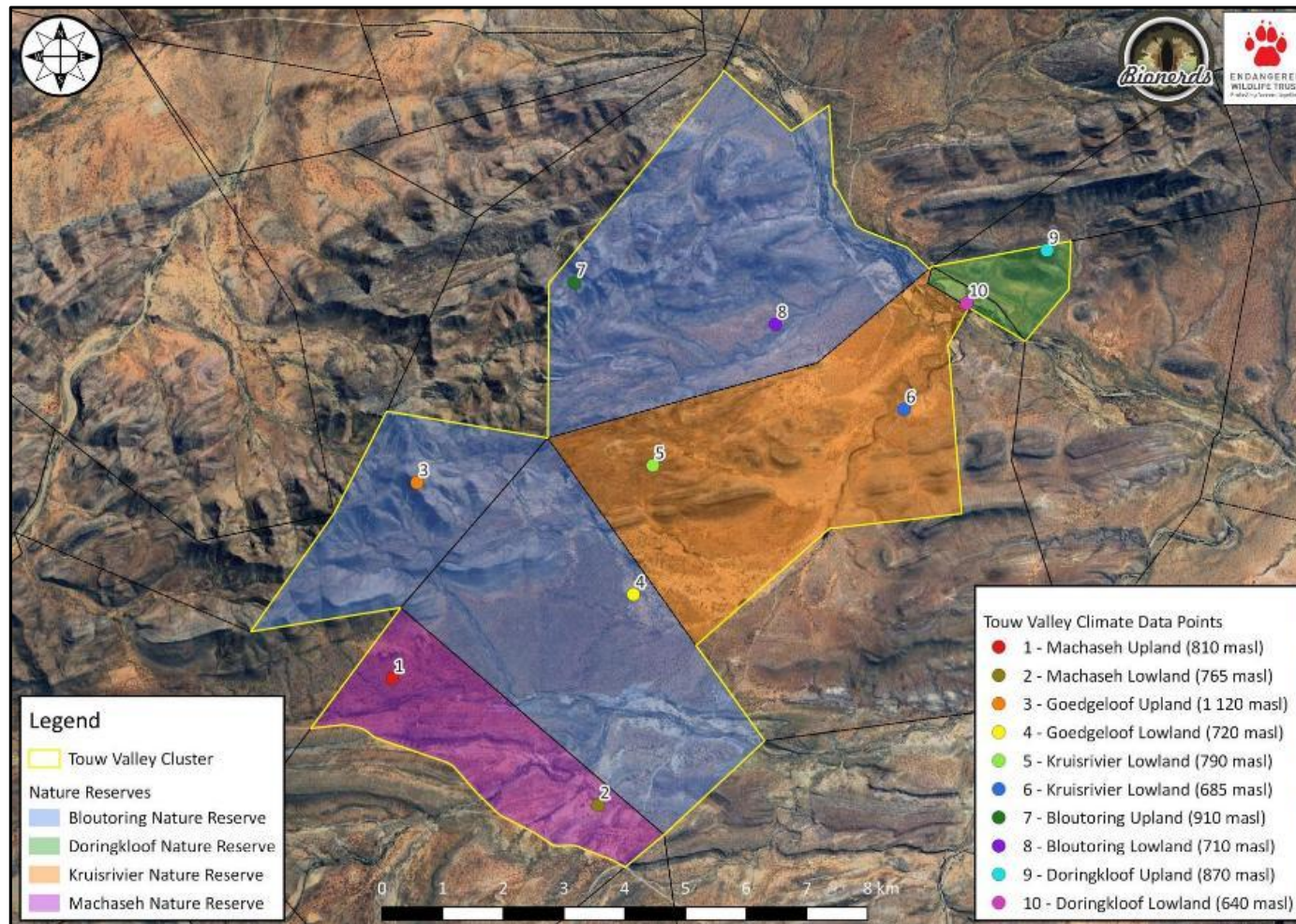


Figure 5 – Climate data points generated for the Touw Valley Cluster

Table 5 - Climatic data captured for the data points generated for the Touw Valley Cluster.

Month	1. Machaseh Upland (810 masl)				2. Machaseh Lowland (765 masl)				3. Goedgeloof Upland (1120 masl)				4. Goedgeloof Lowland (720 masl)				5. Kruisrivier Lowland (790 masl)			
	Ave Temp	Max Temp	Min Temp	Rainfall	Ave Temp	Max Temp	Min Temp	Rainfall	Ave Temp	Max Temp	Min Temp	Rainfall	Ave Temp	Max Temp	Min Temp	Rainfall	Ave Temp	Max Temp	Min Temp	Rainfall
January	20.5	27.6	13.4	3	20.5	27.5	13.5	2	20.5	27.7	13.4	3	20.9	28.1	13.7	3	20.9	28.1	13.7	3
February	20.0	26.8	13.3	6	20.1	26.7	13.5	7	20.1	26.9	13.3	7	20.5	27.4	13.7	7	20.5	27.4	16.6	7
March	18.3	24.8	11.9	10	18.4	24.8	12.1	9	18.4	24.9	11.8	12	18.8	25.4	12.2	10	18.8	25.4	12.2	11
April	14.8	21.1	8.5	11	14.9	21.1	8.6	9	14.9	21.2	8.5	13	15.2	21.7	8.8	11	15.2	21.7	8.8	11
May	11.9	18.5	5.4	18	12.1	18.6	5.6	17	11.9	18.5	5.4	21	12.3	18.9	5.7	19	12.3	18.9	5.7	20
June	9.7	16.3	3.2	17	9.9	16.5	3.3	15	9.7	16.3	3.2	23	10.1	16.8	3.4	18	10.0	16.7	3.4	21
July	9.0	15.7	2.2	16	9.1	15.9	2.4	13	9.0	15.7	2.2	20	9.3	16.1	2.5	16	9.3	16.1	2.5	17
August	9.6	16.2	3.1	17	9.8	16.3	3.3	15	9.6	16.2	3.1	20	10.0	16.7	3.4	17	10.0	16.6	3.4	18
September	11.7	18.3	5.1	11	11.8	18.3	5.2	11	11.7	18.3	5.1	13	12.1	18.8	5.4	11	12.0	18.7	5.4	12
October	14.4	21.2	7.6	14	14.1	21.1	7.8	13	14.4	21.3	7.5	15	14.8	21.7	7.9	14	14.7	21.6	7.9	14
November	17.2	24.1	10.3	13	17.2	24.0	10.4	14	17.2	24.2	10.3	14	17.6	24.6	10.6	14	17.5	24.6	10.6	14
December	19.3	26.3	12.2	16	19.3	26.3	12.3	23	19.3	26.4	12.2	18	19.6	26.9	12.5	20	19.6	26.8	12.4	19
Month	6. Kruisriver Lowland (685 masl)				7. Bloutoring Upland (910 masl)				8. Bloutoring Lowland (710 masl)				9. Doringkloof Upland (870 masl)				10. Doringkloof Lowland (640 masl)			
	Ave Temp	Max Temp	Min Temp	Rainfall	Ave Temp	Max Temp	Min Temp	Rainfall	Ave Temp	Max Temp	Min Temp	Rainfall	Ave Temp	Max Temp	Min Temp	Rainfall	Ave Temp	Max Temp	Min Temp	Rainfall
January	21.1	28.3	13.8	3	20.7	27.9	13.5	3	21.1	28.4	13.8	3	21.1	28.4	13.9	3	21.1	28.4	13.9	3
February	20.7	27.6	13.8	7	20.3	27.2	13.4	7	20.7	27.7	13.8	7	20.8	27.7	13.8	9	20.8	27.7	13.8	9
March	19.0	25.6	12.4	11	18.6	25.2	12.0	13	19.0	25.7	12.3	11	19.1	25.8	12.4	14	19.1	25.8	12.4	12
April	15.4	21.9	8.9	11	15.0	21.5	8.6	13	15.5	22.0	9.0	11	15.5	22.0	9.0	14	15.5	22.0	9.0	12
May	12.5	19.1	5.8	19	12.1	18.7	5.5	23	12.4	19.1	5.8	21	12.5	19.2	5.9	25	12.5	19.2	5.9	21
June	10.2	17.0	3.5	20	9.9	16.5	3.3	26	10.2	16.9	3.5	22	10.3	17.0	3.6	27	10.3	17.0	3.6	21
July	9.5	16.3	2.7	16	9.1	15.9	2.4	22	9.5	16.3	2.6	18	9.5	16.4	2.7	22	9.5	16.4	2.7	18
August	10.2	16.9	3.6	17	9.8	16.4	3.2	21	10.2	16.8	3.5	19	10.2	16.9	3.6	22	10.3	16.9	3.6	18
September	12.2	19.0	5.5	12	11.9	18.5	5.2	13	12.3	19.0	5.5	12	12.3	19.1	5.6	14	12.3	19.1	5.6	12
October	14.9	21.9	8.1	14	14.6	21.5	7.7	15	14.9	21.9	8.1	14	15.0	21.9	8.1	16	15.0	21.9	8.1	14
November	17.8	24.8	10.8	13	17.4	24.4	10.4	14	17.8	24.9	10.7	13	17.8	24.9	10.8	14	17.8	24.9	10.8	14
December	19.8	27.1	12.6	20	19.5	26.7	12.3	16	19.8	27.1	12.6	18	19.9	27.2	12.6	19	19.9	27.2	12.6	18

Table 6 - Consolidated seasonal climatic data for the data points generated for the Touw Valley Cluster.

Site	Temp (°C)	Max (°C)	Min (°C)	Rainfall (mm)	Temp (°C)	Max (°C)	Min (°C)	Rainfall (mm)	Annual Rainfall (mm)	Winter	Summer
1. Machaseh Upland	11.1	17.7	4.6	90	18.3	25.1	11.5	62	152	59	41
2. Machaseh Lowland	11.3	17.8	4.7	80	18.3	25.1	11.6	68	148	54	46
3. Goedgeloof Upland	11.1	17.7	4.6	110	18.3	25.2	11.4	69	179	61	39
4. Goedgeloof Lowland	11.5	18.2	4.9	92	18.7	25.7	11.8	68	160	58	43
5. Kruisrivier Lowland	11.5	18.1	4.9	99	18.7	25.7	12.2	68	167	59	41
6. Kruisrivier Lowland	11.7	18.4	5.0	95	18.9	25.9	11.9	68	163	58	42
7. Bloutoring Upland	11.3	17.9	4.7	118	18.5	25.5	11.6	68	186	63	37
8. Bloutoring Lowland	11.7	18.4	5.0	103	18.9	26.0	11.9	66	169	61	39
9. Doringkloof Upland	11.7	18.4	5.1	124	19.0	26.0	11.9	75	199	62	38
10. Doringkloof Lowland	11.7	18.4	5.1	102	19.0	24.3	11.9	70	172	59	41

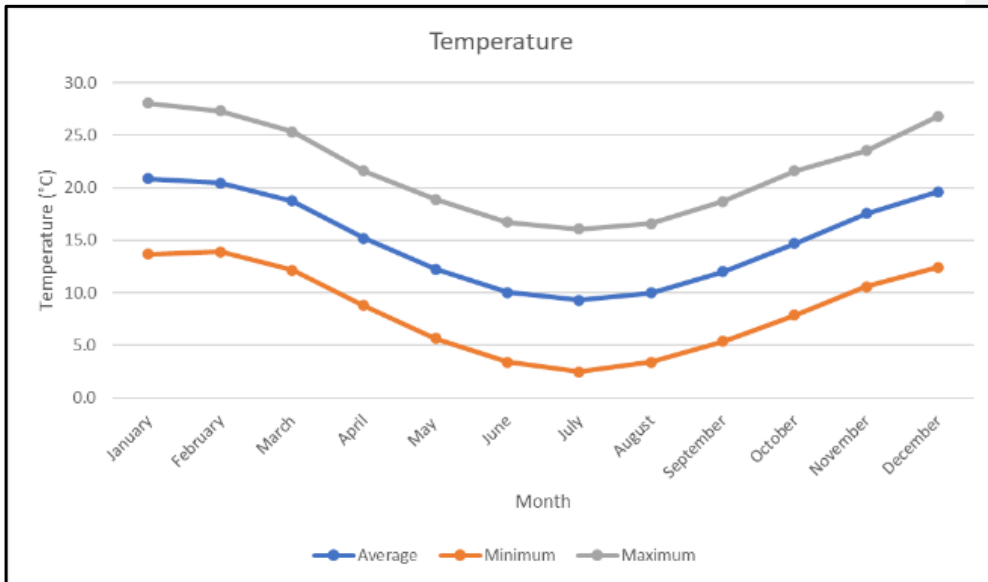


Figure 6 – Consolidated average monthly temperature data for the Touw Valley Cluster

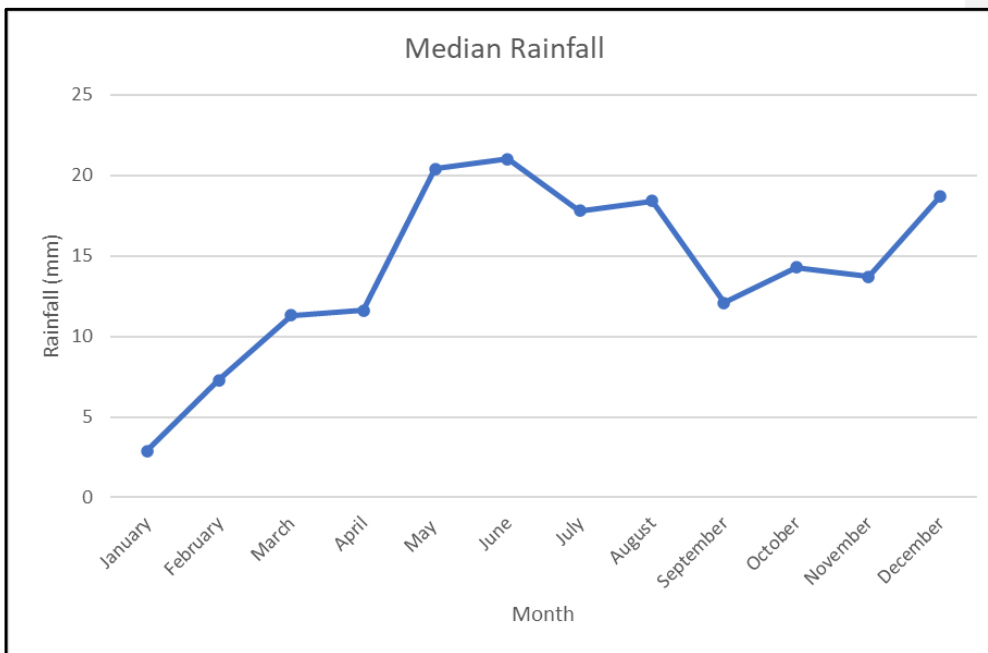


Figure 7 – Consolidated median monthly rainfall data for the Touw Valley Cluster

2.7.2 Geology and Soils

The Klein Karoo consists of a mosaic of rock strata that are dominated by the Table Mountain Group, a group of rock formations within the Cape Supergroup, in the higher reaches and by the Witteberg Group (quartzite and shale) and Bokkeveld Group (shale, siltstone and sandstone) in the low-lying areas. The Table Mountain Sandstone is made up of predominantly quartzitic sandstone and is the hardest, and most erosion resistant layer of the Cape Supergroup, therefore forming most of the highest and most conspicuous peaks in the Western Cape. The low hills and valleys are typically sandstones and mudrocks of the Bokkeveld Group, or the Witteberg Group. These formations weather to form soils that are generally darker, finer, and more nutrient rich than the soils of the Table Mountain Group, which breaks down to form acidic sands that are poor in phosphates, potassium, and other minerals.

South Africa implemented a land type survey (1972 – 2006) which produced a 1:250 000 scale map for the country and divided homogeneous parcels of land in terms of terrain, climate, and soil distribution patterns, described as land types. The Touw Valley Cluster has high variability with respect to land types with six represented across all of the nature reserves. The variability in land types on the Touw Valley Cluster is illustrated in Figure 8 below.

The northeastern portions of the Touw Valley Cluster are dominated by the rugged mountains of Bloutoring, which consists of Land Type Ic52. This land type consists of mainly quartzitic sandstone, shale, siltstone and sandstone of the Witteberg Group as well as quartzitic sandstone, shale, siltstone, mudstone, and sandstone of the Bokkeveld Group. The geology in this land type shows great variation of stages of weathering. The soil-rock complex comprises rock with little to no soil. The soils are predominantly of the Mispah soil formation and have moderate erodibility factors (0.31).

The high-lying northwestern section of the reserve is dominated by the mountains of Doringkloof Karoo Plaas, which consists of Land Type Ic34. This land type is comprised of mainly quartzitic sandstone, shale, and siltstone of the Witteberg Group. The soil-rock complex comprises rock with little to no soils. The soils consist of predominantly the Mispah, Paardeberg and Glenrosa soil formations, and have moderate erodibility factors (0.41).

The rugged hills that comprise the eastern extent of the Touw Valley Cluster on Kruisrivier consists of Land Type Ib76. This land type consists of mainly quartzitic sandstone, shale, and siltstone of the Witteberg Group with soils of limited development, primarily shallow on hard, slow weathering rock. The soil formations consist of predominantly the Kanonkop, Mispah and Lekfontein soil formations, with a depth of less than 450 mm and a clay content of less than 15%. The soils have a high erodibility factor (0.54).

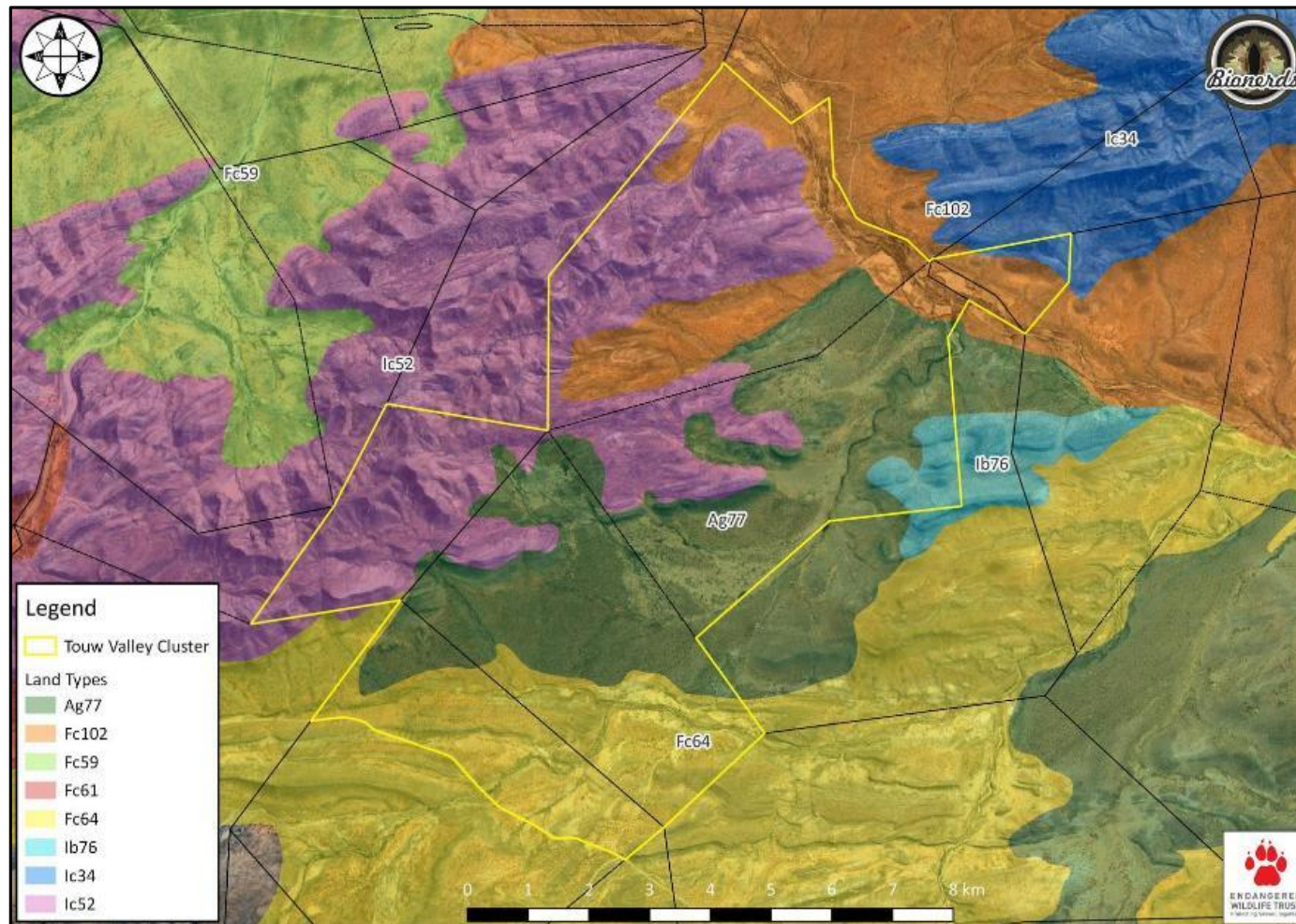


Figure 8 – Land Type distribution across the Touw Valley Cluster

The southern portion of the Touw Valley Cluster consists of the rolling hills of Machaseh which consists of Land Type Fc64. This land type which consists of shale, siltstone, mudstone, and sandstone of the Bokkeveld Group with soils of limited development, primarily shallow on hard, slow weathering rock. Soils formations are typically Glenrosa and/or Mispah forms (other soils may occur) with lime generally present in the entire landscape. The soils have minimal development, usually shallow on hard or weathering rock, with or without intermittent diverse soils. Soil depth is typically less than 450mm with a clay content less than 15% and a high erodibility factor (0.58).

The central plains of the Touw Valley Cluster are dominated by Land Type Ag77 which consists of alluvial and aeolian deposits covering shale, sandstone, siltstone, and mudstone of the Bokkeveld Group. Soil formations are typically Mispah forms with soil depth of less than 450mm with a clay content less than 15% and a high erodibility factor (0.59).

The riparian flats that bisect the northern section of the Touw Valley Cluster from west to east across the Bloutoring Siding and Doringkloof consist of Land Type Fc102. This land type consists of shale, sandstone, siltstone, and mudstone of the Bokkeveld Group. Largely covered by alluvial and colluvial deposits. Soil formations are typically Mispah forms (other soils may occur) and have minimal development, usually shallow on hard or weathering rock. Soil depth is typically less than 450mm with a clay content less than 15%. These soils have a high erodibility factor (0.58). The Land Type memoirs for all land types on the Touw Valley Cluster are shown in Addendums 2 through 7.

2.7.3 Topography and Hydrology

The Touw Valley Cluster is typical of the Klein Karoo region where steep, rugged mountains surround open plains with rolling hills. The eastern boundary of the cluster is dominated by mountainous terrain with the highest elevation on the Bloutoring peak (1280 masl). These peaks descend steeply towards the centre of the cluster, where open plains dominate. The lowest elevation on the reserve is on the north-western boundary where the Touwsrivier flows into the Anysberg World Heritage Site and Nature Reserve, at 640 masl.

The Touw Valley Cluster falls entirely in the Gouritz River System, and the mountains in the east drain into the Skurwebergs and Hoeksleegte Rivers. The Skurweberg is a tributary of the Doring River, which flows into the Kruis River, itself a tributary of the Touws River. The Hoeksleegte River is a tributary of the Touws, which flows from west to east in the northern section of the cluster. All rivers on the Touw Valley Cluster are non-perennial. Three rivers, the Touws, Doring and Kruis, are listed as National Freshwater Ecosystem Priority Area (NFEPA) rivers.

The topography and hydrology of the Touw Valley Cluster is illustrated in Figure 9 below.

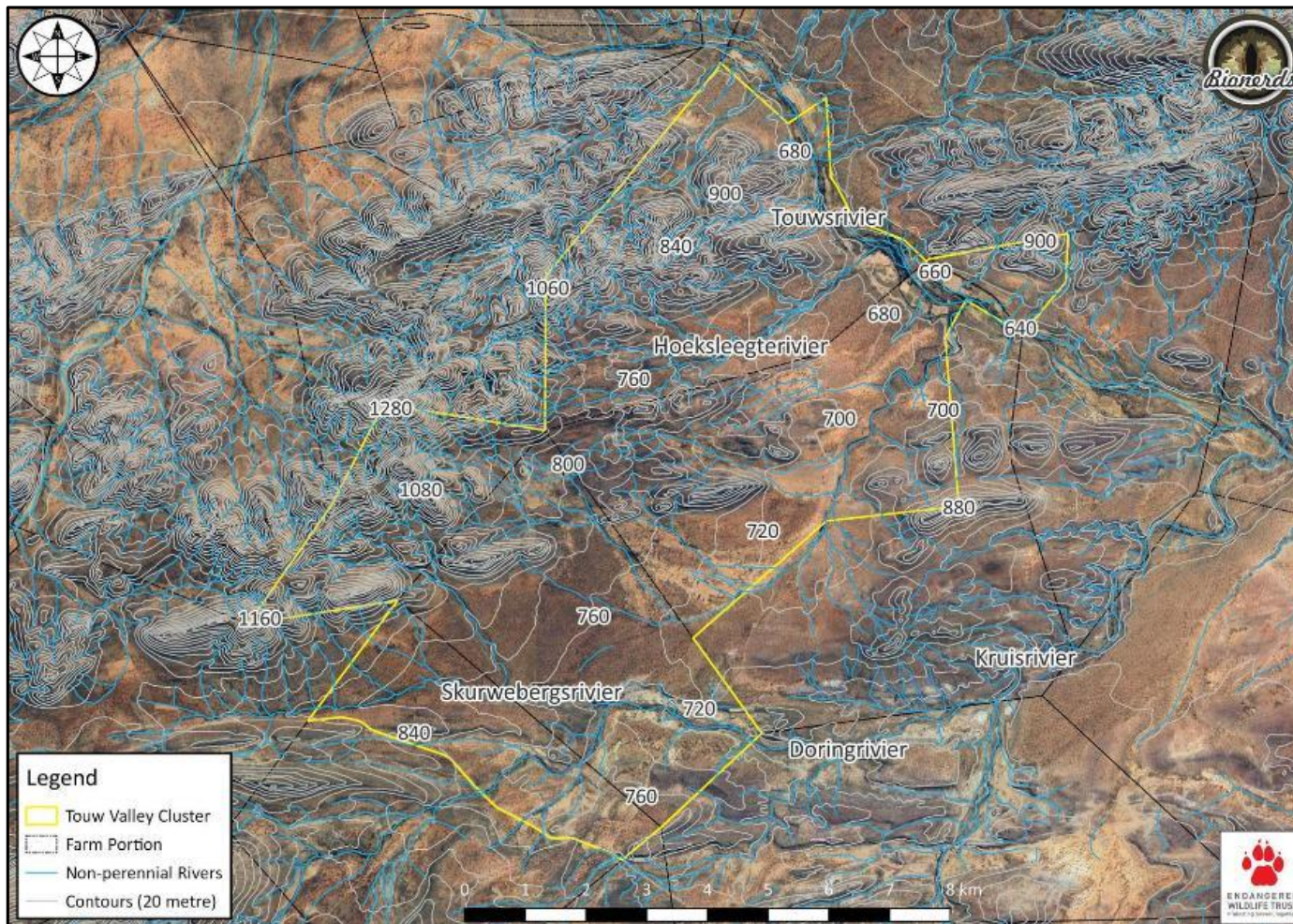


Figure 9 – The topography and hydrology of the Touw Valley Cluster

2.7.4 Vegetation

Vegetation composition is the natural result of a myriad of environmental parameters but is most easily categorised through the interplay between geological formations and climatic patterns. The geographical and climatic variability of the Klein Karoo ensures the unique vegetation characteristics of the region as four of the seven described South African biomes occur within the region's boundaries, namely Succulent Karoo, Fynbos, Forest, and Thicket biomes.

The Touw Valley Cluster has two biomes represented on the reserve, namely Succulent Karoo and Fynbos.

The Fynbos Biome is described as the Cape Floral Kingdom, the only plant kingdom in the world that occurs within the borders of a single country. The floristic region contains over 20 percent of all the African continent's plant species and supports a variety of endemic mammal, insect, reptile, and bird life. The Cape Floristic Region has been declared a Global Biodiversity Hotspot with over 9 000 plant species occurring in the region with more than 6 210 plant species described as endemic, thus having a 69% endemism.

The Succulent Karoo biome, which boasts the richest abundance of succulent flora on earth and is one of only two arid zones that have been declared a Biodiversity Hotspot. The biome is home to 6 356 plant species, 40% of which are endemic and 936 (17%) of which are listed as threatened. This biodiversity is due to massive speciation of an arid-adapted biota in response to unique climatic conditions and high environmental heterogeneity.

South African Vegetation Map

The South African Vegetation Map, revised in 2018, places four ecosystems on the Touw Valley Cluster, namely Matjiesfontein Shale Renosterveld, Matjiesfontein Quartzite Fynbos, Western Klein Karoo and Klein Karoo Quartz Vygieveld. The distribution of ecosystems on the Touw Valley Cluster is illustrated in Figure 10 below, and the descriptions from the Vegetation of South Africa, Lesotho and Swaziland are discussed below.

Matjiesfontein Shale Renosterveld

Matjiesfontein Shale Renosterveld (FRs6) occurs on low mountains, parallel hills and mid-altitude plateaus which support low, open to medium dense, leptophyllous shrubland with a matrix of short shrubs, dominated by renosterbos, *Dicerotheramnus rhinocerotis*, and heuweltjies at low densities. The distribution of the ecosystem is predominantly north of the Warmwaterberg and Anysberg Mountains,

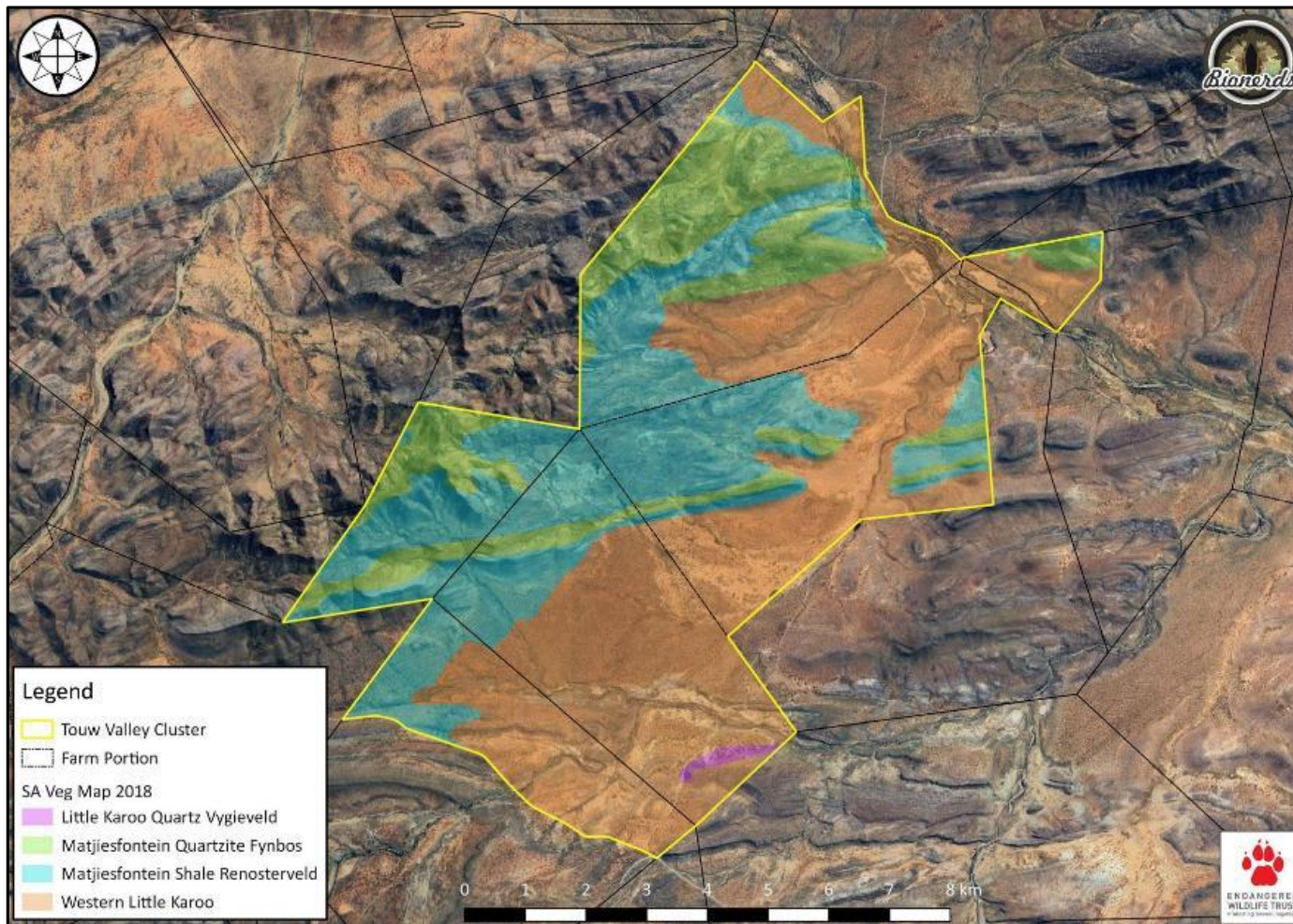


Figure 10 – The distribution of SA Veg Map (2018) ecosystems on the Touw Valley Cluster

and south of the Tanqua Karoo. At an altitude of 750 – 1 300 masl, the ecosystem typically surrounds the high elevation ridges which are dominated by the Matjiesfontein Quartzite Fynbos ecosystem. Mean annual precipitation (MAP) ranges from 150 – 470 mm, with a mean of 300 mm, and a slight peak in winter. Soils within Matjiesfontein Shale Renosterveld tend to be clays and loams derived from the Witteberg and Bokkeveld shales of the Cape Supergroup. Glenrosa and Mispah soil formations are the most common, while land types are classed within the Fc, Ic, Ib and Fb types.

Important taxa that occur in Matjiesfontein Quartzite Fynbos include *Dicerotheramnus rhinocerotis*, *Aspalathus alpestris*, *Asparagus capensis* var. *capensis*, *Athanasia flexuosa*, *Chrysocoma ciliata*, *C. oblongifolia*, *Eriocephalus ericoides* subsp. *ericoides*, *Euryops cuneatus*, *E. imbricatus*, *E. microphyllus*, *Helichrysum simulans*, *Oedera genistifolia*, *Passerina truncata* subsp. *truncata*, *Pteronia sordida*, *Antimima dasyphylla*, *Cotula macroglossa*, *Foveolina dichotoma*, *Lepidium desertorum*, *Rhynchopsidium sessiliflorum*, *Rumex lanceolatus*, *Ursinia nana*, *Chlorophytum lewisiae*, *Gethyllis campanulata*, *Romulea atrandra*, *R. sphaerocarpa*, *R. tortuosa*, *Trachyandra thyrsoides*, *Crassula lanceolata* subsp. *Lanceolata*, *Bromus pectinatus*, *Ehrharta calycina*, *E. capensis*, *E. delicatula*, *Hyparrhenia hirta*, *Hypodiscus sulcatus*, and *Pentaschistis rigidissima*. Endemic taxa include *Lotononis comptonii*, *Disa cochlearis*, *Hesperantha truncatula*, and *Romulea malaniae*.

The revised conservation status for Matjiesfontein Quartzite Fynbos is Least Concern. The conservation target for the ecosystem is 27%, with only 7% in total conserved in the Anysberg World Heritage Site and Nature Reserve and surrounding protected areas, which results in a status of Poorly Protected. Threats to the ecosystem include habitat transformation with some 9% of the original extent has already been transformed for cultivation; and habitat degradation caused primarily by invasive alien plants species such as rooikrans, *Acacia cyclops*. Soil erosion is variable across the distribution of the ecosystem but can be very high in places.

The South African National Biodiversity Institute (SANBI) has remarked that the Matjiesfontein Shale Renosterveld is a poorly studied vegetation unit, with more fynbos than karoo elements, and as such would benefit from further study.

Matjiesfontein Quartzite Fynbos

The Matjiesfontein Quartzite Fynbos (FFq3) ecosystem occurs on low flat mountains and parallel ridges in a west-east orientation. Apart from the Witteberg and Elandsberg mountains, this ecosystem consists of narrow, linear bands surrounded by Matjiesfontein Shale Fynbos and/or Succulent Karoo vegetation. The vegetation comprises medium dense, medium tall shrubland, structurally classified mainly as asteraceous and proteoid fynbos, although restioid fynbos is also present. The ecosystem is distributed in a complex of ridges and low mountains predominantly in the Klein Karoo from Saalberg in the west to Elandsberg in the east. This includes parts of the Bontberg, Voetpadsberg and

Koegaberge in the vicinity of Touws River, the Witteberg south of Matjiesfontein and many ridges between the Witteberg and Anysberg, and the higher ridges north of, and running parallel to, the Klein Swartberg. Matjiesfontein Quartzite Fynbos also occurs between the Ouberg Pass and Gatskraal (Mont Eco) west of Warmwaterberg and on hill summits around Ladismith. The ecosystem typically occurs on sandy and skeletal soils derived from Witteberg Group quartzites.

Important taxa that occur in Matjiesfontein Quartzite Fynbos include *Protea laurifolia*, *P. repens*, *Leucadendron pubescens*, *L. rubrum*, *Muraltia spinosa*, *Phylica buxifolia*, *Agathosma squamosa*, *Amphiglossa tomentosa*, *Diosma hirsuta*, *Dicerotheramnus rhinocerotis*, *Erica cerinthoides* var. *cerinthoides*, *E. plukenetii* subsp. *plukenetii*, *E. rigidula*, *Euryops erectus*, *E. oligoglossus* subsp. *oligoglossus*, *E. rehmannii*, *Leucadendron barkerae*, *L. cadens*, *L. salignum*, *L. teretifolium*, *Polygala myrtifolia*, *Protea canaliculata*, *P. lorifolia*, *P. pendula*, *P. revoluta*, *P. sulphurea*, *Stoebe plumosa*, *Vexatorella obtusata* subsp. *albomontana*, *Quaqua pillansii*, *Ischyrolepis capensis*, *Thamnochortus fruticosus*, and *Willdenowia incurvata*. Endemic species include *Leucadendron osbornei*, *Acmadenia argillophila*, *Aspalathus intricata* subsp. *anthospermoides*, *Chrysocoma acicularis*, *Erica mira*, *Globulariopsis montana*, *G. wittebergensis*, *Helichrysum archeri*, *Hermannia pillansii*, *Phylica retorta*, *Selago albomontana*, *Drosanthemum archeri*, *D. wittebergense*, *Ruschia altigena*, *Senecio wittebergensis*, *Albuca unifolia* var. *vestitum*, *Haworthia wittebergensis*, *Ischyrolepis esterhuyseniae* and *I. karoocica*.

The revised conservation status for Matjiesfontein Quartzite Fynbos is Least Concern. The conservation target for the ecosystem is 27% with portions formally protected in the Anysberg World Heritage Site and Nature Reserve (5%) and a further 3% in Vaalkloof Private Nature Reserve. Threats to the ecosystem include habitat transformation with some 15% of the original extent already transformed for cultivation.

The SANBI has indicated that the ecosystem requires detailed study, especially in the southern extent of the distribution at the Bellair Dam which has the lowest mean annual precipitation in the Klein Karoo basin and may well comprise a distinct ecosystem requiring formal description.

Western Klein Karoo

The Western Klein Karoo (SKv8) ecosystem occurs on flat or slightly undulating landscapes dominated by a mosaic of Karoo shrublands of low and medium height encompassing both non-succulent (*Chrysocoma*, *Pentzia*, *Pteronia*, *Rhigozum*, *Osteospermum*) as well as succulent (*Crassula*, *Euphorbia*, *Ruschia*, *Tylecodon*) shrubs. The ecosystem covers most of the western Klein Karoo basin and has a multimodal precipitation regime with major peaks in May and August and minor ones in March and November. The summer peak (December to January) is markedly drier giving a slight inclination of the local climate towards a winter-rainfall pattern. Mean annual precipitation of approximately 230 mm

indicates that the ecosystem can be considered semidesert. Western Klein Karoo occurs on sandstones and shales of the Devonian Bidouw and Ceres Subgroups (both belonging to the Bokkeveld Group), Devonian sandstones of the Witteberg Group and Silurian sandstones of the Nardouw Subgroup (Table Mountain Group), supporting deep, loamy-sandy soils.

Important taxa that occur in the Western Klein Karoo ecosystem include *Pappea capensis*, *Crassula rupestris* subsp. *commutata*, *Drosanthemum wittebergense*, *Euphorbia mauritanica*, *Hereroa odorata*, *Ruschia cymosa*, *R. spinosa*, *Tylecodon paniculatus*, *T. wallichii* subsp. *wallichii*, *Adromischus filicaulis* subsp. *marlothii*, *A. mammillaris*, *Aridaria noctiflora* subsp. *noctiflora*, *Augea capensis*, *Braunsia geminata*, *Cotyledon cuneata*, *C. orbiculata* var. *orbiculata*, *Crassula cultrata*, *C. ovata*, *C. rupestris* subsp. *rupestris*, *C. subaphylla*, *Drosanthemum chrysom*, *D. lique*, *Euphorbia brachiata*, *E. mammillaris*, *E. multiceps*, *E. mundii*, *E. stolonifera*, *Gibbaeum nuciforme*, *Leipoldtia schultzei*, *Lycium oxycarpum*, *Crassosiphon calalioides*, *Phyllobolus nitidus*, *P. splendens*, *Ruschia archeri*, *R. intricata*, *R. multiflora*, *Salsola aphylla*, *Monsonia patersonii*, *Mesembryanthemum rigidum*, *Smicrostigma viride*, *Tetragonia fruticosa*, *T. robusta* var. *psiloptera*, *Tylecodon calalioides*, *Euclea undulata*, *Putterlickia pyracantha*, *Chrysocoma ciliate*, *Eriocephalus ericoides*, *Felicia filifolia*, *F. muricata*, *Galenia africana*, *Monechma spartioides*, *Pentzia incana*, *Pteronia incana*, *P. pallens*, *Rhigozum obovatum*, *Rosenia humilis*, *Osteospermum sinuata*, *Amphithalea spinosa*, *Aptosimum procumbens*, *Argyrobolus collinum*, *Asparagus burchellii*, *A. capensis* var. *capensis*, *A. krebsianus*, *A. mucronatus*, *Barleria pungens*, *Berkheya spinosa*, *Carissa bispinosa*, *Dicerotheramnus rhinocerotis*, *Eriocephalus africanus*, *E. purpureus*, *Felicia macrorrhiza*, *F. ovata*, *F. whitehillensis*, *Galenia fruticosa*, *G. secunda*, *Garuleum latifolium*, *Gnidia deserticola*, *Helichrysum asperum* var. *albidulum*, *H. rosum*, *H. simulans*, *H. zeyheri*, *Hermannia filifolia* var. *grandicalyx*, *H. multiflora*, *Hirpicium integrifolium*, *Indigofera heterophylla*, *Justicia cuneata* subsp. *cuneata*, *Lessertia fruticosa*, *Limeum aethiopicum*, *Macledium spinosum*, *Nenax microphylla*, *Oedera squarrosa*, *Osteospermum microphyllum*, *Pegolettia baccaridifolia*, *Pentzia elegans*, *P. lanata*, *P. spinescens*, *Phymaspermum aciculare*, *Plumbago tristis*, *Polygala asbestina*, *Pteronia adenocarpa*, *P. empetrifolia*, *P. fasciculata*, *P. flexicaulis*, *P. glauca*, *P. membranacea*, *P. oblanceolata*, *P. paniculata*, *P. sordida*, *P. succulenta*, *Rosenia oppositifolia*, *Selago geniculata*, *Sericocoma avolans*, *Zygophyllum microphyllum*, *Z. spinosum*, *Thesium lineatum*, *Asparagus racemosus*, *A. retrofractus*, *Cissampelos capensis*, *Microloma sagittatum*, *Othonna perfoliata*, *Viscum rotundifolium*, *Cineraria platycarpa*, *Cotula bipinnata*, *Diascia parviflora*, *Foveolina dichotoma*, *Heliophila pectinate*, *Plantago cafra*, *Amellus microglossus*, *Galenia papulosa*, *Heliophila amplexicaulis*, *Hermannia pulverata*, *Leysera gnaphalodes*, *Lotononis pungens*, *Albuca maxima*, *Oxalis obtusa*, *O. pes-caprae*, *Xenoscapa fistulosa*, *Drimia intricata*, *Empodium plicatum*, *Geissorhiza karooica*, *Lachenalia ameliae*, *Oxalis convexula*, *Crassula lanceolata*, *C. orbicularis*, *Psilocaulon articulatum*, *P. junceum*, *Gonialoe variegata*, *Astroloba foliolosa*, *Crassula muscosa*, *Othonna auriculifolia*, *Psilocaulon coriarium*, *Curio radicans*, *Stapelia engleriana*, *S. pillansii*, *S. rufa*, *Stapeliopsis*

saxatilis, *Tetragonia microptera*, *Tridentea gemmiflora*, *Ehrharta delicatula*, *Stipagrostis obtusa*, *Digitaria argyrograpta*, *Ehrharta calycina*, *E. erecta* and *Enneapogon scaber*. Endemic species include *Cotyledon tomentosa* subsp. *ladismithiensis*, *Crassula atropurpurea* var. *muirii*, *Drosanthemum bicolor*, *D. crassum*, *D. globosum*, *D. splendens*, *Gibbaeum nebrownii*, *Glottiphyllum cruciatum*, *G. suave*, *Lampranthus egregius*, *Octopoma octojuge*, *O. quadrisepalum*, *Dicoma fruticosa*, *Diascia hexensis*, *Ornithogalum synadelphicum* and *Haworthia pulchella*.

Biogeographically Important Taxa, which are classified as Klein Karoo endemics, Southern distribution limits, Eastern distribution limits, Western distribution limits; include *Drosanthemum delicatulum*, *Glottiphyllum depressum*, *Tetragonia glauca*, *Freylinia densiflora*, *Asparagus glaucus*, *Barleria stimulans*, *Berkheya cuneata*, *Eriocephalus pauperrimus*, *Euryops imbricatus*, *Polygala empetrifolia*, *P. uncinata*, *Pteronia glomerata*, *Rosenia glandulosa*, *Alonsoa peduncularis*, *Freesia speciosa*, *Duvalia parviflora* and *Stipagrostis anomala*.

The revised conservation status for the Western Klein Karoo ecosystem is Least Concern. The conservation target for the ecosystem is 16% with formally protected habitat conserved (4%) in the Anysberg World Heritage Site and Nature Reserve, Doornkloof Nature Reserve and Eyerpoort Private Nature Reserve. Threats to the ecosystem include habitat transformation with some 3% of the original extent already transformed for cultivation; and habitat degradation caused primarily by invasive alien plants species (*Acacia cyclops*, *A. saligna* and *Atriplex lindleyi* subsp. *inflata*). Erosion is a major threat with 54% of the ecosystem classified as having high erodibility.

Klein Karoo Quartz Vygieveld

The Klein Karoo Quartz Vygieveld (SKv10) ecosystem occurs on flat and slightly undulating plains covered by open, low vegetation dominated by fruticose or compact leaf-succulent dwarf members of the Aizoaceae (*Gibbaeum*), Crassulaceae and Euphorbiaceae, accompanied by non-succulent asteraceous shrubs and dwarf shrubs. The ecosystem occurs especially in the western regions of the Klein Karoo, bordered by the Witteberg and Swartberg mountains from the north and the Riviersonderend, Langeberg and Outeniqua mountains from the south, between the Koegaberge in the west and Oudtshoorn in the east. The largest patches are found at the northern foothills of the Langeberg mountains, between Barrydale and Muiskraal. The mean annual precipitation of 220 mm is multimodal and distributed in similar fashion as the Western Klein Karoo and Western Gwarrieveld ecosystems. A tendency towards winter-rainfall regime can be detected in the western part of the distribution area of the quartz fields, while the influence of summer rainfall increases to the east. The ecosystem typically occurs on loamy-sandy, shallow to moderately deep, slightly alkaline soils, mainly derived from micaceous sandy shales and mudstones of the Devonian, Ceres and Bidouw Subgroups (both belonging to Bokkeveld Group) as well as, though to a lesser extent, sandstones of the Silurian Nardouw Subgroup (Table Mountain Group). Critically, the soil surface is densely covered with

characteristic quartz gravel and rubble which are derived from weathered quartz veins accompanying the shales.

Important taxa that occur in the Klein Karoo Quartz Vygieveld include *Gibbaeum gibbosum*, *Hereroa tenuifolia*, *Sarcocornia* sp. nov., *Adromischus filicaulis* subsp. *marlothii*, *Antegibbaeum fissoides*, *Caulipsolon rapaceum*, *Drosanthemum delicatulum*, *Tetragonia robusta* var. *psiloptera*, *Pteronia pallens*, *Chrysocoma ciliata*, *Macledium rehmanioides*, *Pteronia empetrifolia*, *P. succulenta*, *P. viscosa*, *Osteospermum sinuata*, *Anacampseros papyracea*, *Crassula columnaris* subsp. *columnaris*, *C. deltoidea*, *C. pyramidalis* and *Psilocaulon articulatum*. Endemic taxa include *Gibbaeum album*, *G. dispar*, *G. heathii*, *G. petrense*, *G. pubescens*, *Muiria hortenseae*, *Zeuktophyllum suppositum*, *Cerochlamys pachyphylla*, *Drosanthemum albiflorum*, *Euphorbia susannae*, *Gibbaeum pachypodium*, *G. pilosulum*, *G. shandii*, *Hereroa muirii*, *Rhinephyllum muirii*, *Salsola verdoorniae*, *Zeuktophyllum calycinum*, *Conophytum joubertii*, *C. piluliforme*, *Crassula congesta* and *Quaqua ramosa*. One biogeographically important taxon is listed, namely *Gibbaeum nuciforme*.

The revised conservation status for the Klein Karoo Quartz Vygieveld is Least Concern. The conservation target is 16% with 9% statutorily conserved in the Anysberg World Heritage Site and Nature Reserve (2%) and Eyerpoot Private Nature Reserve (7%). Threats to the ecosystem include habitat transformation with almost 8% of the original extent already transformed for cultivation. Most of the quartz-field communities of the Klein Karoo are exposed to increasing pressure from the local rangeland farming with sheep, goats, wildlife, and ostrich. Erosion is a major threat with 84% of the ecosystem classified as having high erodibility and may presumably be a natural feature of the quartz-field habitats.

The quartz fields in the Klein Karoo basin represent edaphically defined special habitats, which house distinct vegetation units typically dominated by numerous habitat endemics. In different regions, the quartz fields are inhabited by similar plant growth forms of distantly related lineages, predominantly Aizoaceae. This is explained by convergent evolution in adaptation to special habitat conditions. The total cover of the quartz field vegetation is typically significantly lower than that of the surrounding vegetation while the geophytic *Caulipsolon rapaceum*, unpalatable *Pteronia pallens* as well as alien *Atriplex lindleyi* subsp. *inflata* are indicators of disturbance by overgrazing or trampling.

Klein Karoo Vegetation Map

A fine-scale vegetation map was compiled at a 1:50 000 scale for the Klein Karoo which captures the complexity in the landscape because of the three biomes that occur within the region. Environmental factors, such as the variation in geology, annual rainfall, temperature, and the dependence on fire create the diversity within vegetation types with a total of 369 different vegetation units identified and described within the vegetation map. The fine-scale map offers more value to the conservation manager, and as each vegetation unit consists of a unique assemblage of species, some of which are endemic to specific units, provides greater insight to inform management actions and develop thresholds of potential concern.

Klein Karoo Habitat Types

The 2005 unpublished “A vegetation map for the Klein Karoo” report describes 10 habitat types that occur across the Touw Valley Cluster (Figure 11). The habitat types are described below in detail.

Apronveld

The Apronveld habitat type is located at the base of hills and ridges and never occurs on steep slopes, where Randteveld or Arid Thicket Mosaic habitat types occur, or in valley bottoms, where the Gannaveld habitat type replaces it. Soils are loamy to clayey with abundant surface rocks. Shrub cover is well developed with Gombos, *Pteronia spp.*, and Kapokbos, *Eriosephalus spp.*, the most abundant species. Leaf- and stem-succulents, as well as a variety of geophytes are also abundant in Apronveld, but grasses are uncommon.

Apronveld is typically grazed by domestic stock as many of the common plant species are palatable and the terrain is easily accessible. Several rare plant species occur in this habitat, but not many of them are highly localized endemics.

Arid Renosterveld Mosaic

The Arid Renosterveld Mosaic habitat occurs along the interface of Succulent Karoo and Renosterveld vegetation in the northwestern extent of the Klein Karoo. Renosterbos, *Dicerotheramnus rhinocerotis*, is often abundant in typical Succulent Karoo communities where sandy soils are washed onto lowland soils. The habitat type can be confused with overgrazed Succulent Karoo habitat, but a lack of palatable species such as *Ehrharta calycina* with an abundance of unpalatable species such as *Cotyledon spp.* and *Tylecodon spp.* will indicate degraded Succulent Karoo habitat. Trees are sparse, but a diverse array of plant growth forms occur in Arid Renosterveld Mosaic. Shrubs, typically *Dicerotheramnus spp.*, *Eriosephalus spp.*, *Euryops spp.* and *Pteronia spp.*, and succulents are dominant, but grasses, *Ehrharta spp.* and *Pentaschistis spp.*, annuals and geophytes may be abundant after rain.

Several localized endemic plant species occur in the Arid Renosterveld Mosaic. The habitat type is vulnerable to incorrect grazing regimes but will recover if provided adequate rest.

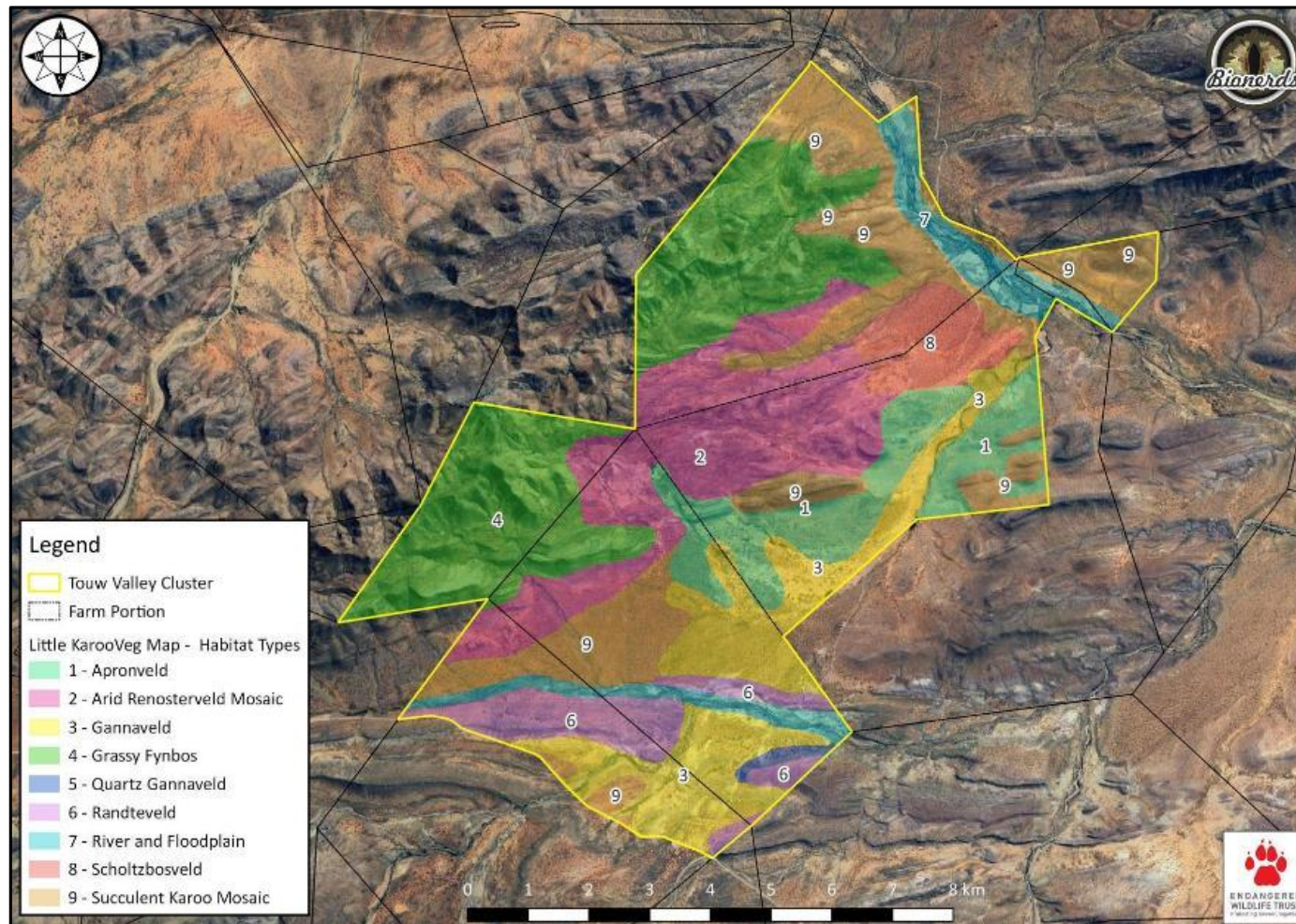


Figure 11 – The distribution of Klein Karoo Veg Map habitat types on the Touw Valley Cluster

Gannaveld

Gannaveld is in valley bottoms where soils are deep, loamy, and saline, and often forms large open plains just above the River and Floodplain habitat type. Gannaveld is typically denuded of trees, but tall shrubs such as Gannabos, *Salsola spp.*, and Kriedoring, *Lycium spp.*, are usually abundant. Small shrubs such as *Eriocephalus spp.*, *Pentzia incana*, *Pteronia spp.*, and *Osteospermum spp.* also occur in Gannaveld, and many annual species, some of which are endemic, flower after rain. Succulents are uncommon, perhaps due to the occurrence of frost in these valley bottoms, while grasses are also uncommon, except in sandy patches where they may be locally abundant.

“Heuweltjies”, termataria constructed mostly by *Microhodotermes viator*, are often a prominent feature, and species that occur on these “heuweltjies” are very different to species that occur in typical Gannaveld. The “heuweltjies” are often targeted by domestic stock and a deterioration of their vegetation condition is an early indication of over utilization of the Gannaveld habitat type. When badly degraded, the “heuweltjies” have few perennial plants and only an abundance of annual plants after rain, with *Mesembryanthemum crystallinum* abundant.

Most of the species present in Gannaveld are very palatable and it is the preferred habitat of small game species typical of the Klein Karoo. Rodents are remarkably active here, especially in the winter and spring months, prior to snakes becoming active. The soft soils of Gannaveld are important breeding areas for many of the wasp species found in the Klein Karoo. These wasps are important predators of other invertebrates that may become destructive to natural vegetation and agricultural crops if not controlled. However, the wasps are very sensitive to disturbance of the soft soils of the Gannaveld, and over utilization of Gannaveld may, therefore, result in a changed invertebrate fauna.

The deep, fine-fractured soils of Gannaveld are highly susceptible to soil erosion when the habitat type is overgrazed, and vegetation structure is degraded. This often results in gully erosion that cannot be rectified easily or cheaply. Most of these eroded soils are transported to the River and Floodplain habitat type during rainstorms, which not only degrades the water quality, but also causes nutrient enrichment that promotes the growth of undesired plant species. Once this habitat type is disturbed it is prone to invasion by non-locally indigenous species such as *Augea capensis*, and alien species such as *Atriplex lindleyi* ssp. *Inflata*, that increase the salinity of the topsoil and thereby adversely affect the natural regeneration process of indigenous species.

Grassy Fynbos

Fynbos habitat types are easily recognized due to the presence of Restios, Ericas and Proteas, which are generally well known and easy to recognize. The habitat types in Fynbos are also stratified along altitudinal gradients and it is possible to predict their occurrence in the landscape. While Restios,

Ericas and Proteas are not equally abundant in Fynbos habitat types, at least two or more must be present to define the habitat type as part of the Fynbos biome.

Fynbos habitat in the Klein Karoo occur on acidic sandy to sandy-loamy soils that are poor in nutrients, especially in nitrogen and phosphorous content, and are in mountainous terrain with higher rainfall. Most of these habitat types are rich in plant species and play an important role as an ecosystem service by delivering remarkably clean water to the lowlands.

Fire is one of the most important natural disturbance regimes in Fynbos, with grazing by larger mammals almost negligible. Impacts of small mammals, predominantly rodents, are vital as they play important roles as pollinators and seed dispersers. Rodents also played an important role in the evolution of plants traits in Fynbos, and anomalous fire regimes, invasion by alien plants and grazing by domestic stock soon after a fire will affect the regeneration success of plants. This alters the post-fire structure of the vegetation, the finely tuned plant-plant competitive interactions and the faunal component. Changes in the natural composition of Fynbos plant communities also negatively affect the quality and quantity of water runoff from water catchment areas.

Grassy Fynbos habitat is easy to recognize, as it is structurally very simple, with C3 grasses abundant. The grasses are typically comprised of species from the *Aristida*, *Merxmüllera*, *Pentameris*, and *Pentaschistis* genera. Restios from the *Calopsis*, *Hypodiscus*, *Ischyrolepis*, *Restio*, and *Rhodocoma* genera, as well as Ericas are present, but never prominent. Proteas, mostly only *Leucospermum spp.* and *Paranomus spp.*, are rare, but quite a variety of other shrubs such as *Agathosma spp.*, *Aspalathus spp.*, *Euryops spp.*, *Eriocephalus spp.*, *Felicia spp.*, *Heliophila spp.*, *Hermannia spp.*, *Montinia spp.*, *Passerina spp.*, and *Phylica spp.* may be present. Some short-lived shrubs, such as *Aspalathus spp.* and *Hermannia spp.*, may be super-abundant after a fire. While geophytes are also present after fire, they are never as abundant as they are in wetter Fynbos habitat types. Despite the relative abundance of grasses, Grassy Fynbos is not particularly suitable for grazing purposes, except perhaps for bulk-grazers such as the Cape Mountain Zebra, *Equus zebra zebra*.

Quartz Gannaveld

Quartz Gannaveld habitat only differs from Gannaveld in having patches of white quartz pebbles present and only occurs in the western Klein Karoo. Gannabos, *Salsola aphylla*, remains the most abundant shrub in the habitat type. Leaf succulents are abundant in the quartz patches and a number of these succulents are localized endemics. Quartz Gannaveld is also very sensitive to overgrazing as it results in accelerated soil erosion and facilitates the invasion of alien plant species. Soil stability in these quartz patches seems to be vital for regeneration of the succulents that are endemic to these patches and habitat degradation in quartz habitat types should therefore be avoided at all costs.

Randteveld

Randteveld is a very arid habitat type, one of the most arid habitat types in the Klein Karoo and is only prominent in the western reaches of the regio. The habitat type has a sparse woody tree and tall shrub component, and if present, these species are mostly restricted to south-facing slopes. Randteveld occurs on ridges and hills where the shale derived soils are very shallow, and the vegetation consists mostly of a sparse cover of small shrubs and compact leaf-succulents. A well-developed lichen and moss cover may occur in Randteveld and often indicates microhabitat in which the highly localized species endemic to this habitat type are restricted.

River and Floodplain

River and Floodplain habitat is restricted to the lowest elevation in the local landscape, where water draining from the upper catchment areas is transported. Riparian vegetation on the slightly higher embankment area that is occasionally inundated during floods, approximately 1:50 year flood line, is classified as floodplain.

The habitat type is easily recognizable as the riparian vegetation consists predominantly of woody trees such as *Senegalia caffra*, *Vachellia karroo*, *Searsia lancea*, and *Tamarix usneoides*, reeds, *Phragmitis australis*, and bulrush, *Typha capensis*, which are resilient to brackish conditions. Shrubs dominate the floodplain vegetation with Gannabos, *Salsola aphylla*, always abundant and a variety of other shrub species, *Atriplex vestita*, *Osteospermum incanum*, *Kochea tricophylla*, *Pteronia oblancoolata*, *Salsola glabrescens* and *Suaeda fruticosa*, present.

The spatial extent of the River and Floodplain habitat extends into the side branches of main river systems to include seasonal drainage systems that deliver water after heavy rainfall. The vegetation of these upper drainage systems is often quite different to those of the main river channel, but *Vachellia karroo* is always present. An interesting feature in the western Klein Karoo is that *Schotia afra* is sometimes abundant in these seasonal drainage areas. After good rains the grass component may be well developed, often with *Cenchrus ciliaris*, *Cynodon dactylon*, *Ehrharta thunbergii*, *Eragrostis sarmentosa* and *Fingerhuthia africana* locally abundant. Few rare or localized endemic plant species are known to occur in this habitat.

River and Floodplain habitat in the Klein Karoo region has been negatively affected by a number of activities. Most of the fresh water that used to run from the upper catchment areas into the river systems has been cut off and is now mostly used for agricultural purposes. The removal of this perennial supply of fresh water has altered the composition of the natural vegetation in the riverine areas. The upper floodplain embankments have also been transformed to establish intensive agricultural crops, such as lucerne, and the irrigation of these lands results in the leaching of sodium from floodplain soils into the river system, thereby causing increased salinity of water downriver. This

has resulted in the salination of soil in many of the lower riverine areas. River systems are also heavily invaded by alien species such as *Arundo donax*, *Nerium oleander*, *Pennisetum clandestinum*, *Prosopis glandulosa*, *Shinus molle*, *Tamarix chinensis* and *Tamarix ramosissima*, while the floodplain habitat may have *Alhagi maurorum* and *Atriplex nummularia* present.

Apart from providing many unique habitats for bird and invertebrate species, this unit probably also played an important historical role in providing suitable migration corridors for larger mammals such as Elephant, *Loxodonta Africana*, Black Rhinoceros, *Diceros bicornis*, and Hippopotamus, *Hippopotamus amphibius*. River and Floodplain habitat provided important freshwater and browsing/grazing sources for these species, which in turn likely maintained open channels within the riverine vegetation, limiting flood damage to the upper floodplain zones.

Scholtzbosveld

Scholtzbosveld habitat is easy to recognize, as it is usually located on flat tops of hills and is dominated by a single shrub species, Scholtzbos, *Pteronia pallens*. However, a rich variety of other shrubs and small succulents may also be present. The surface soils are loamy to clayey but are invariably underlain by calcrete. Small patches of Scholtzbosveld also occur in the Apronveld and Gannaveld habitat types, wherever calcrete underlays the local soils.

Scholtzbos is not palatable, but many of the other species present in this habitat type are quite palatable. The relative dominance of Scholtzbos may in some cases be an artifact of historical overgrazing pressure that favored Scholtzbos and facilitated its dominance. However, this habitat type should not be considered an anthropogenic habitat type. Its occurrence is highly predictable in the Klein Karoo landscape and species composition is rather uniform with no localized endemic plant species recorded. The relative stability of its soil and absence of endemic plant species renders this habitat type one of the least sensitive in the Klein Karoo region.

Succulent Karoo Mosaic

Succulent Karoo Mosaics occur in the lower valleys and hills of the Klein Karoo where soils are rich in nutrients, annual rainfall is less than 350 mm per year, and summer rainfall is less than half the mean annual rainfall. Leaf- and stem-succulents are always abundant in Succulent Karoo habitat types, indicating that high winter air humidity is important, as it prevents “black-frost” that could kill most of these succulent species. Maximum sunlight seems equally important, and a sparse cover of tall woody shrubs and trees is prevalent. The lack of summer rain and paucity of tall shrubs and trees is not coincidental, as these tall plants seem to require a fair amount of summer rain to be abundant.

Succulent Karoo Mosaic habitat lacks a well-developed woody tree component and while *Carissa bispinosa*, *Lycium cinereum*, *Nymannia capensis* and *Rhigozum obovatum* may be present, they are

never dominant. Shrub species that are less than 1 meter tall are typical and most common are the Aizoaceae, Amaranthaceae or Asteraceae plant families.

One of the interesting features of the Succulent Karoo Mosaic is that many species only occur under the small shrubs which provide microhabitat conditions suitable which often result in close relationships between plants species of different growth forms to develop miniature bush-clumps. Bush-clumps are the basic building block of plant communities in the Succulent Karoo Mosaic habitat.

Grasses are never abundant, but “heuweltjies”, termataria constructed mostly by *Microhodotermes viator*, are often a prominent feature. Also remarkable about this habitat is the abundance of lichens, liver mosses and mosses which form a prominent crust on the ground. These simple plants play a vital role in preventing soil erosion in fine fractured soils, maximizing water infiltration, and minimizing water runoff that could result in floods during heavy rainstorms. They are, however, easily degraded through physical disturbance such as repeated trampling by domestic stock.

Klein Karoo Vegetation Variants

The Touw Valley Cluster has 15 vegetation units recorded (Figure 12) and each vegetation unit is briefly described below as per the descriptions in the 2005 unpublished “A vegetation map for the Klein Karoo” report.

Bloutoring Fynbos-Renosterveld

The Bloutoring Fynbos-Renosterveld vegetation variant occurs on steep south facing slopes of hills. Renosterbos, *Dicerthamnus rhinocerotis*, is dominant and small patches of *Protea*, *Leucadendron salignum*, *Leucadendron teretifolium*, *Leucospermum wittebergense* and *Protea laurifolia* are present in mesic habitat. Grasses are very prominent after fire, including species such as *Cymbopogon plurinodes*, *Ehrharta ramosa*, *Merxmuellera arundinacea*, *Merxmuellera stricta*, *Pentameris distichophylla*, *Pentaschistis eriostoma*, *Pentaschistis malouiensis* and *Pentaschistis pallida*. *Agathosma adenandriiflora* is the only rare species of this variant, but careful surveys of the mesic patches may reveal more, such as *Agathosma acocksii*.

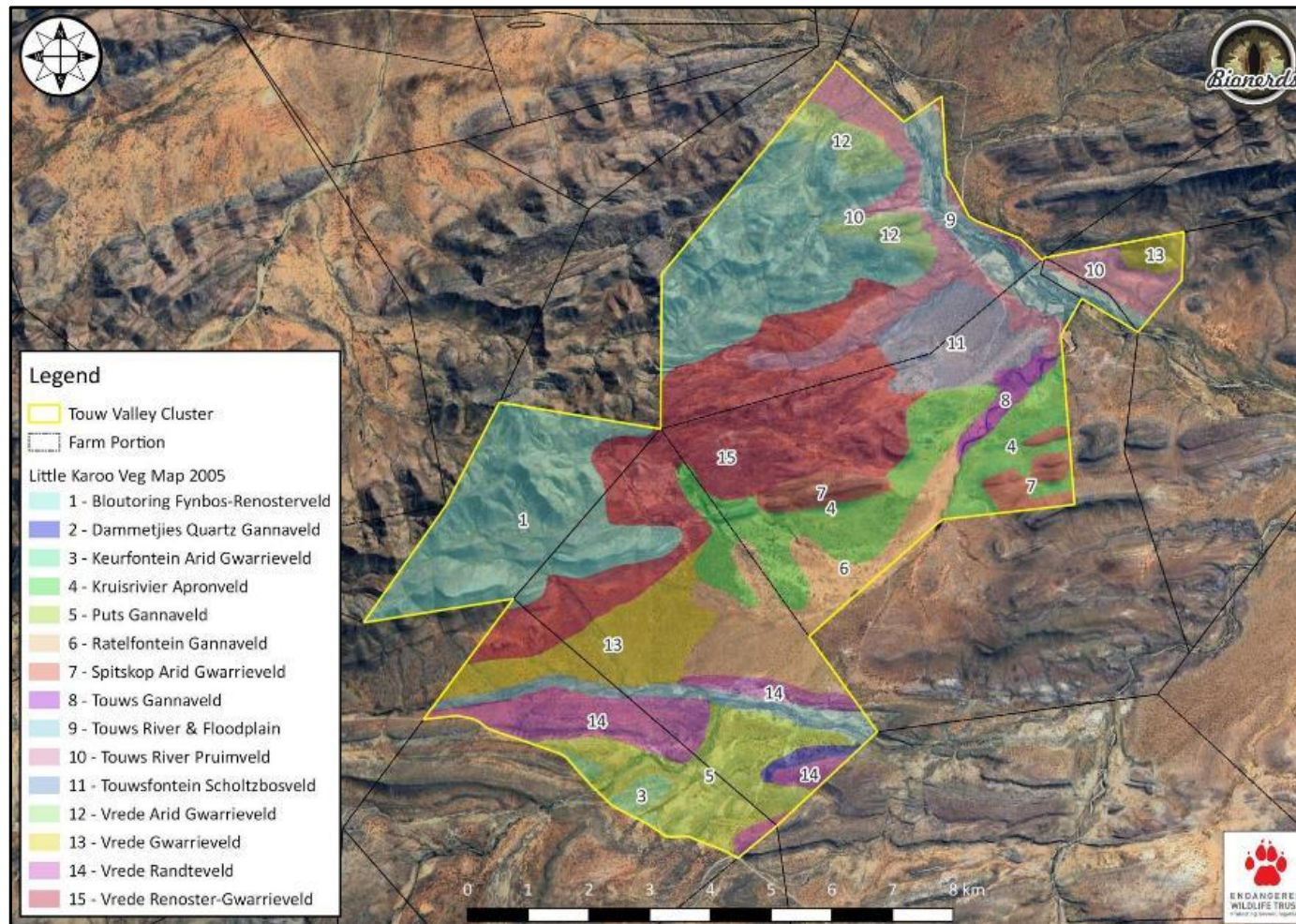


Figure 12 – The distribution of Klein Karoo Veg Map vegetation variants on the Touw Valley Cluster

Dammetjies Quartz Gannaveld

The Dammetjies Quartz Gannaveld occurs in seasonal water drainage areas, where the soils are a deep loamy clay derived from the Waboomsberg formation. A sparse layer of quartz pebbles is often exposed, which creates the favored habitat of *Gibbaeum cryptopodium*, a species that is often very abundant and characteristic of this variant. The tree component is absent and this variant usually has a sparse cover of shrubs and succulents, with *Berkheya spinosa*, *Mesembryanthemum subtruncatum*, *Psilocaulon junceum*, *Pteronia pallens*, *Pteronia* spp., *Ruschia* spp., *Ruschia spinosa*, *Salsola tuberculata*, *Salsola verdoorniae* and *Zygophyllum retrofractum* common.

Most of this vegetation variant has been exposed to very heavy grazing pressure by domestic stock, which may account for the low species richness of and the sparse vegetation. No rare species are known to occur in this variant, but *Gibbaeum johnstonii* may be present.

Keurfontein Arid Gwarrieveld

The Keurfontein Arid Gwarrieveld variant has a sparse cover of Gwarrie, *Euclea undulata*, and Spalkpendoring, *Gloveria integrifolia*, trees present in a matrix of Succulent Karoo plant communities where asteraceous shrubs and succulents such as *Aloe comptonii*, *Crassula arborescens*, *Crassula rupestris*, *Monechma incanum*, *Pelargonium alternans*, *Pteronia fasciculata* and *Tylecodon wallichii* are abundant. South-facing slopes provide habitat for some fynbos elements such as *Ischyrolepis ocreatus*, and a rich assemblage of small succulents, especially *Crassula* spp., are present. No rare or localized endemic species are known from this variant but may appear after good rainfall.

Kruisrivier Apronveld

The Kruisrivier Apronveld occurs on gravelly-clayey soils derived from the shale and mudstones of the Klipbokkop and Swartuggens formations. Woody trees are rare with asteraceous shrubs, *Berkheya cuneata*, *Berkheya spinosa*, *Eriocephalus ericoides*, *Eriocephalus grandiflorus*, *Hirpicium alienatum*, *Pteronia empetrifolia*, and *Pteronia paniculata* dominant. Succulents such as *Drosanthemum* spp., *Monsonia crassicaule*, *Monsonia salmoniflorum*, *Ruschia spinosa* and *Trichodiadema* spp. are also abundant. On deeper soils *Euphorbia mauritanica* is often prominent, amongst uncommon species such as *Euphorbia juglans*, *Euphorbia pillansii* and *Limonium amoenum*.

A rich assemblage of small leaf- and stem succulents, *Antegibbaeum fissoides*, *Conophytum minimum*, *Conophytum piluliforme*, *Crassula tecta*, *Gibbaeum heathii*, and *Glottiphyllum suave* are prominent on the small quartz and terrace gravel outcrops. Uncommon succulents include *Rhinephyllum muirii*, *Gibbaeum gibbosum*, *Glottiphyllum fergusoniae* and *Zeuktophyllum suppositum*. *Lachenalia ameliae* and *Ornithogalum diluculum* are two rare geophytes that occur in this vegetation variant.

Puts Gannaveld

Puts Gannaveld is quite an unusual Gannaveld vegetation variant as Gwarries, *Euclea undulata*,) are often prominent in drainage lines. An abundance of Ganna, *Salsola aphylla*, remains the distinctive element, but in Puts Gannaveld soils are often very sandy and shrubs such as Kraalbos, *Galenia Africana*, and stem succulents such as Nenta, *Tylecodon wallichii*, are often abundant. The latter two species are indicators of disturbance and their local abundance suggest that this vegetation variant has been subjected to heavy grazing by domestic stock in the past. “Heuveltjies” are rare here, but where present they are distinctive with species such as *Mesembryanthemum nodiflorum*, *Oncosiphon suffruticosum*, *Phyllobolus splendens* and *Psilocaulon junceum* prominent

Ratelfontein Gannaveld

In the lower lying valleys of the Ratelfontein Gannaveld vegetation variant the soils are a deep loamy clay, but there are small ridges present where the soils are very shallow and consist of bare shales of the Klipbokkop and Karooport formations. A sparse tree component, mostly only *Vachellia karroo* and some *Schotia afra* occurs along the drainage lines, where Ganna, *Salsola aphylla*, is the most prominent shrub. Other common species on the deeper soils include *Berkheya spinosa*, *Chrysocoma ciliata*, *Drosanthemum* cf. *lique*, *Drosanthemum hispidum*, *Eriocephalus ericoides*, *Lycium cinereum*, *Malephora luteola*, *Menodora juncea*, *Pentzia incana*, *Pteronia oblanceolata*, *Pteronia pallens*, *Rosenia humilis*, *Selago geniculata*, *Tetragonia fruticosa*, *Osteospermum scariosum* and *Zygophyllum retrofractum*.

On the ridges the shrub and tree component are sparse with only *Carissa bispinosa* and *Euclea undulata* present, while *Berkheya cuneata*, *Crassula arborescens*, *Crassula subaphylla*, *Cylindrophyllum tugwelliae*, *Dicoma spinosa*, *Hereroa gracilis*, *Plumbago triste*, *Pteronia flexicaulis*, *Mesembryanthemum tortuosum* and *Osteospermum sinuate* are the most abundant shrubs and succulents.

Grasses are sparse, with *Aristida diffusa* present on the ridges, but this may be an artifact of previous grazing regimes as *Fingerhuthia africana* and *Cenchrus ciliaris* could be abundant in the deeper soils. The highly localized *Gibbaeum nebrownii* and *Conophytum joubertii* occur on these small shale ridges, while the very rare and highly localized *Gibbaeum johnstonii* occurs in some of the small quartz patches that are present in this variant. *Lachenalia ameliae* is the only rare species known to occur in the deep, soft soils of the Gannaveld. *Pteronia pallens* and *Hereroa gracilis* are abundant where vegetation has degraded through overgrazing. When rested, palatable species such as *Berkheya cuneata*, *Berkheya spinosa* and *Selago geniculata* recover rapidly.

Spitskop Arid Gwarrieveld

Spitskop Arid Gwarrieveld has Gwarrie, *Euclea undulata*, and Koeniebos, *Searsia undulata*, trees present in a matrix of Succulent Karoo plant communities where asteraceous shrubs and succulents such as *Aloe comptonii*, *Aloe microstigma*, *Crassula rupestris*, *Monechma incanum*, *Pelargonium alternans*, *Pteronia fasciculata*, *Tylecodon paniculata* and *Tylecodon wallichii* are present. No rare or localized endemic species are known from this variant, but some interesting geophytes may appear after good rainfall.

Touws Gannaveld

Touws Gannaveld is directly linked to the vegetation of the Touws River and Floodplain vegetation variant, and they consequently share many species. In the upper areas, where the soils are not very saline, Bietou, *Osteospermum incanum*, is the dominant shrub, but in the lower saline areas, Ganna, *Salsola aphylla*, is abundant, as well as several distinctive shrub species such as *Atriplex vestita*, *Eriocephalus decussatus*, *Kochea tricophylla*, *Pteronia oblanceolata*, *Salsola glabrescens* and *Suaeda fruticosa*. Grasses are uncommon, but clumps of *Stipagrostis namaquensis* are occasionally present. Flushes of annuals appear after rain, but geophytes are rare. “Heuweltjies” are absent or very rare.

Touws River & Floodplain

Touws River and Floodplain comprises woody trees such as *Vachellia karroo*, *Searsia lancea* and *Tamarix usneoides* on the riverbanks, while reeds such as *Phragmites australis* and *Typha capensis* are occasionally abundant along the edges of pools and in the riverbed. Grasses are uncommon, but *Agrostis lachnantha* occurs in moist sites in the riverbed and *Stipagrostis namaquensis* often form prominent clumps in the floodplain. This vegetation variant has been invaded by several alien species, including *Arundo donax*, *Prosopis glandulosa*, *Shinus molle*, *Tamarix chinensis* and *Tamarix ramosissima*, with *Atriplex nummularia* occasionally also present in the floodplain zone. No rare or localized endemic species are known to occur in this variant.

Touws River Pruimveld

The Touws River Pruimveld is located along the upper embankment of the Touws River, where alluvial soils are deep, often sandy to loamy, with a high quartzitic rock component. Most characteristic is the abundance of woody trees with species such as *Gloveria integrifolia*, *Gymnosporia szyszlowiczii*, *Euclea undulata* and occasionally *Pappea capensis*. The abundance of trees and presence of shrubs and lianas such as *Asparagus burchellii* and *Zygophyllum morskana* in the bush-clumps clearly indicate that this unit is related to the Subtropical Thicket Biome. In Touws River Pruimveld, Succulent Karoo plant communities are not species rich, with *Crassula rupestris*, *Leipoldtia schultzei*, *Monechma incanum*, *Pentzia incana*, *Pteronia fasciculata*, *Pteronia flexicaulis*, *Rhigozum obovatum*, *Thesium lineatum* and *Tylecodon wallichii* the most abundant and dominant species recorded.

The grass component is often well developed but may be impacted on when grazed by domestic stock. Species characteristic of this vegetation variant include *Aloe comptonii*, *Bulbine latifolia*, *Carissa bispinosa*, *Cotyledon orbiculata*, *Crassula subaphylla*, *Crassula deltoidea*, *Crassula pyramydalis*, *Dicoma spinosa*, *Digitaria argyrograpta*, *Ehrharta calycina*, *Dicerotheramnus rhinocerotis*, *Felicia filifolia*, *Felicia muricata*, *Gnidia deserticola*, *Hereroa gracilis*, *Ornithogalum maculatum*, *Psilocaulon junceum*, *Rhodocoma arida*, *Ruschia* cf. *ceresiana*, *Mesembryanthemum tortuosum* and *Selago albida*. *Tritonia watermeyerii* and an undescribed *Haworthia* species are two uncommon species present.

Touwsfontein Scholtzbosveld

Touwsfontein Scholtzbosveld is restricted to flat open plains, where loamy, alluvial soils overlay calcrete. Woody trees are rare and shrubs such as *Berkheya spinosa*, *Eriocephalus ericoides*, *Pentzia incana*, *Psilocaulon junceum*, *Pteronia glauca*, *Pteronia pallens*, *Ruschia spinosa*, *Salsola tuberculata* and *Zygophyllum retrofractum* dominate. Most of this vegetation variant was subjected to severe grazing pressure in the past, which resulted in the abundance of the unpalatable *Pteronia pallens*.

Although not abundant, a rich assemblage of other species still occur here, including *Asparagus capensis*, *Blepharis mitrata*, *Cephalophyllum curtrophyllum*, *Drosanthemum* cf. *lique*, *Eragrostis bergiana*, *Euclea undulata*, *Euphorbia arceuthobioides*, *Fingerhuthia africana*, *Hereroa gracilis*, *Hirpicium alienatum*, *Monsonia crassicaule*, *Monsonia salmoniflora*, *Octopoma quadrisepalum*, *Phyllobolus spendens*, *Pteronia staehelinoides*, *Rhygozum obovatum*, *Ruschia* cf. *rigida*, *Mesembryanthemum tortuosum*, *Stipagrostis obtusa*, *Thesium lineatum* and *Zygophyllum lichtensteinianum*. In certain sites this unit has been ploughed up to plant *Atriplex nummularia*, which persists along with the alien *Atriplex lindleyi* subsp. *inflata* in disturbed sites.

Vrede Arid Gwarrieveld

Vrede Arid Gwarrieveld is largely restricted to arid north-facing slopes, where soils are shallow and sandy to loamy derived from the Wagendrift and Witpoort formations. The variant has a sparse cover of *Euclea undulata*, while *Dicerotheramnus rhinocerotis* is uncommon. Drought tolerant shrubs and succulents such as *Aloe comptonii*, *Braunsia apiculata*, *Crassula rupestris*, *Monechma incanum*, *Pelargonium alternans*, *Pteronia fasciculata*, and *Cynanchum viminalis* are abundant and prominent on the rocky outcrops.

Most of this variant has been subjected to severe grazing pressure with palatable species such as *Cymbopogon plurinodes*, *Monechma incanum*, and *Zygophyllum fulvum* now uncommon. The variant is mostly free of alien plants, but *Opuntia ficus-indica* may occur. *Quaqua linearis* and *Romulea sphaerocarpa* are two rare species known to occur in Vrede Arid Gwarrieveld.

Vrede Gwarrieveld

Vrede Gwarrieveld may be easily distinguished from the Touws River Pruimveld in that it lacks *Pappea capensis* in the woody component and *Pteronia fasciculata* as a prominent shrub. Woody trees are still abundant but consist mostly of *Euclea undulata*. The shrub component consists of *Berkheya cuneata*, *Berkheya spinosa*, *Eriocephalus ericoides*, *Pteronia pallens*, and *Tetragonia fruticosa*.

The Vrede Gwarrieveld vegetation variant has been exposed to serious grazing pressure, which resulted in an invasion by *Dicrothamnus rhinocerotis*. On clay soils the disturbed sites have been invaded by *Pteronia pallens* and *Hereroa gracilis*. When rested areas the Renosterbos shrubs became senescent and are replaced by more palatable shrubs, such as *Berkheya spinosa*, and grasses, such as *Ehrharta calycina*, a very promising sign that Gwarrieveld habitat can revert to near pristine conditions if well rested from grazing pressure. The only rare species known to be present in this vegetation variant *Tritonia watermeyerii*.

Vrede Randteveld

Vrede Randteveld occurs on shallow clay soils derived from the siltstone and shales of the Tra-Tra and Waboomsberg formations. Small trees and shrubs such as *Euclea undulata* and *Nymannia capensis* are occasionally present, even on north facing slopes where *Crassula arborescens* is abundant. Tall shrubs and species such as *Pteronia incana* and *Dicrothamnus rhinocerotis* occur on the south-facing slopes. There seems to be nothing unique to this variant, and in all respects, it is a true intermediate vegetation variant, with no known rare or endemic species known to occur here.

Vrede Renoster-Gwarrieveld

Vrede Renoster-Gwarrieveld is largely restricted to south facing slopes where the sandy loam soils are derived from the Wagendrift and Karooport formations. A sparse woody component is present, consisting almost entirely of *Euclea undulata*. *Renosterbos*, *Dicrothamnus rhinocerotis*, and *Kapokbos*, *Eriocephalus africanus*, are abundant. The abundance of *Renosterbos* is more likely due to the periodic occurrence of fires, as opposed to disturbance by overgrazing. The only uncommon species known from this vegetation variant are *Gasteria brachyphylla* var. *bayeri*, *Hoodia pilifera* and *Tylecodon leucothrix*. All three of these species reach their westernmost distribution in Vrede Randteveld.

Contribution to Ecosystem Conservation Targets

The SANBI developed the South African List of Threatened Ecosystems which is the national indicator of ecosystem conservation status. In 2018 the National Biodiversity Assessment reassessed ecosystem threat status based on the updated national vegetation map and developed a new ecosystem condition map based on land cover change.

Threatened ecosystems are those that are at risk of losing constituent biodiversity, structure and function and include Vulnerable, Endangered and Critically Endangered classifications.

The original extent of the ecosystems distributed on the Touw Valley Cluster, the changes in ecosystem status and the current conservation targets are given in Table 7 below.

Table 7 - The original extent and conservation targets for ecosystems recorded on the Touw Valley Cluster.

Ecosystem Name	Protection Status	Target (%)	Ecosystem Status		Original Extent (Ha)	Natural Extent (Ha)	Target (Ha)
			2009	2018			
Matjiesfontein Shale Renosterveld	Poorly protected	27	LT	LC	209 585	190 722	56 588
Matjiesfontein Quartzite Fynbos	Poorly protected	27	LT	LC	126 728	120 138	34 217
Western Little Karoo	Poorly protected	16	LT	LC	419 818	316 123	67 171
Little Karoo Quartz Vygieveld	Poorly protected	16	LT	LC	11 484	7 063	1 838

The contribution of the Touw Valley Cluster to the conservation targets for ecosystems that occur across the cluster reserve is given in Table 8 below.

Table 8 - The extent of ecosystems on the Touw Valley Cluster and their contribution to conservation targets.

Ecosystem Name	Protection Status	Target (%)	Status 2018	Original Extent (Ha)	TVC Extent (Ha)	Contribution (%)
Matjiesfontein Shale Renosterveld	Poorly protected	27	LC	209 585	2 440	4
Matjiesfontein Quartzite Fynbos	Poorly protected	27	LC	126 728	1 348	4
Western Little Karoo	Poorly protected	16	LC	419 818	3 886	6
Little Karoo Quartz Vygieveld	Poorly protected	16	LC	11 484	36	2

2.7.5 Species of Conservation Concern

Species of Conservation Concern (SoCC) typically include threatened species which are facing a high risk of extinction. This includes any species classified as threatened in the International Union for Conservation of Nature's (IUCN) Red List of Threatened Species. The IUCN Red List was established in 1964 and has become the most comprehensive source on the global conservation status of animal, fungi, and plant species. The Red List is more than a list of species and their conservation status but provides a powerful tool that has been designed to inform and catalyse action for biodiversity conservation and policy change. The IUCN Red List includes nine categories of which the Near Threatened (NT), Vulnerable (VU), Endangered (EN) and Critically Endangered (CR) categories inform the selection of SoCC on the Touw Valley Cluster.

BirdLife South Africa in collaboration with Animal Demography Unit of the University of Cape Town, and the SANBI have produced the 2015 Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland. This publication is an updated, peer-reviewed conservation status assessment of the 854 bird species occurring in South Africa, including the Prince Edward Islands, Lesotho and Swaziland. Of the 854 bird species, 132 threatened species have been listed as regionally threatened, which incorporates Near Threatened, Vulnerable, Endangered and Critically Endangered categories. The regional status for avifaunal species that occur on the Touw Valley Cluster is preferred to the IUCN Red List and has been used to include threatened species as SoCC on the Touw Valley Cluster.

From a botanical perspective, the SANBI's Threatened Species Programme has fully assessed the status of its entire flora and is the resource utilised to determine the floristic SoCC on the Touw Valley Cluster. Within the SANBI Red List, threatened species are species that are facing a high risk of extinction and include species classified in the IUCN categories of Critically Endangered (CR), Endangered (EN) or Vulnerable (VU). The SANBI Red List identifies SoCC as species that have a high conservation importance in terms of preserving South Africa's high floristic diversity and include not only threatened species, but also those classified in the categories Extinct in the Wild (EW), Regionally Extinct (RE), Near Threatened (NT), Critically Rare, Rare, Declining and Data Deficient - Insufficient Information (DDD). For the purposes of the Touw Valley Cluster PAMP, threatened species are given priority as SoCC.

Finally, while the SoCC on the Touw Valley Cluster follows an international, national, provincial, and local approach, the Touw Valley Cluster recognises that species endemic to the Klein Karoo also warrant monitoring and research and may be included in the PAMP.

From a faunal perspective, the following SoCC that occur across the reserves have been highlighted for monitoring and research: Grey Rhebok *Pelea capreolus* NT, Honey Badger *Mellivora capensis* NT,

Leopard *Panthera pardus* VU, Riverine Rabbit *Bunolagus monticularis* CR, Karoo Dwarf Tortoise *Chersobius boulengeri* EN, Tent Tortoise *Psammobates tentorius* NT, Karoo Korhaan *Eupodotis vigorsii* NT, Lanner Falcon *Falco biarmicus* VU, Secretarybird *Sagittarius serpentarius* VU, Southern Black Korhaan *Afrotis afra* VU, Verreaux's Eagle *Aquila verreauxii* VU, Ludwig's Bustard *Neotis ludwigii* EN, and Martial Eagle *Polemaetus bellicosus* EN.

Botanical SoCC for the Touw Valley Cluster include *Crotalaria lebeckioides* Rare, *Crassula congesta* subsp. *laticephala* Rare, *Eriocephalus grandiflorus* Rare, *Tritonia securigera watermeyeri* Rare, *Agathosma adenadriflora* NT, *Agathosma foetidissima* NT, *Hoodia pilifera* NT, *Leucospermum pluridens* NT, *Glottiphyllum suave* NT, *Blepharis inermis* VU, *Gibbaeum pilosulum* VU, *Gibbaeum velutinum* VU, *Calobota elongata* VU, *Drosanthemum giffenii* VU, *Lotononis venosa* VU, *Lotononis argentea* VU, *Lotononis rigida* VU, *Babiana cuneata* LC, *Brunsvigia josephinae* VU, *Duvalia parviflora* VU, *Octopoma octojuge* VU, *Octopoma quadrisepalum* VU, *Wurmbea compacta* VU, *Euphorbia pseudoglobosa* VU, *Mesembryanthemum expansum* VU, *Ornithogalum perpavum* VU, *Drosanthemum micans* EN, *Glottiphyllum carnosum* EN, *Mesembryanthemum strictum* EN, *Zeuktophyllum suppositum* EN, *Anisodonteia dissecta* CR, *Gibbaeum nebrownii* CR, *Mesembryanthemum tortuosum* (Commercial Trade), *Tylecodon reticulatus* (Commercial Trade) and *Conophytum truncatum* (Sensitive Species – Trade).

It is recommended that species flagged in the National Screening Tool of the Department of Environmental Affairs (DEA) environmental screening tool for the Touw Valley Cluster (Section 1.8) as well as regionally and biogeographically important taxa highlighted by the SANBI (Section 2.4) are prioritised for surveys to determine the presence or absence of the taxa on the Touw Valley Cluster.

2.7.6 Fire Regime

Fire is a primary ecological driver in fynbos ecosystems and creates the necessary disturbance and stimulus that drives diversity within the Cape Floristic Region. Fire is therefore an ecosystem process that is critical to ensure the continued functioning of ecosystems and to maintain the evolution of fauna and flora therein. However, due to fragmentation of the natural landscape and the danger wildfires pose to human life and infrastructure, fire no longer operates naturally on a landscape scale.

Where possible natural resource managers should facilitate the process within smaller fragments to ensure the persistence of biodiversity whilst on a landscape level it is necessary to develop fire management plans that determine where fire suppression is required and where wildfires should be allowed to spread naturally. Landscape level planning should be developed with multiple stakeholders: district and local municipalities, fire protection associations and landowners.

To ensure that fire benefits ecosystem process and does not alter natural process it is important that the following principles are adopted by conservation managers:

- Fire frequency must be determined by the flowering and seeding cycles of non-sprouting plant species. It is necessary to determine the species composition on the nature reserve and isolate how long non-sprouting species require to set sufficient seed before the next fire, which is known as the minimum fire return interval. At least 90% of the slowest-maturing species should have flowered before the next fire is allowed to occur to ensure that these species do not become locally extinct. It is also important to ensure that the frequency between fires is not too long as fynbos flora become senescent or moribund in the absence of fire. These species will produce fewer seeds or release canopy-stored seeds which will be targeted by small mammals or destroyed when the next fire sweeps across the area.
- Fire season and intensity must be prioritised from an ecological perspective wherever possible to minimise the negative impacts on organisms. Fynbos species (fauna and flora) have adapted to summer and autumn fires and implementing prescribed burns or not suppressing natural wildfires is critical to ensure that the evolved fire response defence mechanisms are maintained to prevent local extirpation. Likewise, species have adapted to persist under quick, hot fires as opposed to slow, cool burns. Germination of seeds may not take place unless hot, intense fires are experienced. By implementing prescribed burns during the correct season, it is possible to ensure that the correct intensity may be generated.
- The role that invasive alien plants play in increasing fire frequency and intensity cannot be downplayed and it is important that alien vegetation management is implemented to prevent densities of alien invasives to minimise this threat within natural ecosystems.

In 2007 the Critical Ecosystem Partnership Fund (CEPF) funded a project to provide spatially explicit indices of potential reoccurrence of fire in untransformed examples of the 56 habitat types of the Klein Karoo, as well as the fire frequency regimes required (upper and lower thresholds) to maintain the biodiversity of these habitat types. The project was implemented by Jan Vlok (Regalis Environmental Services) and the data were tested at a workshop held on the 3rd June 2007. The outcome generated a fire regime map for the Klein Karoo.

The minimum potential fire return times was determined by estimating the maximum potential accumulation of flammable material within each habitat type. The accumulation rate of flammable material is strongly affected by edaphic condition and annual rainfall, which then largely determines the dominant species and vegetation structure of the habitat type. Natural fire barriers such in the broader landscape was also considered. The project defined the “minimum potential fire return time” as the minimum period in which the vegetation can carry a fire during extreme fire danger conditions where temperatures are greater than 40 °C with strong winds. These extreme fire potential conditions

should not be confused with the recommended ecological minimum fire frequency as they only represent an absolute minimum fire return period under extreme conditions.

An ecologically acceptable minimum fire frequency for the conservation of biodiversity within the habitat types was derived by estimating the minimum period that the slowest non-sprouting species present in each habitat type would require to reach maturity, defined as the first seed production. As the data in this respect are very limited and mostly available only for Fynbos habitat types, the projects estimate for most non-Fynbos habitat type must be treated with caution.

The proposed maximum age at which a habitat type should burn, the maximum fire frequency, was determined by utilising the maximum lifespan of the fastest growing non-sprouting serotinous species known from each habitat type. These are the species that would first become extinct within the habitat type in the absence of fire. The maximum frequency cannot be estimated on the slowest growing species, such as *Protea rupicola*, within a habitat type, as the faster growing serotinous species, such as *Protea repens*, will become senescent before the absolute maximum age of the slowest species is attained. Data in this respect are similarly very limited and restricted to Fynbos habitat types with the same caveat as the minimum fire frequency for non-Fynbos habitat types.

The proposed minimum biologically acceptable fire frequency was categorised in five classes: 10 – 15, 15 – 20, 20 – 50, 50 – 75, and 75+ year classes. These classes are extremely valuable to conservation managers as they can be utilised as indicators of minimum fire frequency that should be allowed within habitat units. The minimum biologically acceptable fire frequency for the Touw Valley Cluster is illustrated in Figure 13 below.

Recommendations for further refinement of the fire regime maps include adding transformation map data to alter maps to current transformed condition, where intensively farmed areas would be changed to a non-flammable category. It is also important to capture the extent of past land use practices within fire dependant ecosystems to ensure that rehabilitation of these ecosystems is not negatively affected by utilising fire as a management tool in the promotion of biodiversity.

Likewise, it is critical to adequately capture the historical incidence of fire on the Touw Valley Cluster to ensure that expected fire returns are adapted and potential fire suppression management interventions adopted.

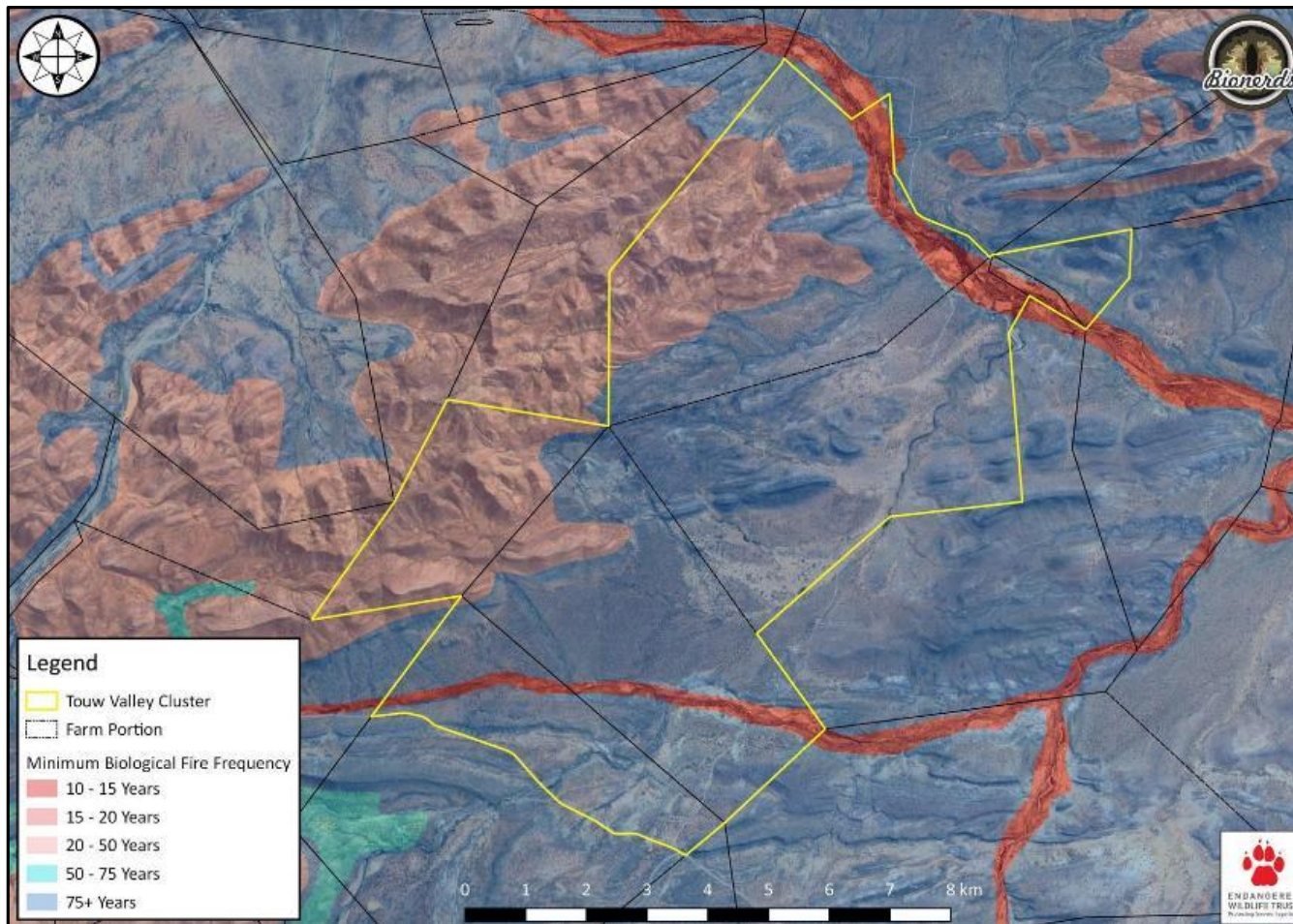


Figure 13 – Minimum biologically acceptable fire frequencies for the Touw Valley Cluster and surrounds

2.7.7 Invasive Alien Plants

Numerous species introduced from other countries have become aggressive invaders of natural ecosystems throughout South Africa. These species have transformed ecosystem structure and function and often entirely displace indigenous vegetation cover. Invasive alien plants have numerous impacts on ecosystems where they have become prevalent, especially where the invasive aliens have reached medium to high densities. Changes in nutrient cycling occur due to the high biomass and leaf litter production and Australian *Acacia* species, which are nitrogen fixing, will lead to substantial increases in soil nitrogen and phosphorous levels. Fynbos species are low-nutrient adapted species and are outcompeted in these altered soil environments, which typically leads for further invasions of woody alien species.

The strategy behind invasive alien plant control on the Touw Valley Cluster is to remove, control, maintain gains and where possible restore previously invaded or planted areas. Where densities of invasive alien plants preclude total eradication, the species will be controlled to a level where the survival rate is minimised, and further expansion limited.

The list of alien plant species that occur on the Touw Valley Cluster include *Argemone ochroleuca* Mexican Poppy, *Atriplex lindleyi* Sponge-fruit Saltbush, *Atriplex nummularia* Old Man Saltbush, *Eucalyptus grandis* Saligna Gum, *Nicotonia glauca* Wild Tobacco, *Opuntia ficus-indica* Sweet Prickly Pear, *Prosopis glandulosa* Honey Mesquite, *Ricinus communis* Castor oil plant, *Schinus terebinthifolius* Brazilian Pepper Tree and *Xanthium spinosum* Spiny Cocklebur.

2.8 Cultural Heritage

2.8.1 Heritage Resources

According to the National Heritage Resources Act, 1999 (Act No. 25 of 1999), types of Heritage Resources include:

- Archaeology
- Built environment
- Palaeontology (fossils)
- Maritime
- Cultural Landscapes
- Natural Heritage (Geology, Meteorites)
- Places
- Monuments & Memorials

Rock art surveys were conducted on the adjacent Anysberg Nature Reserve and World Heritage site by Dr René Rust (Rust 2000). Details of approximately 50 rock art images were recorded on forms

and, where possible, by tracing and photography. The sites tend to be small and are located in narrow kloofes, mostly on the Anysberg Mountain. There are no known sites within the Touw Valley Cluster.

As per the rock art, landowners are aware of a number of geological and palaeontological sites located on adjacent properties, to include fossil sites situated close to roads and trails used by visitors on Anysberg Nature Reserve and World Heritage site. Further surveys will determine localities within the Touw Valley Cluster.

2.8.2 Living Heritage

The relatively late date of farming settlement of the Klein Karoo suggests that it was remote and isolated in historical times. From the 1600s, herders and hunters (agriculturists lived on the eastern coast) living along the southern shores of South Africa, were exposed to increasing contact with sailors, travelers and hunters from Europe. Some contacts were peaceful encounters; others were aggressive (Raven-Hart 1967). The first Europeans to penetrate into the Klein Karoo or “Kannaland” were the members of the trading expedition led by Ensign Isaac Schrijver in 1689 (Moodie 1960).

During the 1920s the railway line between Touwsrivier and Ladismith, was completed (1925), serving the farming communities in the area. The railway line followed the Touws River through the Allemorgensfontein and Touwsfontein sectors. The train used to travel between Touwsrivier and Ladismith, stopping at the following stations: De Bron – Langverwacht – Blou Toring – Allemorgensfontein - Valletjies – Kareevlakte – Hondewater – Vensterkrans; and then turning at Ladismith. The steam engine used on this line was affectionately known as Makadas (‘Make a dash’).

During the Laingsburg flood of 1981, the railway line was severely damaged. It was never repaired and was eventually removed altogether. Contractors were used to remove most of the railway sleepers and steel which could be carried out. There are still steel tracks in certain areas on the reserve where it was too difficult to remove them (Johan Vaughan; pers. comm.).

The Touw Valley Cluster reserves are within the core area of the Gouritz Cluster Biosphere Reserve (GCBR), South Africa’s seventh biosphere reserve that was designated by UNESCO on the 9th June 2015, and on the 3rd July 2015, the adjoining Nature Reserve, Anysberg was inscribed as part of the serial site extension of the CFRPA WHS approved by UNESCO.

2.9. Regional and local planning context

2.9.1 The Protected Area Expansion Strategy and Implementation Plan

The Protected Area Expansion Strategy and Implementation Plan is a response to the National Protected Area Expansion Strategy (NPAES) (SANBI & DEAT, 2010) which calls on Provinces to develop implementation plans in support of the NPAES and in support of provincial conservation efforts and priorities. The NPAES, which provides a broad national framework for Protected Area expansion in South Africa, also identifies areas of importance to be targeted for Protected Area expansion in the country, and mechanisms to achieve this.

The Western Cape Protected Area Expansion Strategy addresses the formal declaration of priority natural habitats as protected areas to secure biodiversity and ecosystem services for future generations. This strategy is aligned with the concepts and goals of the NPAES.

2.9.2 Western Cape Biodiversity Spatial Plan

The Western Cape Biodiversity Spatial Plan (WCBSP) comprises biodiversity priority areas with contextual information and land use guidelines that make the most recent and best quality biodiversity information available for informing all aspects of sustainable development in the Western Cape. This includes land use and development planning, environmental assessment and regulation, and natural resource protection and management more broadly.

The key informant in the spatial product is the category field which speaks to broad categories defined in the National Environmental Management: Biodiversity Act (Act 10 of 2004) and in the guidelines regarding Bioregional Plans. The broad categories are: Protected Areas, Critical Biodiversity Areas, Ecological Support Areas, and Other Natural Areas.

Protected Areas (PAs) are areas that are formally protected by law and recognised in terms of the NEMPA. This includes gazetted Private Nature Reserves and Protected Environments concluded via Section 28 of NEMPA.

Critical Biodiversity Areas (CBAs) are areas that are required to meet biodiversity targets for species, ecosystems, or ecological processes. These include 1) all areas required to meet biodiversity pattern, such as species and ecosystems, targets; 2) Critically Endangered (CR) ecosystems (terrestrial, wetland, and river types); 3) all areas required to meet ecological targets, which are necessary to ensure the persistence and continued functioning of ecosystems and essential ecosystem service delivery; and 4) critical corridors to maintain landscape connectivity. Therefore, CBAs are areas of high biodiversity and ecological value and need to be kept in a natural or near-natural state, with no further loss of habitat or species. Degraded areas should be rehabilitated to natural or near-natural condition. Only low-impact, biodiversity-sensitive land uses are appropriate.

A further distinction is made between CBAs that are likely to be in a natural condition (CBA 1) and those that are potentially degraded or represent secondary vegetation (CBA 2). This distinction is based on best available land cover data, and therefore may not be an entirely accurate or current reflection of condition and should also be assessed in field.

Ecological Support Areas (ESAs) are not essential for meeting biodiversity targets but play an important role in supporting the functioning of PAs or CBAs and are often vital for delivering ecosystem services. They support landscape connectivity, encompass the ecological infrastructure from which ecosystem goods and services flow, and strengthen resilience to climate change. They include features such as regional climate adaptation corridors, water source and recharge areas, riparian habitat surrounding rivers or wetlands, and Endangered vegetation. ESAs need to be maintained in at least a functional and often natural state, in order to support the purpose for which they were identified, but some limited habitat loss may be acceptable. A greater range of land uses over wider areas is appropriate, subject to an authorisation process that ensures the underlying biodiversity objectives and ecological functioning are not compromised. Cumulative impacts should also be explicitly considered.

A distinction is made between ESAs that are likely to be functional, in a natural, near natural or moderately degraded condition (ESA 1), and ESAs that are likely severely degraded or have no natural cover remaining and therefore require restoration where feasible (ESA 2). The WCBSP categories represented on the Touw Valley Cluster are illustrated in Figure 14.

Importantly, both CBAs and ESAs are further divided into sub-categories which recognise important inherent attributes of the site, allowing for greater specificity in applying land-use guidelines. The sub-categories should be used in conjunction with the WCBSP Handbook and its proposed land use guidelines. Category 1 indicates whether the CBA or ESA sites require (where feasible) restoration from plantation or high-density invasive alien plant cover, versus restoration from some other form of land use or land cover.

Other Natural Areas (ONAs) are areas that have not been identified as a priority in the current WCBSP but retain most of their natural character and perform a range of biodiversity and ecological infrastructure functions. Although they have not been prioritised for meeting biodiversity targets, they are still an important part of the natural ecosystem. ONAs should be managed or utilised in a manner that minimises habitat and species loss and ensures ecosystem functionality through strategic landscape planning. These 'other natural areas' offer considerable flexibility in terms of management objectives and permissible land uses, but some authorisation may still be required for high impact land uses.

Another category exists for habitat that has been transformed for agriculture or development and are described as severely modified to No Natural Remaining (NNR). These are areas that have been modified by human activity to the extent that they are no longer natural, and do not contribute to biodiversity targets. These areas may still provide limited biodiversity and ecological infrastructure functions, even if they are never prioritised for conservation action. While these areas offer the most flexibility for land use, they should still be managed in a biodiversity-sensitive manner, aiming to maximise ecological functionality. Authorisation is still required for high-impact land uses.

These WCBSP maps should serve as the primary source of information on biodiversity and ecological infrastructure for all land- and resource use decision-making and forward planning processes, such as Strategic Environmental Assessments (SEAs), Environmental Management Frameworks (EMFs), Spatial Development Frameworks (SDFs), and Integrated Development Plans (IDPs).

This section and the BSP categories and their associated objectives and guidelines were sourced from the 2017 WCBSP, which was developed by the CapeNature Scientific Services Land Use Team. The handbook and spatial data are available at the SANBI Biodiversity GIS portal (<http://bgis.sanbi.org/Projects/Detail/194>). It is highly recommended that protected area managers download the handbook and familiarise themselves with the spatial plan.

The Touw Valley Cluster will be proclaimed a S23 Nature Reserve in terms of NEMPA and will then be captured as a Protected Area in the next iteration of the WCBSP. The desired management objective for PAs, as a benchmark for biodiversity, is to ensure that they are kept in a natural state, with a management plan focused on improving the state of biodiversity.

Presently, the categories for the Touw Valley Cluster as per the 2017 WCBSP are captured and illustrated in Figure 14 below. The extent of the WCBSP (2017) zonation categories that are recorded on the Touw Valley Cluster are given in Table 9 below.

Table 9 - The Western Cape Biodiversity Spatial Plan (2017) categories recorded for the Touw Valley Cluster.

Nature Reserve	CBA 1		CBA2 Terrestrial (Ha)	ESA1 Aquatic (Ha)	ESA2 (Ha)	ONA (Ha)	NNR (Ha)
	Terrestrial (Ha)	Aquatic (Ha)					
Bloutoring	2 405	9	1	382	57	1 695	100
Doringkloof	117	2	0	5	19	50	32
Kruisrivier	1 574	2	2	29	39	284	65
Machaseh	57	0	0	135	7	618	28
Total (Ha)	4 153	13	3	551	122	2 647	225

The WCBSP (2017) management guidelines and objectives for categories recorded on the Touw Valley Cluster are given as Table 10 below.

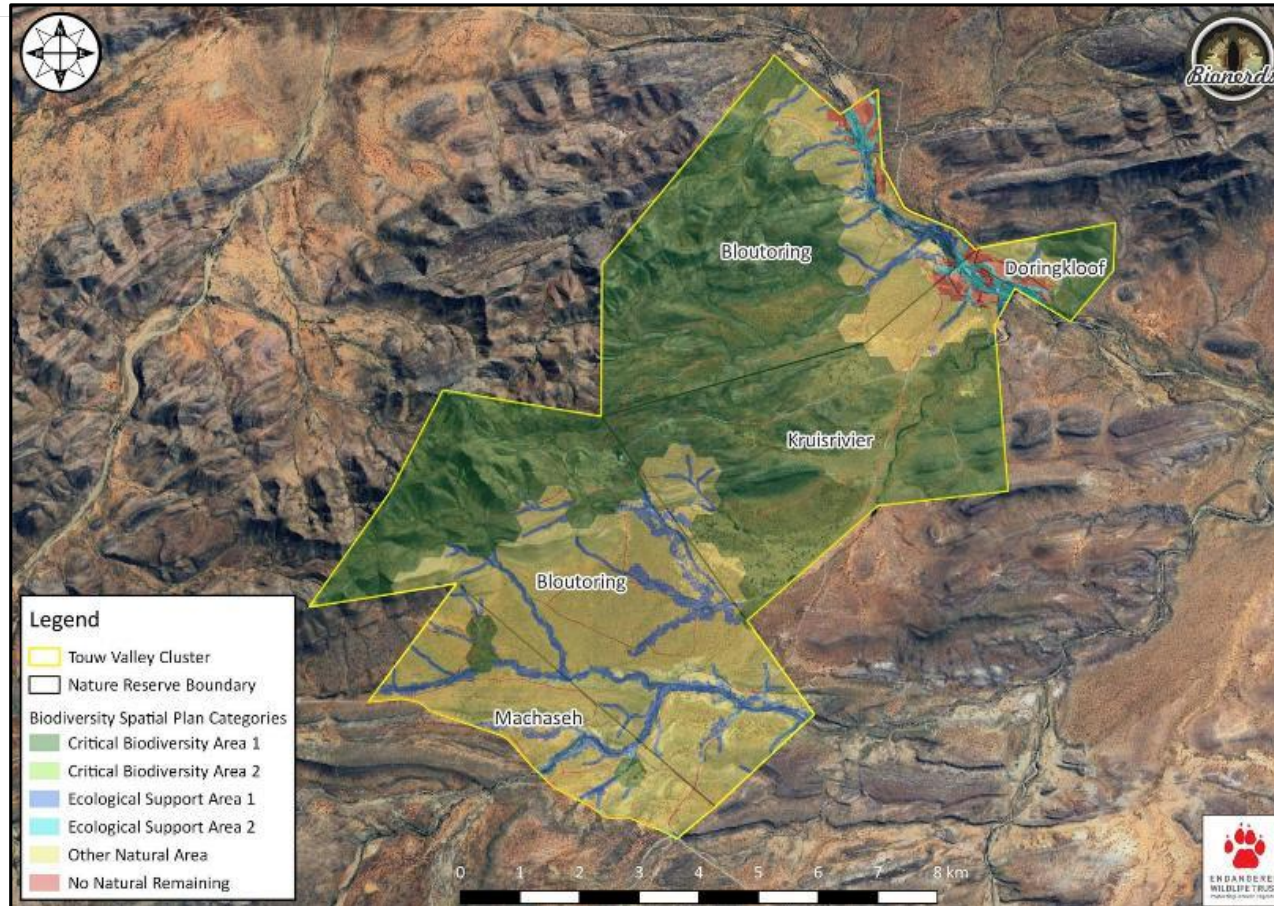


Figure 14 – Western Cape Biodiversity Spatial Planning categories for the Touw Valley Cluster

Table 10 - The WCBSP (2017) management guidelines and objectives for categories recorded on the Touw Valley Cluster.

Category	Management Objective	Guidelines
Protected Area	Must be kept in a natural state, with a PAMP focused on maintaining or improving the state of biodiversity. A benchmark for biodiversity.	All operational aspects of managing these areas must be subject to their main purpose, which is to protect and maintain biodiversity and ecological integrity and should be governed by a formally approved PAMP including land use activities that support the primary function of these areas as sites for biodiversity conservation. The PAMP must identify allowable activities, which should be consistent at least with the irreplaceable CBA category; the location of these allowable activities should be captured in a Zonation Plan in the PAMP. Activities relating to the construction of roads, administrative or tourism infrastructure and services required to support the primary function of the protected area and its allowable activities are subject to NEMA authorisation and the PAMP.
CBA1: Terrestrial	Maintain in a natural or near-natural state, with no further loss of natural habitat. Degraded areas should be rehabilitated. Only low-impact, biodiversity-sensitive land uses are appropriate.	Biodiversity loss and land use change in CBAs should not be permitted. Unauthorised land use change or degradation must be monitored as a matter of priority. Ideally, conservation management activities should be the primary land use in all irreplaceable areas, or they should be managed in ways that have no negative impact on species, ecosystems or ecosystem services. Extensive (low-intensity) game ranching may be compatible if well managed and biodiversity features, recommended stocking rates and infrastructure impacts are considered. Conservation efforts should focus on Species of Conservation Concern, keystone species, pollinators and seed dispersers. Ideally, development should be avoided. Specialist studies must form part of the Scoping and EIA process. Degraded areas should be restored where possible. Soil Erosion Management should be given high priority.

Table 10. The WCBSP (2017) management guidelines and objectives for categories recorded on the Touw Valley Cluster (continued).

Category	Management Objective	Guidelines
CBA1: Aquatic	Maintain in a natural or near-natural state, with no further loss of natural habitat. Degraded areas should be rehabilitated. Only low-impact, biodiversity-sensitive land uses are appropriate.	Aquatic CBAs should be maintained in good ecological condition, and degraded systems should ideally be rehabilitated. Land use practices that will deteriorate the condition of an aquatic CBA or make rehabilitation difficult are not acceptable. Any proposed land use change must be subject to an EIA where river or wetland ecosystems may be affected. Maintain riparian vegetation and buffers along watercourses and implement rehabilitation where erosion or degradation occurs. Where ecological condition is good, it must be maintained. Where condition is fair to poor, rehabilitation must be implemented and any further loss avoided. All aquatic ecosystems must be appropriately buffered to protect ecological condition and allow future restoration.
CBA2: Terrestrial	Maintain in a functional, natural or near-natural state, with no further loss of natural habitat. These areas should be rehabilitated.	Acceptable land uses are those least harmful to biodiversity, such as conservation management or game farming. Extensive, well-managed game ranching is compatible with the desired management objectives. Habitat restoration measures should be implemented where necessary. If small-scale land use change is unavoidable, it must be located and designed to be as biodiversity-sensitive as possible. A specialist study must form part of the Scoping and EIA process for land use applications. These areas should be targeted as high-priority areas for rehabilitation, including Soil Erosion and Alien Vegetation Management.

Table 10. The WCBSP (2017) management guidelines and objectives for categories recorded on the Touw Valley Cluster (continued).

Category	Management Objective	Guidelines
ESA1: Aquatic	Maintain in a functional, near-natural state. Some habitat loss is acceptable, provided the underlying biodiversity objectives and ecological functioning are not compromised.	The ecological importance of aquatic ESAs may be related to ecosystem functioning rather than biodiversity pattern. Maintain the hydrological regime and water quality required to support the ecosystem. All aquatic ecosystems must be appropriately buffered to protect ecological condition and allow future rehabilitation or restoration. Activities affecting rivers, wetlands or open water bodies, including indirect impacts within the buffer, must be assessed by a suitably qualified specialist as part of any environmental assessment or licensing process.
ESA2	Restore and/or manage to minimise impacts on ecological infrastructure functioning, especially soil- and water-related services.	These areas may already contain development but should continue to provide ecosystem services where possible. Existing land uses should be withdrawn where feasible and rehabilitation undertaken. These areas should be prioritised for habitat rehabilitation and restoration activities, including Soil Erosion and Alien Vegetation Management.
ONA	Minimise habitat and species loss and ensure ecosystem functionality through strategic landscape planning. Offers flexibility in permissible land uses, but authorisation may still be required for high-impact land uses.	These areas have the greatest flexibility in terms of management objectives and permissible land uses. Where possible, avoid modifying any remaining natural habitat by locating development within already-modified areas. Authorisation may still be required for high-impact land uses under EIA regulations. These areas may still contain Species of Conservation Concern and should be surveyed before land-use change proceeds.
NNR	Manage land use in a biodiversity-friendly manner, aiming to maximise ecological functionality.	Areas with no remaining natural habitat are preferred locations for higher-impact land uses. Prioritise restoration where modified areas occur adjacent to high biodiversity areas. Develop incentives to restore biodiversity and ecological connectivity. Consider off-site impacts on neighbouring natural habitat. Use indigenous plants, especially trees, where suitable.

2.9.3 National Protected Area Expansion Strategy

The National Protected Areas Expansion Strategy (NPAES) was commissioned by the National Department of Environmental Affairs and served as a national framework for an integrated, coordinated, and uniform approach to the expansion and consolidation of the national protected areas system.

The NPAES, which provides a broad national framework for Protected Area expansion in South Africa, also identifies areas of importance to be targeted for Protected Area expansion in the country, and mechanisms to achieve this target. The strategy identifies biodiversity stewardship, principally through the declaration of nature reserves on private land, as a preferred mechanism for protected areas expansion. The NPAES calls on provinces to develop implementation plans in support of the NPAES and in support of provincial conservation efforts and priorities.

2.9.4 Western Cape Protected Area Expansion Strategy

CapeNature has developed a Protected Area Expansion Strategy for the Western Cape province to expand the network to encompass a more representative and resilient suite of areas that support biodiversity and habitats, especially those threatened species and ecosystems that remain as yet unprotected.

The strategy sets a target to formally protect 60% of the biodiversity thresholds for all terrestrial ecosystems by the year 2030. This target speaks to South Africa's ecological requirements and political commitments where the total area implied by the target is equivalent to the area committed to by the Government of South Africa in terms of the Convention on Biological Diversity's Aichi Target 11.

The objectives developed in the 2015 Western Cape Protected Area Expansion Strategy aims to achieve the above targets by achieving the following objectives:

- Critically Endangered ecosystems: to secure the best remaining sites in the province of poorly protected Critically Endangered ecosystems. Critically Endangered ecosystems are vegetation types that have been irreversibly transformed and where conservation targets for the ecosystem can no longer be achieved.
- Under-protected ecosystems and strategic landscapes: to make a significant contribution towards meeting Protected Area targets for under-represented ecosystems in the Western Cape by achieving conservation targets in strategic locations.
- Essential habitat for selected species: to secure at least one site considered essential to ensuring the long-term viability of threatened species or specific groups.
- Freshwater ecosystems: to secure freshwater ecosystems such as peat wetlands, vernal pools, and Critically Endangered freshwater ecosystem types.

The CapeNature Biodiversity Stewardship Programme has been given the mandate by the Western Cape Provincial Minister of Local Government, Environmental Affairs and Development Planning to implement the National Protected Area Expansion Strategy and grow the formal protected area network in the Western Cape Province. The Stewardship programme utilises Section 23 and Section 28 of the NEMPA (Act No 57 of 2003) to proclaim formally protected Nature Reserves and Protected Environments.

2.9.5 Landscape Conservation Corridors

One of the greatest threats facing ecosystem and species persistence is climate change. Climate change linked with irreversible habitat loss and associated degradation will become the greatest challenge facing conservation in the future. The creation of conservation corridors on a landscape level provides an opportunity for ecosystems to adapt to future challenges, especially where conservation management is already in place on properties comprising the corridors. Properties that promote biodiversity conservation and ecosystem function ensure that resilient ecosystems are in place to allow for the continued evolution and adaptation of ecosystems under future environmental change. Species that are reliant on the ecosystems within corridor systems also have the opportunity to move in response to environmental change, thereby ensuring that evolutionary drivers continue to promote biodiversity in the landscape.

A major focus in the Klein Karoo basin has been the mega-corridor that would link the Anysberg mountain range to the Langeberg mountains. The Touw Valley Cluster directly borders the Anysberg, and would form part of the corridor that linked the Anysberg and Grootvadersbosch Nature Reserves, the Sanbona Wildlife Reserve, the Warmwaterberg State Forest, and the Boosmansbos Wilderness Area. The Langeberg Mountain Catchments are statutorily protected and provide links and buffers to these provincial nature reserves (Figure 15). The CapeNature Biodiversity Stewardship Programme and the Leslie Hill Succulent Karoo Trust have been active in the landscape and have already included numerous properties within the corridor in Biodiversity Stewardship. Only a few of these sites have been included as formally proclaimed protected areas, with the remainder included as Voluntary Conservation Areas and Biodiversity Agreements, but the commitment to Stewardship indicates that landowner willingness and a conservation mindset is already in place.

The opportunity is now available to the Touw Valley Cluster to become a role-player in turning this landscape conservation corridor vision into a reality, as a stakeholder in proactive landscape-level conservation partnerships.

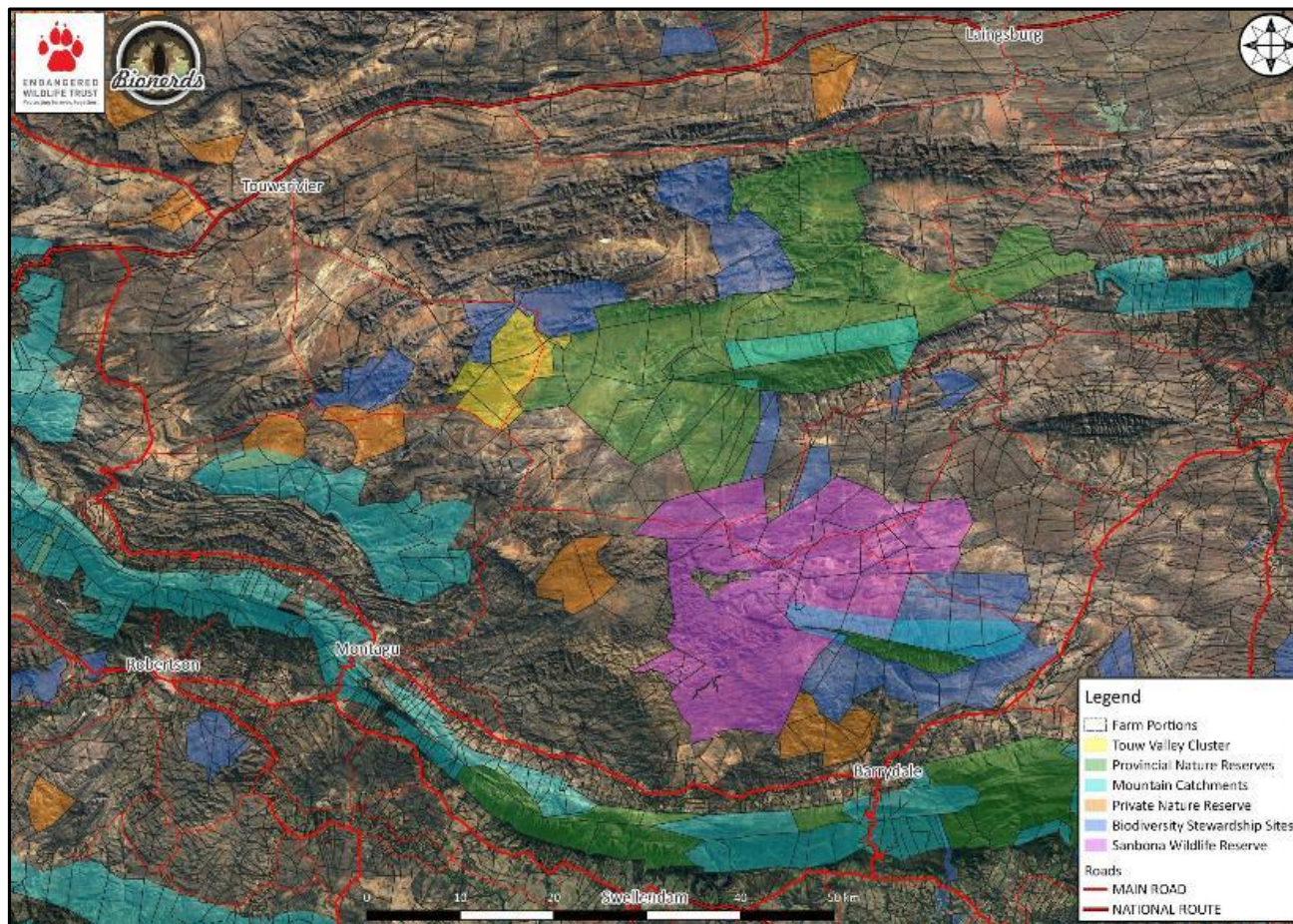


Figure 15 – Landscape conservation opportunities in the Klein Karoo basin linking the Anysberg, Warmwaterberg and Langeberg mountains

While the conservation corridor linking the Anysberg, Warmwaterberg and Langeberg mountains is a realistic and achievable protected area expansion target, it is important to recognise the incredible conservation strides that have already been achieved in the corridor.

The Endangered Wildlife Trust, CapeNature, WWF-SA, Leslie Hill Succulent Karoo Trust and the conservation minded landowners involved in the Biodiversity Stewardship Programme have already created a major conservation corridor in the Western Klein Karoo. The variety of mechanisms that have secured and achieved this conservation corridor have created a mega-reserve in the Klein Karoo basin that conserves approximately 228 544 hectares. The largest role players within the mega reserve include CapeNature (Anysberg), the Sanbona Wildlife Reserve and Koktyls. The Touw Valley Cluster will become part of this mega reserve as it borders directly on the Anysberg World Heritage Site and Nature Reserve's western boundary.

The mega reserve secures 11 ecosystems, the extent of which are shown below in Table 11 and illustrated in Figure 16.

Table 11 - Ecosystems conserved in the Klein Karoo mega reserve.

Ecosystem Name	SA Veg Map Code	Biome	Conservation Target	Protection Status	Hectares
Little Karoo Quartz Vygieveld	SKv10	Succulent Karoo	16%	Poorly Protected	4 867
Matjiesfontein Quartzite Fynbos	FFq3	Fynbos	27%	Poorly Protected	14 101
Matjiesfontein Shale Fynbos	FFh2	Fynbos	27%	Well Protected	4 376
Matjiesfontein Shale Renosterveld	FRs6	Fynbos	27%	Poorly Protected	21 849
Montagu Shale Fynbos	FFh8	Fynbos	30%	Poorly Protected	2 501
Montagu Shale Renosterveld	FRs7	Fynbos	27%	Poorly Protected	42 045
North Langeberg Sandstone Fynbos	FFs15	Fynbos	30%	Well Protected	8 856
North Swartberg Sandstone Fynbos	FFs23	Fynbos	27%	Well Protected	13 567
South Langeberg Sandstone Fynbos	FFs16	Fynbos	30%	Well Protected	5 935
South Swartberg Sandstone Fynbos	FFs24	Fynbos	27%	Well Protected	8 725
Western Little Karoo	SKv8	Succulent Karoo	16%	Moderately Protected	103 709



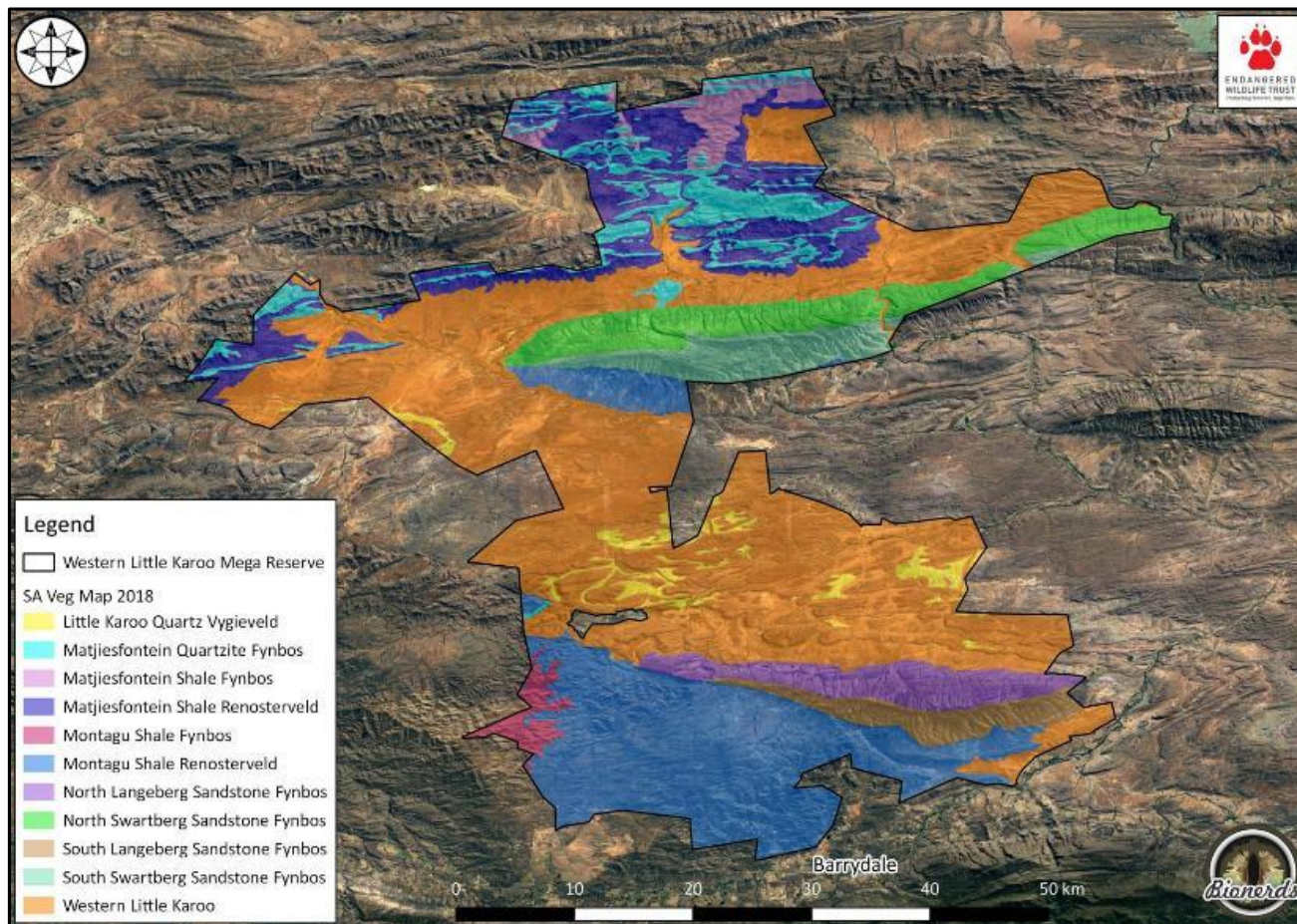


Figure 16 – The distribution of ecosystems in the Klein Karoo mega reserve

PART C

3. Strategic Management Framework

3.1 Integrated Development Plans and Strategic Development Framework

In terms of the Municipal Systems Act No. 32 of 2000, local municipalities in South Africa are required to use integrated development planning to plot future development in their area. An Integrated Development Plan (IDP) is a 5-year strategic plan in which the municipal strategic and budget priorities are set. An IDP is intended to be the principal strategic instrument to inform planning and development within a municipality. Among the key components of an IDP are disaster management plans and a Spatial Development Framework (SDF).

SDF's are essentially the spatial reflection of a municipality's IDP. An SDF is updated every five years and must indicate the desired patterns of land-use for the municipality and provide strategic guidance regarding the location and form of development, as well as conservation, within the municipality.

IDPs and SDF's are tools for integrating social-, economic- and environmental issues and development within a municipality. As biodiversity is a fundamental component of sustainable development, IDPs and SDFs offer an opportunity to ensure that biodiversity priorities are incorporated into planning processes. The Spatial Proposals from the Langeberg and Witzenberg Breede Valley Municipality Integrated Development Plan list the need to promote the conservation of sensitive natural and cultural heritage resources in the Langeberg and Witzenberg Breede Valley. This should be read in context with the Cape Winelands District Municipal Spatial Development Framework.

The Vision for the Cape Winelands SDF is to *“optimise the rich and balanced mix of Langeberg's agriculture, tourism, heritage and conservation resources within their scenic setting...”*. The implications of this vision for conservation is to ensure that private conservation areas must continue to be promoted with careful consideration of appropriate development rights to mobilise the necessary resources for veld rehabilitation and management. This is achieved with the broad Spatial Planning Categories which include Core Areas, where no conventional urban development occurs and includes conservation areas, river corridors and ridgeline boundaries, and Buffer Areas which includes undeveloped rural land and extensive agriculture with no development beyond one building per 10 hectares with clustered development nodes.

The Spatial Planning Categories further divide the Core Areas into two categories – Core 1: Formally Protected Areas and Core 2: River and Wetland Corridors. The Core 1 category comprises formally protected natural areas, including large Core Biodiversity Areas identified by SANBI. The Buffer 1 Critical Biodiversity Areas outside of Core 1 areas is a further category which encompasses important vegetation fragments requiring protection that have been identified by SANBI. Landowners are encouraged to protect these areas through

Stewardship Agreements or in the establishment of conservancies and should only be utilised for conservation purposes.

The formal proclamation of the Touw Valley Cluster meets the vision of the IDP and SDF which is to ensure that *“private conservation areas must continue to be promoted...”* and in terms of the IDP’s identified needs to *“promote the conservation of sensitive natural and cultural heritage resources”*. The importance of the Touw Valley Cluster within the local, regional planning context is further illustrated when one considers the position of the nature reserve within the local landscape, its potential to form part of a larger Protected Area network and to meet targets in conserving CBAs.

3.1.1 Critical Biodiversity Area

The portions of the Touw Valley Cluster where ecosystem function is in a natural or semi-natural state have been included in the zonation scheme as CBAs. The objective for the CBA zonation category is to maintain this category 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. The motivation for zoning these habitats as CBA include the fact that this category is required to meet biodiversity targets for species, ecosystems or ecological processes and infrastructure which includes: all areas required for biodiversity pattern targets, Critically Endangered ecosystems, all areas required to meet ecological infrastructure targets, which are aimed at ensuring the continued existence and functioning of ecosystems and delivery of essential ecosystem services, and critical corridors to maintain landscape connectivity.

3.1.2 Ecological Support Area

The ESA zonation scheme on the Touw Valley Cluster captures habitat where historical transformation has led to degradation, but rehabilitation has occurred to such an extent that ecosystem structure has returned. These systems require ongoing management interventions to continually facilitate the rehabilitation process, which will eventually lead to their reclassification as CBAs when a fully functional ecosystem is restored.

The motivation for inclusion of these areas as an ESA is that the rehabilitated sections include areas that are required to meet biodiversity pattern, such as species and ecosystems targets; areas required to meet ecological targets, which are necessary to ensure the persistence and continued functioning of ecosystems and essential ecosystem service delivery, and critical corridors required to maintain landscape connectivity.

The management objective and guideline for ESAs on the Touw Valley Cluster is to maintain these habitats in a functional, natural, or near-natural state, with no further loss of natural habitat. These areas should be prioritised for rehabilitation.

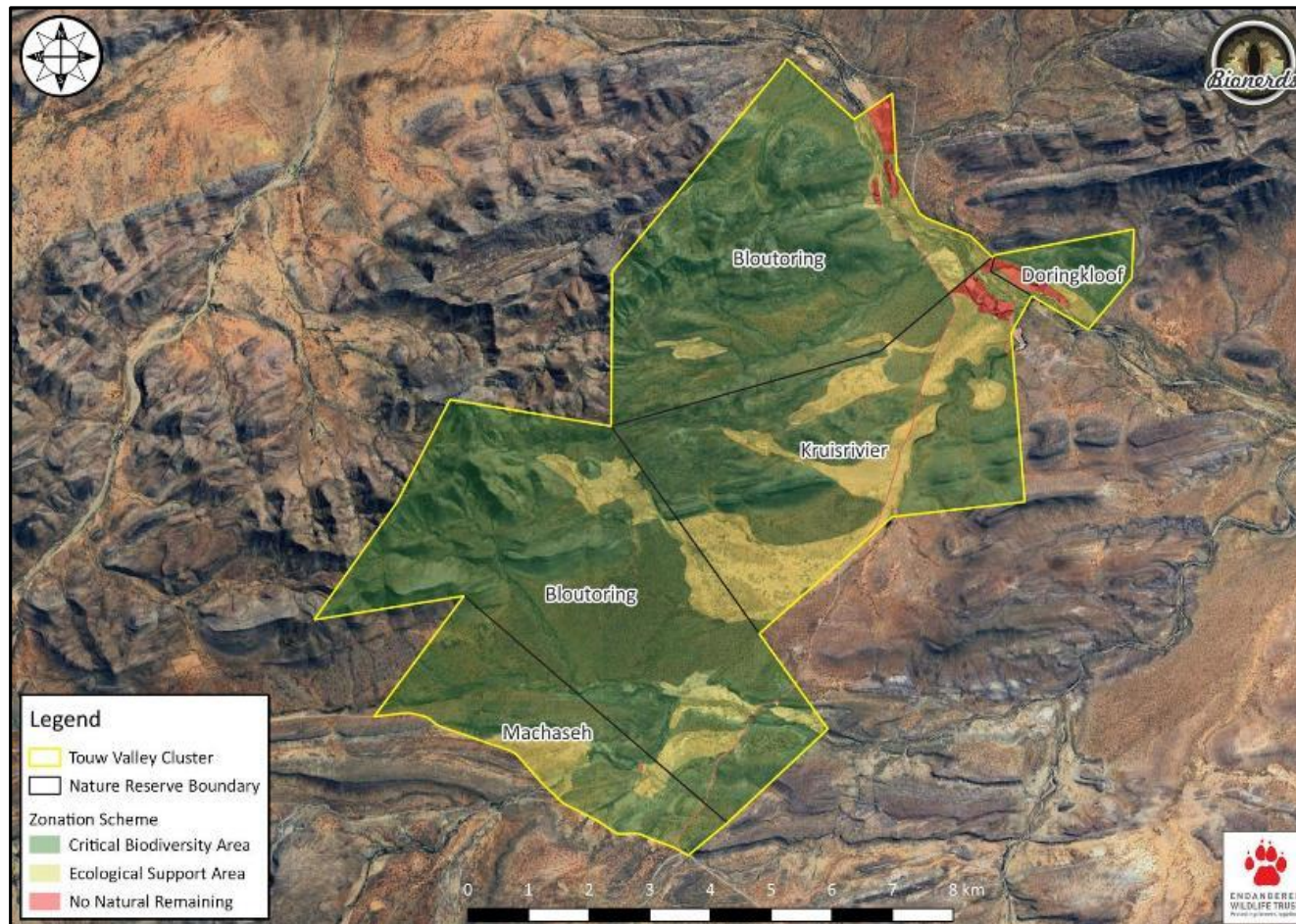


Figure 17 – The Touw Valley Cluster zonation scheme as assessed in 2023

3.1.3 No Natural Remaining

The WCBSP captures areas with no natural remaining habitat (NNR) as areas that have been modified by human activity to the extent that they are no longer natural, and do not contribute to biodiversity targets. These areas may still provide limited biodiversity and ecological infrastructure functions, even if they are never prioritised for conservation action. While these areas offer the most flexibility for land use, they should still be managed in a biodiversity-sensitive manner, aiming to maximise ecological functionality. On the Touw Valley Cluster all portions of the reserves that include infrastructure, highly transformed habitat, and road networks have been assigned the NNR category.

The management objective and guidelines for this category are to manage the land use in a biodiversity-friendly manner where possible, while aiming to maximise ecological functionality. Where rehabilitations of heavily degraded areas are possible, these systems should be stabilised to restore a semblance of ecological functionality, particularly soil carbon and water-related functionality, using indigenous plant cover. Rehabilitated NNR systems can be reviewed and reclassified as ONAs when appropriate.

The extent of each zonation category on the Touw Valley Cluster and for each Nature Reserve is given below in Table 12.

Table 12 - The zonation scheme extent across the Touw Valley Cluster.

Nature Reserve	Extent (Ha)	Critical Biodiversity Area		Ecological Support Area		No Natural Remaining	
		Hectares	Percentage	Hectares	Percentage	Hectares	Percentage
Bloutoring	4 648	4 070	88	521	11	57	1
Doringkloof	225	156	69	37	16	32	14
Kruisrivier	1 994	1 280	64	662	33	52	3
Machaseh	845	714	84	112	13	19	2
Touw Valley Cluster	7 712	6 219	81	1 332	17	161	2

Management objectives and guidelines for each zonation category are given as Table 13 below.

Table 13 - Management objectives and guidelines for zonation categories on the Nature Reserves comprising the Touw Valley Cluster.

Category	Management Objective	Guidelines
CBA	Maintain in a natural or near-natural state, with no further loss of natural habitat. Degraded areas should be rehabilitated. Only low-impact, biodiversity-sensitive land uses are appropriate.	Biodiversity loss should not be permitted and the zonation category must be managed without negative impacts on species, ecosystems or ecosystem services. CBAs should be maintained in good ecological condition and degraded areas rehabilitated. Where ecological condition is intact it must be maintained. Where condition is fair, the zonation should be amended to ESA until rehabilitation has improved the condition. If ecological condition is impacted, rehabilitation must be implemented and any further loss avoided. Riparian vegetation and buffers must be maintained, and rehabilitation implemented along watercourses. All aquatic ecosystems must be appropriately buffered. Wildlife management is compatible with this category provided biodiversity features, stocking rates and ecological carrying capacity are considered. Conservation efforts should focus on Species of Conservation Concern, pollinators and seed dispersers. Degraded areas should be restored to natural ecosystem functioning. Soil Erosion Control and Alien Vegetation Management should be prioritised.



Table 13. Management objectives and guidelines for zonation categories on the Nature Reserves comprising the Touw Valley Cluster (continued).

Category	Management Objective	Guidelines
ESA	Restore and/or manage to minimise impact on ecological infrastructure functioning; especially soil- and water-related services.	These areas may have been degraded through historical land-use practices (such as livestock grazing) but still provide ecosystem regulation. Prioritise habitat rehabilitation and restoration activities including alien plant clearing and soil erosion prevention. Apply best-practice natural resource management to minimise further habitat loss. Species of Conservation Concern may still occur and rehabilitation should be undertaken as a matter of urgency. If ecological condition is impacted, rehabilitation must be implemented and any further loss avoided. Maintain riparian vegetation and buffers along watercourses. All aquatic ecosystems must be appropriately buffered. Wildlife management is compatible with this category provided biodiversity features and ecological condition are taken into consideration. Where historical grazing has degraded habitat, conservative stocking rates and adequate resting periods are recommended.
NNR	Manage land use in a biodiversity-friendly manner, aiming to maximise ecological functionality.	These areas include infrastructure, lands, homesteads, roads and quarries. Due to the level of ecological degradation, these are preferred sites for higher-impact land uses before modifying any remaining natural habitat. Restoration and rehabilitation should be prioritised where heavily modified areas occur adjacent to land of high biodiversity value to promote natural buffers and minimise edge effects. When locating development in modified areas, consider off-site impacts on neighbouring natural habitat. Use indigenous plants, especially trees, wherever aesthetic or functional options exist.

3.2 Purpose

The Touw Valley Cluster serves in the protection of South Africa's threatened and rare species, provides protection to ecosystems and preserves ecological integrity. Benefits of appropriate nature based economic activities may be utilised to promote human, social, cultural and economic development while protecting ecosystems that are vulnerable and ecologically sensitive.

3.3 Vision

The Vision of the four Nature Reserves comprising the Touw Valley Cluster is to ensure the long-term preservation of ecosystem structure and function as well as the conservation of biodiversity through promoting ecosystem resilience. The various Management Authorities of the Touw Valley Cluster will strive to achieve effective ecological management through continual improvement of all activities - environmentally, socially, and economically.

3.4 Mission

The four Management Authorities comprising the Touw Valley Cluster undertakes to hold the principles of biodiversity conservation and ecosystem resilience paramount in their management and decision-making relating to the Nature Reserves and will strive to ensure that the Vision is achieved.

3.5 Key Performance Areas and Management Objectives

Management objectives have been developed with the express purpose of providing the basis for achieving the vision of the Touw Valley Cluster. The management objectives are derived from the mission, purpose and vision and are grouped under Key Performance Areas (KPA's).

In the Annual Plan of Operations (APO), the management objectives below will be prioritised in terms of importance and urgency and coupled with detailed management activities that will deliver the desired outcomes under each objective.

The Key Performance Areas, management objectives and key deliverables for Biodiversity and Ecological Components (Table 14), Sustainable utilisation of Natural Resources (Table 15), Socio-economic and Heritage (Table 16), and Management Authority Effectiveness and Sustainability (Table 17) and are given below.

Table 14 - Biodiversity and Ecological Components objectives and deliverables.

Key Performance Area: Biodiversity and Ecological Components		
Management Objective	Objective Statement	Key Deliverables
Fire Management	Promote and maintain a natural fire regime that best serves the ecological functioning of fire driven ecosystems.	Determine the extent of fire prone ecosystems and adopt a natural fire regime to promote ecological processes.
		Promote regional partnerships with relevant stakeholders to develop a landscape-level fire strategy.
		Implement cross-border firebreak agreements with neighbouring landowners to ensure legal compliance with respect to uncontrolled wildfires.
Alien Vegetation Management	Minimise the spread of Invasive Alien Plant (IAP) species and target the clearing of priority species wherever they may be encountered.	Continually monitor the presence of prioritised IAP species.
		Eradicate prioritized IAP species using mechanical control methods.
		Apply for exclusion permits as per the NEMBA regulations.
Soil Erosion Prevention and Control	Halt the degradation of ecosystems caused by soil erosion by assessing problem erosion areas annually and combating erosion accordingly.	Quantifies the extent of erosion on a watershed level and prioritise key areas that require management intervention to halt degradation and promote rehabilitation.
		Monitor problem erosion areas annually to ensure early detection of accelerated soil loss which should be combatted accordingly.
		Implement long-term monitoring of rehabilitated soil erosion sites to quantify rehabilitation effectiveness.
Terrestrial Habitat Management	Conserve ecological function, biodiversity pattern and ecosystem structure and function of terrestrial ecosystems on the Touw Valley Cluster.	Conduct research on ecosystems as per the South African National Biodiversity Institute.
		Develop a fine-scale plant community map for the Touw Valley Cluster that captures habitat quality, threatened species assemblages, ecological carrying capacities and monitoring protocols for each described community.
		Implement Veld Condition Assessments to assess habitat quality.
Wildlife Management	Ensure effective conservation of faunal species, populations and inter-relationships in order to enhance biodiversity while maintaining and improving ecosystem function.	Determine stocking rates based on the ecological carrying capacities for the Touw Valley Cluster.
		Review stocking rates annually and manage offtake or intake of wildlife.
		Monitor the impact of fauna on the ecosystem and evaluate the health of faunal populations across the Touw Valley Cluster.

Table 15 - Sustainable utilisation of Natural Resources objectives and deliverables.

Key Performance Area: Sustainable utilisation of Natural Resources		
Management Objective	Objective Statement	Key Deliverables
Grazing and browsing of livestock and game	Game and livestock are effectively used as a management tool to ensure the health of natural vegetation.	Veld condition assessments are used to determine carrying capacity relative to climatic and rainfall cycles.
		A Grazing Plan is compiled which takes into consideration veld condition, stock numbers, stock breeds, herd size, camp sizes and grazing frequency per camp.
		Game and livestock numbers are managed to ecological carrying capacity.
Recreation and tourism	To generate income from a tourism business that makes a sustainable contribution towards the conservation management costs of the reserve.	Viable tourism business model to guide tourism development and operations.
		A range of appropriate eco-tourism products and services are offered.
		Tourism infrastructure and operations do not have a negative impact on any of the conservation objectives of the reserve.
		Tourism infrastructure design and construction comply with development planning requirements.
		Profits from tourism operations make a meaningful contribution towards conservation management costs.
Sustainable harvesting	To ensure the sustainable use of natural plant resources in a manner that ensures the conservation of biodiversity and minimal ecological disturbance in the areas where harvesting operations occur.	Harvesting Plan with well managed harvesting activities.
		Possession of all necessary harvesting permits.
		Accurate and up-to-date records of all harvesting operations maintained.
		Monitor and evaluate long-term impacts of harvesting operations.

Table 16 - Socio-economic and heritage objectives and deliverables (continued).

Key Performance Area: Socio-economic and heritage		
Management Objective	Objective Statement	Key Deliverables
Environmental Awareness and Education	Stakeholders receive an increased awareness and understanding of the importance and value of functioning ecosystems and an introduction to careers in eco-tourism, hospitality and nature conservation.	• Increase awareness about the value of functioning ecosystems and conservation land use.
		• Address specific management issues such as security, poaching, etc.
		• Informal training and/or holiday camps provided to school groups.
		• Formal career development training provided to potential employees.
Socio-economic development initiatives	To work with relevant stakeholders to make a meaningful contribution towards the socio-economic development needs of local communities.	• Eco-tourism guides, hospitality staff and conservators are sourced from local community
		• Community receives tangible value from the reserve.
		• Positive relationships with key community role players and groups.
Heritage features	To locate, document, and conserve archaeological, paleontological and cultural heritage features on the reserve.	• Systematically map and document all archaeological, paleontological and cultural features with input from experts.
		• To support the study of on-reserve features by experts and to share knowledge and insights gained.
		• To conserve the integrity of all archaeological and heritage features on the reserve.

Table 17 - Management Effectiveness and Sustainability objectives and deliverables.

Key Performance Area: Management Effectiveness and Sustainability		
Management Objective	Objective Statement	Key Deliverables
Formal Proclamation as a S23 Nature Reserve	Ensure all reserve declaration documentation is in order and that all activities are compliant with relevant legislation and policies.	Ensure Notarial Deed with surveyor diagram and title deed restrictions are executed by the Notary and registered at the Deeds Office.
		Ensure that PAMP is adopted by all relevant parties.
		Implement the PAMP and conduct annual reviews.
Management Infrastructure and Equipment	Ensure the reserve has the necessary infrastructure and equipment to enable the cost-effective achievement of the management objectives.	Supply, maintain and replace necessary infrastructure and equipment needed to implement the management plan.
Responsible Tourism	Develop a sustainable business model that supports the implementation of management activities and the conservation of biodiversity on the Touw Valley Cluster.	Identify and generate revenue compatible with the values, mission and vision of the Touw Valley Cluster.
Legal Compliance	Ensure that all relevant South African legislation is adhered to by the Management Authorities of the Nature Reserves comprising the Touw Valley Cluster.	Ensure that all proposed projects and objectives are compliant with all relevant legislation and internal policies.
Zonation	Ensure that zonation categories and objectives reflect the Touw Valley Cluster values, mission and vision.	Develop a Past, Present and Future plan that captures zonation objectives for zonation categories across the Touw Valley Cluster.
		Record management interventions implemented and measured their effectiveness. Review zonation categories over the medium to long-term and adapt spatial zonation accordingly.

3.6 Annual Costing Plan

The annual budget is detailed in the Annual Plan of Operation (APO), which serves as the primary financial planning document. A copy of the APO is provided in **Annexure 10**.

Costing within this Strategic Management Plan serves as a critical reality check, helping to prioritize actions and allocate resources effectively. The current budget estimates, presented in the table below, offer a framework for tracking existing financial resources and to identify funding gaps which can lead to exploring alternative funding sources, as well as projecting future financial needs.

The estimated breakdown of management costs is aligned with each management objective for a one-year cycle. These figures reflect realistic projections based on the Management Authority's forecasted budget at the time of drafting. However, it is important to note that detailed budgets in future Annual Plans of Operation will supersede these estimates.

Financial Sustainability and Resource Mobilization

To ensure the effective implementation of the Protected Area Management Plan and the achievement of protected area objectives, the Management Authority will actively pursue strategies to secure adequate funding. These strategies can include Soliciting donor funding for targeted projects and initiatives, advocating for increased budget allocations from government or parent institutions, deferring lower-priority activities until sufficient funding becomes available.

These approaches will be reviewed and adapted annually to respond to changing financial landscapes and emerging opportunities.

Table 18 - Estimated annual management cost breakdown.

Key Performance Area	Management objectives	Estimated Annual Cost Doringkloof Karoo Plaas	Estimated Annual Cost Bloutoring	Estimated Annual Cost Machaseh	Estimated Annual Cost Kruisrivier
BIODIVERSITY & ECOLOGICAL COMPONENTS	Integrated Wildfire Control	R3 500		R11 000	R10 000
	Integrated Invasive Alien Species Control	R5 000	R15 000	R2 000	
	Aquatic and Riparian Systems				R1 000
	Rehabilitation and Restoration	R30 000	R10 000	R12 000	R8 000
	Species of Special Concern		R50 000		R2 500
	Wildlife	R10 000	R50 000	R1 000	R7 000
SUSTAINABLE UTILISATION OF NATURAL RESOURCES	Grazing and Browsing of Livestock and Game				
	Recreation and Tourism			R16 000	R2 000
	Sustainable Harvesting			R3 000	
SOCIO-ECONOMIC & HERITAGE	Environmental Awareness and Education				
	Socio-economic Development Initiatives			R84 400	
	Heritage Features		R1 000		
MANAGEMENT AUTHORITY EFFECTIVENESS & SUSTAINABILITY	Legal Compliance				
	Employee Skills Development			R2 000	R3 000
	Management Infrastructure and Equipment	R150 000	R150 000	R15 000	R50 000
	Signage, Access Control and Security	R1 000	R12 000	R1 500	R10 000
	Research and Management Knowledge				R1 000
	Research and Management Knowledge				
	Estimated Annual Management Cost:	R199 500	R288 000	R147 900	R94 500

*Note: Cost estimates are projected to increase annually, adjusted for inflation and other economic factors.

3.7 Zonation Scheme

The Zonation scheme for the Touw Valley Cluster has been developed within the categories of the WCBSP and has designated categories according to management units and the ecological integrity within each nature reserve. The core zonation categories for the Touw Valley Cluster are:

- **Critical Biodiversity Area** - the portions of the Touw Valley Cluster where ecosystem function is in a natural or semi-natural state have been included in the zonation scheme as Critical Biodiversity Areas (CBAs). The objective for the CBA zonation category is to maintain this category 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. The motivation for zoning these habitats as CBAs include the fact that this category is required to meet biodiversity targets for species, ecosystems or ecological processes which includes: all areas required for biodiversity pattern targets, Critically Endangered ecosystems, all areas required to meet ecological infrastructure targets, which are aimed at ensuring the continued existence and functioning of ecosystems and delivery of essential ecosystem services, and critical corridors to maintain landscape connectivity.
- **Ecological Support Area** - the Ecological Support Area (ESA) zonation scheme on the Touw Valley Cluster captures habitat where historical transformation has led to some degradation, but rehabilitation has occurred to such an extent that ecosystem structure has returned. These systems require ongoing management interventions to continually facilitate the rehabilitation process, which will eventually lead to their reclassification as CBAs when a fully functional ecosystem is restored, and habitat degradation is halted and reversed. The motivation for inclusion of these areas as an ESA is that the rehabilitated sections include areas that are required to meet biodiversity pattern, such as species and ecosystems targets, areas required to meet ecological targets, which are necessary to ensure the persistence and continued functioning of ecosystems and essential ecosystem service delivery, and critical corridors required to maintain landscape connectivity. The management objective and guideline for ESAs on the Touw Valley Cluster is to maintain these habitats in a functional, natural, or near-natural state, with no further loss of natural habitat. These areas should be prioritised for rehabilitation.
- **No Natural Remaining (NNR)** – this zonation category captures areas with no natural remaining habitat as areas that have been modified by human activity to the extent that they are no longer natural, and do not contribute to biodiversity targets. These areas may still provide limited biodiversity and ecological infrastructure functions, even if they are never prioritised for conservation action. While these areas offer the most flexibility for land use, they should still be managed in a biodiversity-sensitive manner, aiming to maximise ecological functionality. On the Touw Valley Cluster, all portions of the reserve that include infrastructure, highly transformed habitat, and road networks have been assigned the NNR category. The management objective and

guideline for this category is to manage the land use in a biodiversity-friendly manner where possible. Where rehabilitations of heavily degraded areas are possible, these systems should be stabilised to restore a semblance of ecological functionality, particularly soil carbon and water-related functionality, using indigenous plant cover. Rehabilitated NNR systems can be reviewed and reclassified, which will require the creation of the Other Natural Area category on the Touw Valley Cluster.

Management interventions that are implemented with the specific purpose of habitat rehabilitation, such as alien vegetation management and soil erosion prevention and control, should be monitored to ensure the effectiveness of the rehabilitation techniques, but should also quantify the potential change within the specific zonation category.

The Vision and Mission of the Touw Valley Cluster expects that a natural progression of No Natural Remaining to Other Natural Area, from Other Natural Area to Ecological Support Area, and Ecological Support Area to Critical Biodiversity Area should take place on the reserves as best practice conservation management principles are adhered to. Likewise, a regression between zonation categories will indicate that thresholds of potential concern have been triggered and habitat degradation has occurred. It is imperative that the causes of degradation are investigated, and adaptive management principles applied to ensure that degradation is halted, with rehabilitation and restoration management interventions applied to promote the reversal of impacts.

The current extent of each zonation category across all management units on the Touw Valley Cluster is given in Table 19 below.

Table 19 - Zonation for Nature Reserves in the Touw Valley Cluster as assessed in 2023.

Nature Reserve	Extent (Ha)	Critical Biodiversity Area		Ecological Support Area		No Natural Remaining	
		Hectares	Percentage	Hectares	Percentage	Hectares	Percentage
Bloutoring	4 648	4 070	88	521	11	57	1
Doringkloof	225	156	69	37	16	32	14
Kruisrivier	1 994	1 280	64	662	33	52	3
Machaseh	845	714	84	112	13	19	2
Touw Valley Cluster	7 712	6 219	81	1 332	17	161	2

The key deliverables and management objectives necessary to achieve Zonation are given in Table 20.

Table 20 - Zonation key deliverables and management activities required to meet the management objective.

Key Deliverable	Management Activities	Responsibility
Zonation Scheme	Develop zonation categories and objectives and spatially capture the relevant zonation categories distribution across the Touw Valley Cluster.	DKPNR /BNR /MNR /KNR /EWT
	Ensure zone objectives and conditions are being adhered to and record management interventions implemented.	DKPNR /BNR /MNR /KNR /EWT
	Review effectiveness of management interventions and amend zonation categories over the medium to long-term where applicable.	DKPNR /BNR /MNR /KNR /EWT

* Please take note that the Management Authorities are indicated in the Responsibility column as:

- **DKPNR – Doringkloof Karoo Plaas Nature Reserve**
- **BNR – Bloutoring Nature Reserve**
- **MNR - Machaseh Nature Reserve**
- **KNR - Kruisrivier Nature Reserve**

The Touw Valley Cluster comprising four individual nature reserves are formally protected nature reserves, and as such will be captured within the WCBSP as a Protected Area with the management objective that the area *“Must be kept in a natural state, with a management plan focused on maintaining or improving the state of biodiversity. A benchmark for biodiversity.”*

On this basis, within some zones, the permissible intensity of use will be relatively higher than in others. CapeNature’s zonation categories, illustrated in Table 21, are derived from existing protected area zonation schemes worldwide, to develop a coherent scheme that provides for visitor experiences, access and conservation management needs.

Table 21 - Guide to CapeNature conservation management zones.

Zonation Category	Explanation
Wilderness / Wilderness (declared)	Areas with pristine landscapes, sensitive areas, or threatened ecosystems. Very limited access.
Primitive	Areas providing natural landscape, solitude and limited access. Normally a buffer area to wilderness zones.
Nature Access	Providing easy access to natural landscapes. Includes areas with roads and trails, and access to popular viewing sites and other sites of interest.
Development – Low intensity	Area with existing degraded footprint. Providing primarily self-catering accommodation and camping, environmental education facilities.
Development – High intensity	Area extensively degraded. Providing low and/or higher density accommodation, and maybe some conveniences such as shops and restaurants.
Development – Management	Location of infrastructure and facilities for reserve administration and management.
Development – Production	Commercial or subsistence farming (applicable to privately owned and managed nature reserves).
Development – Private Areas	Private dwellings and surrounds (only applicable to privately owned and managed nature reserves).
Species / Habitat / Cultural Protection	Areas for protection of species or habitats of special conservation concern.
Cultural Species / Habitat Visual Natural Resource Access	Special management overlays for areas requiring specific management interventions within the Species / Habitat / Cultural Protection Zone.

The following underlying decision-making rules are applied in determining zones:

1. Strike a balance between environmental protection and development of the complex to meet broader economic and social objectives of the protected area.
2. Consider existing development footprints and tourism access routes based on:

- a. The principle that all else being equal, an existing transformed site is preferable to a green fields site from a biodiversity perspective.
 - b. Increase in maintenance cost if the development is not near existing infrastructure.
 - c. The socio-economic benefit of existing tourism nodes and access routes.
 - d. Infrastructure design and services with due consideration for focal conservation targets.
3. Where existing development nodes, tourist sites and access routes occur in areas with high sensitivity-value, associated zonation must aim to confine the development footprint as much as possible and preferably within the existing transformed site.
 4. Sites with high biodiversity sensitivity value are put into stronger protection zones and peripheral development is favoured.

To achieve this objective the following management guidelines are recommended for Protected Areas:

- All operational aspects of managing these areas must be subject to their main purpose, which is to protect and maintain biodiversity and ecological integrity and should be governed by a formally approved management plan including land use activities that support the primary function of these areas as sites for biodiversity conservation.
The management plan must identify allowable activities, which should be consistent at least with the CBA Irreplaceable category; the location of these allowable activities should be captured in a zonation plan in the management plan.
- Activities relating to the construction of roads, administrative or tourism infrastructure and services (such as water reticulation systems or power lines) that are required to support the primary function of the protected area and its allowable activities, are subject to NEMA authorisation and the PAMP.

The WCBSP further recommends the location of these land use activities must be informed by the WCBSP Map and should be included in zonation schemes. All areas of natural habitat should be subject to implementation of the land use guidelines for PAs, CBAs, and ESAs.

To this end, the Zonation Scheme for the Touw Valley Cluster has been developed within the categories of the WCBSP and has designated categories according to management units and the ecological integrity within each unit. The zonation scheme for the Touw Valley Cluster is given as Figure 18 below.

The zonation maps for each Management Authority forming part of the Touw Valley Cluster can be seen in Figure 19 – 24 below.

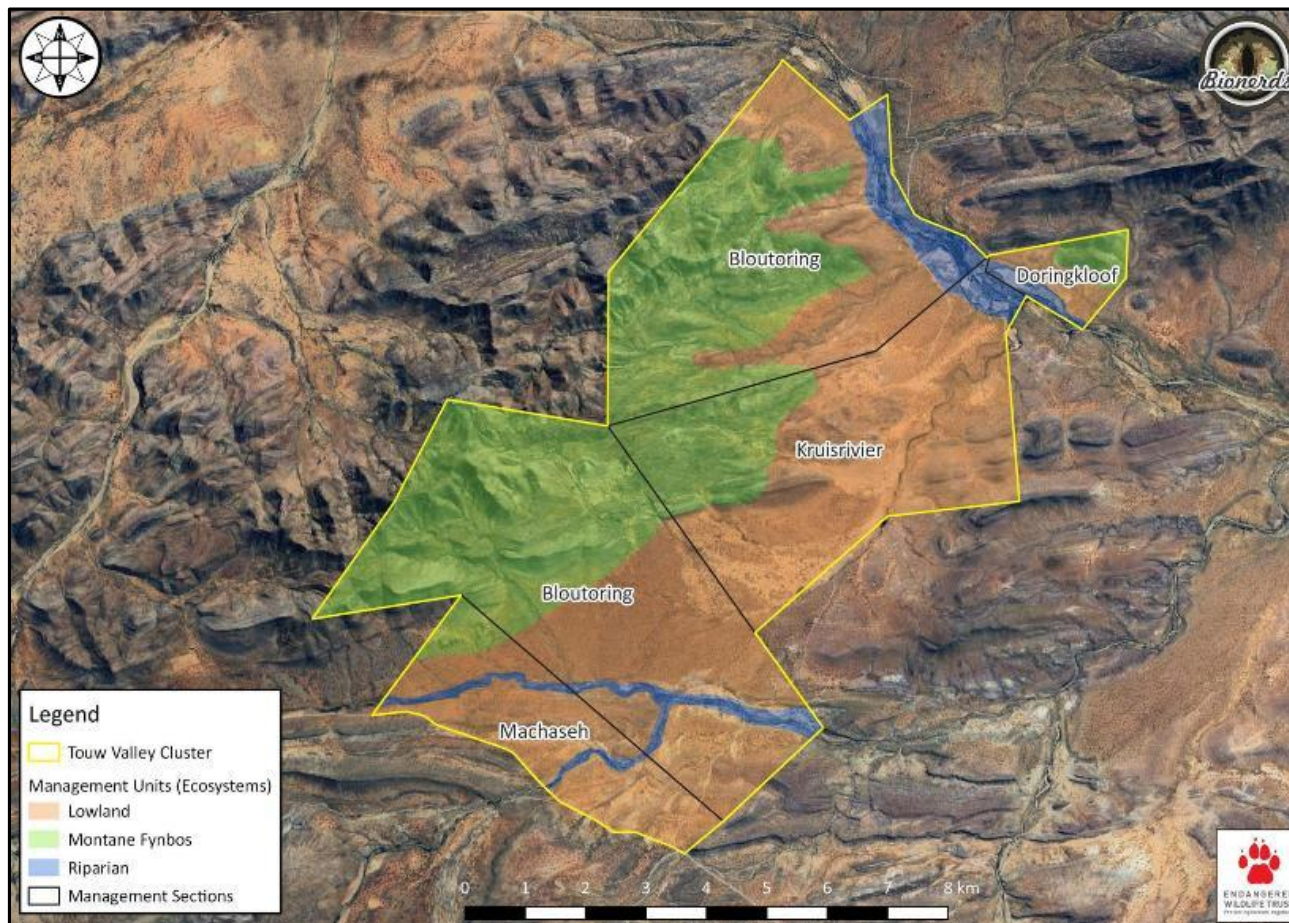


Figure 18 – Management sections and units for the Touw Valley Cluster

3.8 Management Units

Designating management units in a nature reserve is a crucial aspect of effective conservation and ecosystem management. This practice involves dividing the reserve into distinct units and should consider ecological processes and diversity of habitats. The distribution of plant and animal species, habitat types, soil types, topography and ecological drivers are important factors to consider when separating the reserve into units. The designation of management units in a nature reserve is essential for effective conservation and ecological management. It allows for targeted efforts, adaptive strategies, and efficient resource allocation, ultimately contributing to the long-term health and sustainability of natural ecosystems. These benefits can be explained in detail as follows:

- **Habitat Diversity** – management units allow for the conservation and enrichment of habitat types within the reserve, which is critical for promoting ecosystem resilience through supporting a diversity of faunal and floral species, each with specific habitat requirements.
- **Species Protection** – by isolating management actions through ecological processes the conservation manager can prioritise promoting the protection of specific Species of Conservation Concern. This targeted approach increases the chances of successful species conservation.
- **Ecological Processes** – designating management units enables the preservation of natural ecological processes, such as nutrient cycling, pollination, and seed dispersal. This contributes to maintaining the overall health and functionality of the ecosystem.
- **Ecosystem Resilience** – creating management units allows for the identification and protection of key ecological components. This helps build ecosystem resilience which is the ability of an ecosystem to absorb, adapt to, and recover from disturbances or changes while maintaining its essential structure, function, and feedback mechanisms. Resilient ecosystems can withstand shocks, such as climate fluctuations, or human-induced disturbances, without undergoing a fundamental shift to an alternative and less desirable state. Resilience is a key attribute that contributes to the long-term sustainability and health of ecosystems, allowing them to persist in the face of environmental challenges.
- **Adaptive Management** – management units provide a framework for adaptive management. Conservationists can monitor and assess the effectiveness of management strategies in specific units, allowing for adjustments based on changing ecological conditions and emerging threats.
- **Management Experimentation** – different management approaches can be tested in various units, providing valuable insights into the most effective conservation strategies. This experimentation contributes to the development of best practices for conservation.

- **Efficient Resource Use** – designating management units helps allocate resources such as funding, personnel, and technology more efficiently. Conservation efforts can be prioritized based on the specific needs and challenges faced by each unit.
- **Targeted Interventions** – resources can be targeted to address specific issues within each management unit, optimizing the impact of conservation activities and maximizing the benefits for biodiversity.

Management Units on the Touw Valley Cluster are grouped by ecosystems that have been consolidated according to ecological process. This includes Riparian, Montane Fynbos and Lowland ecosystems which are clarified as follows:

- **Riparian** – riparian ecosystems include the River and Floodplain habitat which is classed as the lowest elevations in the landscape where water drains from the upper catchment areas, and the associated floodplains which may be inundated during floods events. While the riparian habitat in the Touw Valley Cluster has been degraded due to alternative landuse such as pasture and irrigated cultivation, there are sections of the river and floodplain habitat which in a natural condition.
- **Montane Fynbos** – montane fynbos ecosystems include the grassy fynbos and renosterveld mosaic habitat which are fire driven ecosystems that can carry fires due to the distribution of plant species and vegetation structure. These ecosystems are typically limited to the upper elevations of the Touw Valley Cluster in rugged montane habitat.
- **Lowland** – lowland ecosystems occur on gentle topography in valley bottoms and plains. The Apronveld, Randteveld, Gannaveld and Karoo mosaic vegetation variants have been included as lowlands ecosystems as the same pressures are shared across these systems. This includes historical grazing practices that may have led to habitat degradation through overgrazing as well as the associated increase in topsoil loss and capped soils which lead to accelerated soil erosion.

The Touw Valley Cluster is comprised of four nature reserves, namely the Bloutoring, Doringkloof Karoo Plaas, Kruisrivier and Machaseh Nature Reserves. The Management Authority that has been designated for each Nature Reserve as per the NEMPA declaration process and is responsible for all management activities within the boundaries of their Nature Reserve. It is recommended that the management units described above are grouped according to management section, which are divided according to the boundaries of the nature reserves. The management units and management sections across the Touw Valley cluster are given below in Figure 15, while the extent of each management unit within the boundaries of the nature reserves are given in Table 22.

Table 22 - The extent of management units and sections of the Touw Valley Cluster.

Management Section	Management Unit			Total (Ha)
	Riparian (Ha)	Montane Fynbos (Ha)	Lowland (Ha)	
Bloutoring	320	2 523	1 806	4 649
Doringkloof	49	79	98	226
Kruisrivier	64	442	1 488	1 994
Machaseh	72	83	690	845
Total (Ha)	505	3 127	4 082	7 714

3.9 Development Plans

The concept development plan sets out the long-term plan for the development of the protected area. Development should not negatively affect the purpose or any of the key determining factors of the protected area. In essence this section of the plan should inform the scoping report required in terms of the National Environmental Management Act's Environmental Impact Assessment Regulations. Below is each planned development for the four Nature Reserves that for part of the Touw Vally cluster, as presented in the zonation maps:

*Bloutoring

- **Long-term development plan for the protected area (as per zoning plan)** – As per maps, Bloutoring has one homestead (purple) surrounding disturbed area and existing lands (indicated in purple).
- **Development nodes** – Possible future planned development sites are all indicated in red. These will likely be off-grid camping sites in future. Not confirmed, and thus no planned dates.
- **Communication routes** – No new roads planned.
- **Service supply routes** – Currently no new water pipelines, electricity and telephone lines which are to feed either existing infrastructure or proposed developments planned. Unless new buildings are developed, however in that case off-grid options will be investigate as first option.
- **Infrastructure development proposals for the period** – No developments planned for existing infrastructure at this stage, only when required due to unexpected damage or wear.

*Macaseh

- **Long-term development plan for the protected area (as per zoning plan)** – As per map, Macaseh has one homestead (purple) surrounding disturbed area and one existing camp site (far West of map).
- **Development nodes** – Possible future planned development is indicated in orange, with one site some minor expansion (like a shade port) added to this shipping container to the right

(far east), possible second homestead or cottage, and one possible site for tented camps. Not confirmed, and thus no planned dates.

- **Communication routes** – No new roads planned.
- **Service supply routes** – Currently no new water pipelines, electricity and telephone lines which are to feed either existing infrastructure or proposed developments planned. Unless new buildings are developed, however in that case off-grid options will be investigated as first option.
- **Infrastructure development proposals for the period** – No developments planned for existing infrastructure at this stage, only when required due to unexpected damage or wear.

*Doringkloof Karoo Plaas

- **Long-term development plan for the protected area (as per zoning plan)** – As per map, Doringkloof has one homestead (purple) surrounding disturbed area (including agricultural lands).
- **Development nodes** – Possible future planned development is indicated in orange, two possible campsites (off-grid), the red area indicates possible future guesthouse. Not confirmed, and thus no planned dates.
- **Communication routes** – No new roads planned. Existing Hiking routes indicated in white on the map (utilising existing paths and roads)
- **Service supply routes** – Currently no new water pipelines, electricity and telephone lines which are to feed either existing infrastructure or proposed developments planned. Unless new buildings are developed, however in that case off-grid options will be investigated as first option.
- **Infrastructure development proposals for the period** – No developments planned for existing infrastructure at this stage, only when required due to unexpected damage or wear.

*Kruisrivier

- **Long-term development plan for the protected area (as per zoning plan)** – As per map, Kruisrivier has one homestead (purple) surrounding disturbed area (including agricultural lands). The second smaller purple site indicates an existing guesthouse and buffer area.
- **Development nodes** – Possible future planned development is indicated in orange. This area is a disturbed area (old dumpsite), which the Managing Authority would like to clean (remove all waste) and use as agricultural lands in future.
- **Communication routes** – No new roads planned.
- **Service supply routes** – Currently no new water pipelines, electricity and telephone lines which are to feed either existing infrastructure or proposed developments planned. Unless new buildings are developed, however in that case off-grid options will be investigated as first option.
- **Infrastructure development proposals for the period** – No developments planned for existing infrastructure at this stage, only when required due to unexpected damage or wear.

The zonation maps for each Management Authority forming part of the Touw Valley Cluster can be seen in Figure 19 – 24 below.

3.9.1 Concept Development Plan

The concept development plan sets out the long-term plan for the development of the Touw Valley Cluster in keeping with the purpose of the complex and with due consideration for protected area sensitivity and zonation.

Tourism products and related infrastructure developments on the Touw Valley Cluster are considered investments and are intended to:

- Harness and enhance the income generation potential of protected areas with a view to achieving long term business sustainability.
- The provision of safe, informative and purpose-built access to protected areas.
- To enhance the operational efficiency and management of protected areas.

3.9.2 Project Selection

Organisationally, potential tourism product developments are selected based on internal consultation and approval where factors such as appropriateness, environmental authorisation, financial feasibility, and the apparent return on investment are considered. Where external approvals for developments are required, these are sought from the relevant authorities prior to the commencement of any development activities.

3.9.3 Methodology

Tourism products and infrastructure within protected areas need to be sensitive to their locations. Tourism developments aim to comply with prevailing zonation schemes and sensitivity analysis unless approval to the contrary has been obtained.

Wherever possible, tourism products, developments and services are intended to provide training and employment opportunities to communities within and surrounding the protected area.



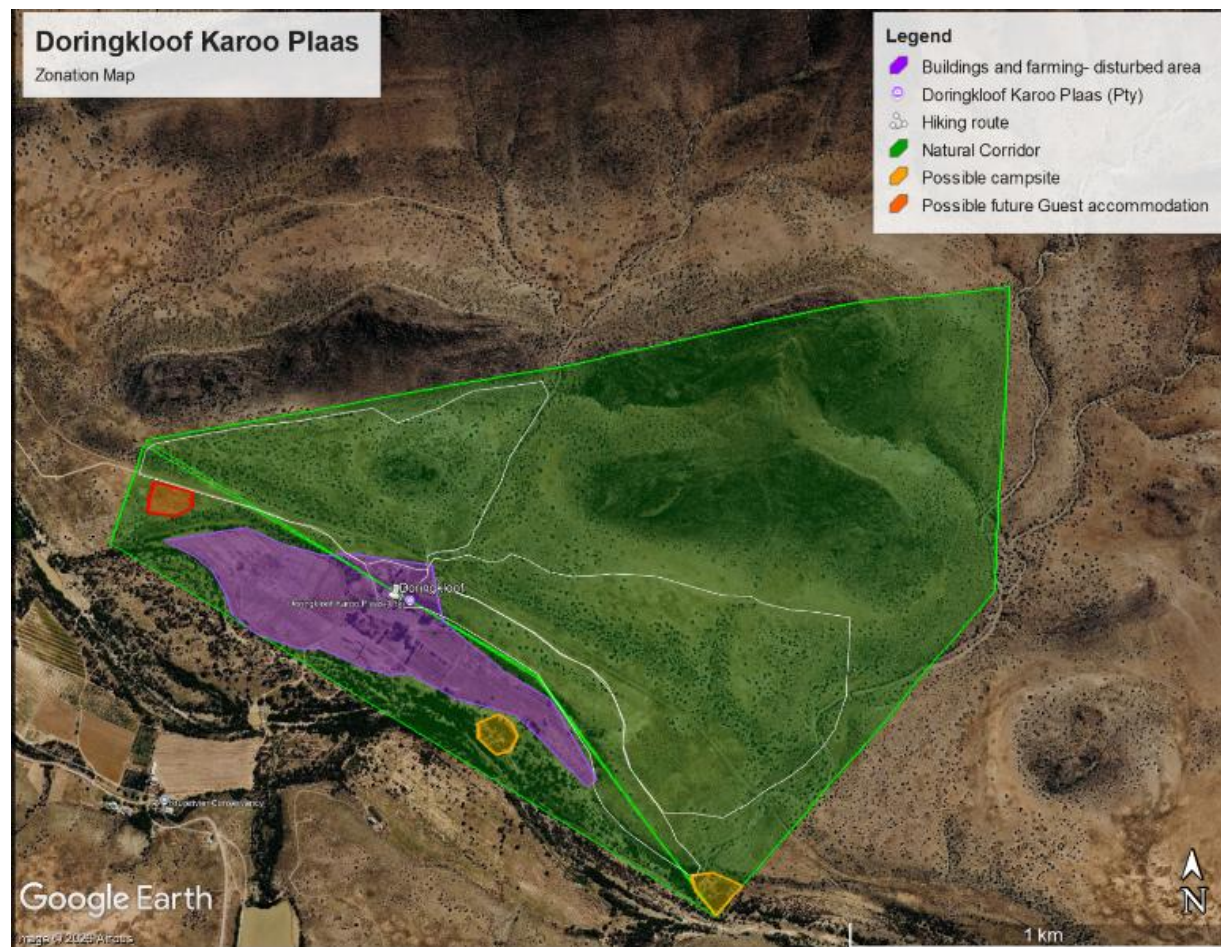


Figure 19 – Zonation map for Doringkloof Karoo Plaas showing planned development

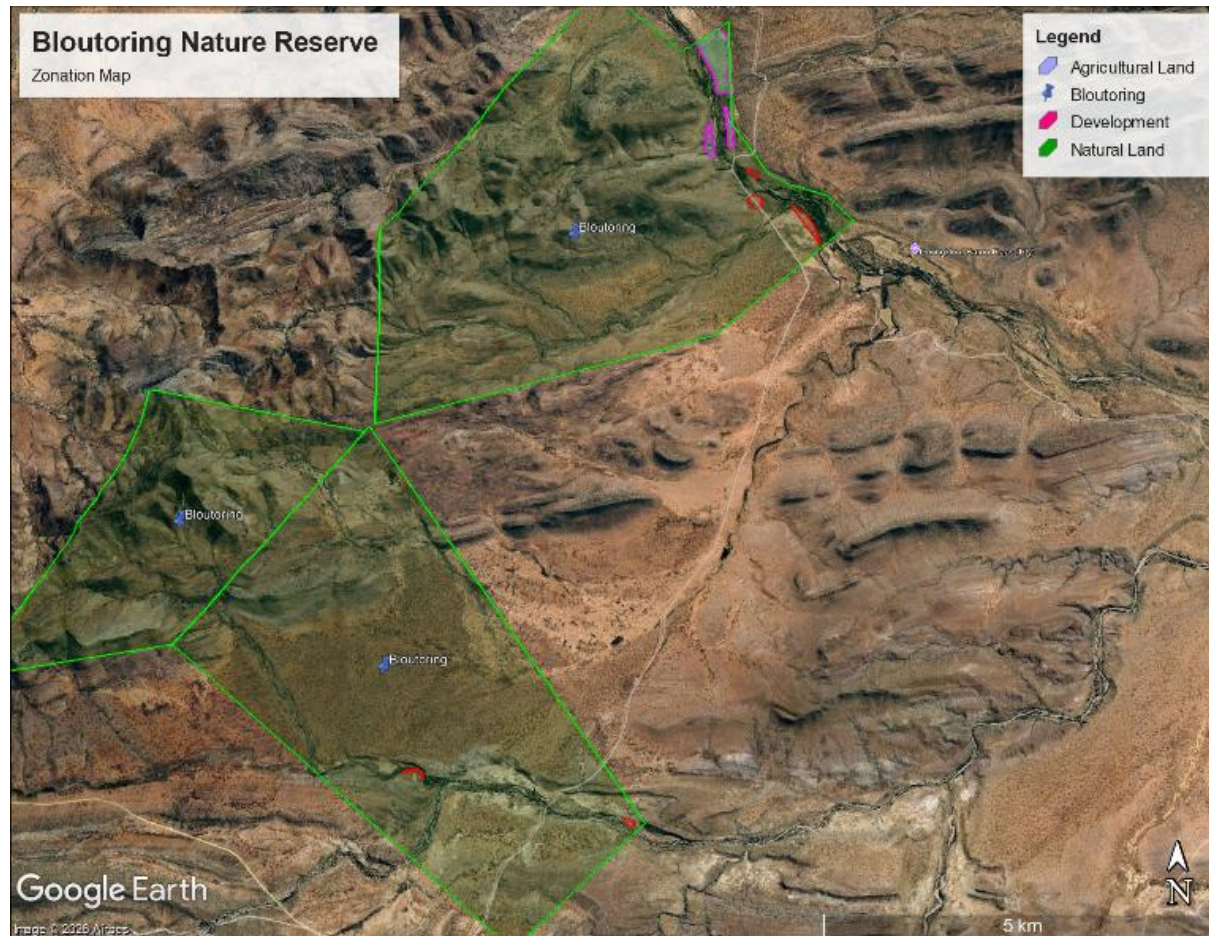


Figure 20 – Zonation map for Bloutoring Nature Reserve showing planned development (entire area)



Figure 21 – Zonation map for Bloutoring Nature Reserve showing planned development zoomed on northern section with homestead

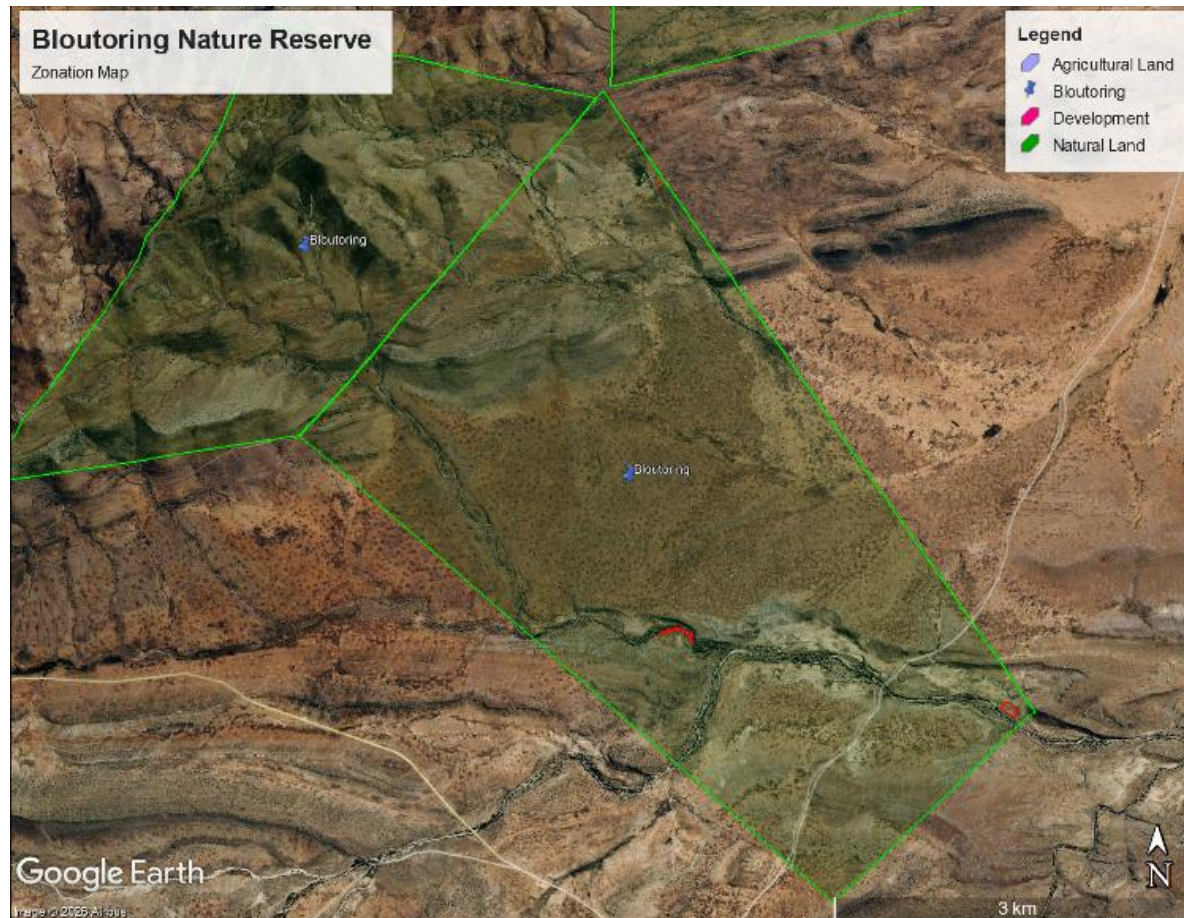


Figure 22 – Zonation map for Bloutoring Nature Reserve showing planned development zoomed on southern sections

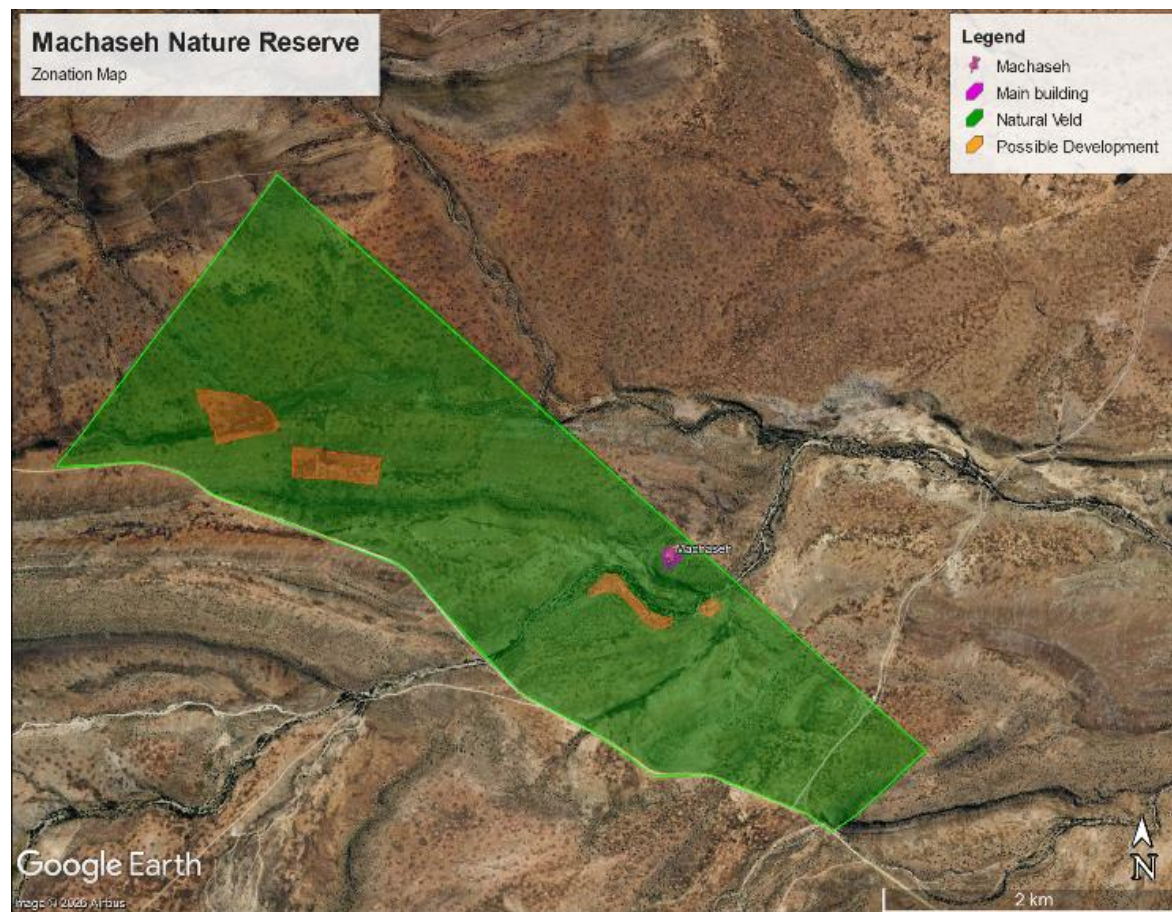


Figure 23 – Zonation map for Machaseh Nature Reserve showing planned development and homestead

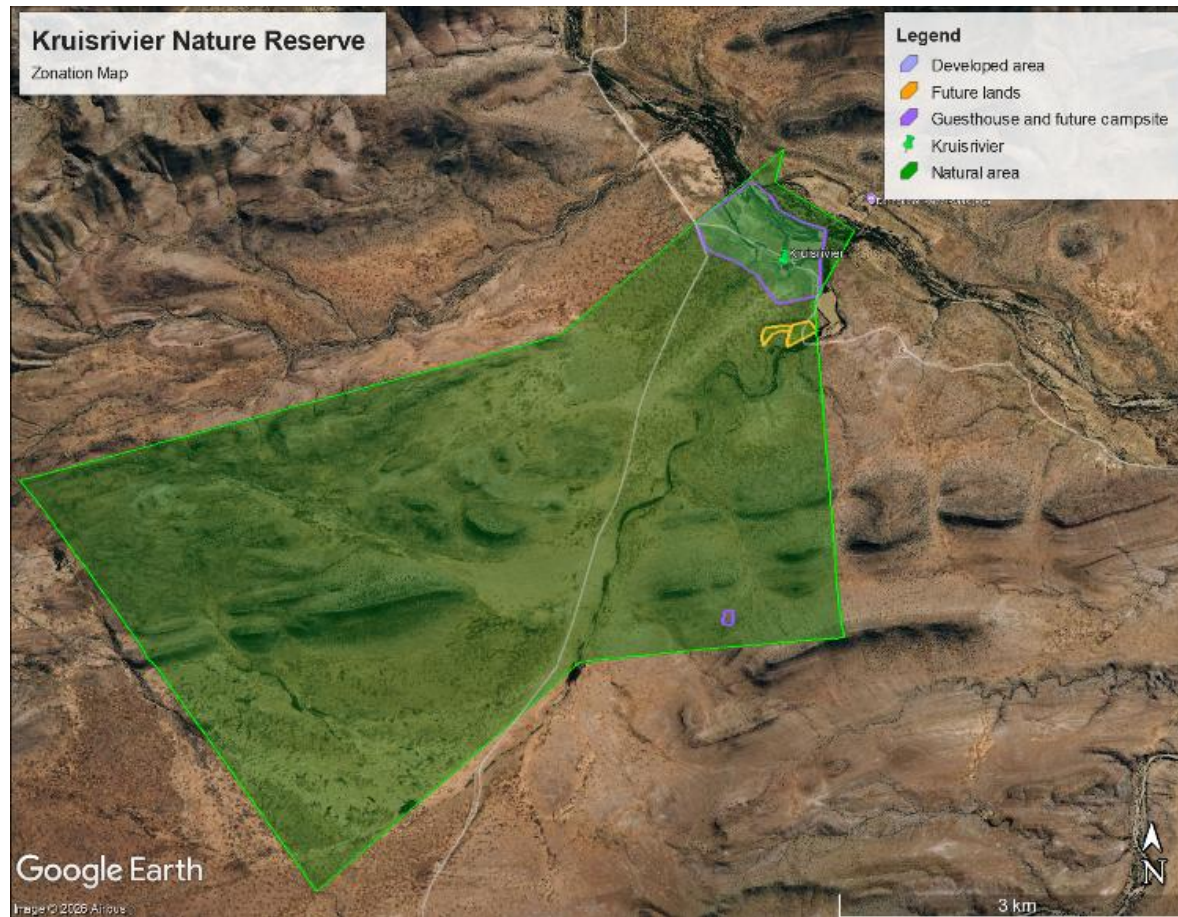


Figure 24 – Zonation map for Kruisrivier Nature Reserve showing planned development and homestead



IMPLEMENTATION OF THE MANAGEMENT PLAN □

PART D

4 Operational Management Guidelines

4.1 Biodiversity and Ecological Components

4.1.1 Fire Management

Management Objective: *Promote and maintain a natural fire regime that best serves the ecological functioning of fire driven ecosystems.*

Fire is an essential ecosystem process in fynbos. It provides the disturbance and stimulus that has contributed to the unprecedented floristic response experienced in the Cape Floristic Region. Fire is essential for the continued functioning of the fynbos ecosystem and the continued evolution of habitat and species. Due to the fragmentation of the natural landscape, fire can no longer operate naturally at a landscape scale and where the possibility exists within montane habitat, the potential of runaway fires with loss of infrastructure and life generally lead to the adoption of fire suppression tactics. It is therefore necessary to facilitate the process across smaller compartments to promote the persistence of biodiversity and ecological function.

The primary use of fire as a management tool is to maintain viable populations of all existing plant and animal species. Other management benefits offered with the implementation of fire as a management tool include the reduction of fuel loads minimising associated risk of uncontrolled wildfire, the control of invasive alien plants, and to increase water yield in mountain catchments. The use of a controlled burning programme should always be informed by ecological best practice, where feasible.

CapeNature recommends that the following ecological guidelines should be considered:

- Burning should be undertaken in such a way that it maintains spatial and temporal heterogeneity within the landscape. A patch mosaic of burnt and un-burnt areas should be maintained. A variety of veld ages is the best way to maintain species diversity.
- Season - burn vegetation at the end of autumn, never in winter or spring. Generally, a late summer or autumn burn is best for fynbos species, prescribed burning in the summer months (November – February) is seldom advised due to the risk of runaway fires. Burning is usually only feasible in March and April. The season for prescribed burns in the Western Cape is 15 January – 15 May.
- Frequency – do not burn too frequently. Fynbos should be burnt at intervals of between 8 and 20 years, with Renosterveld at 7 to 12-year intervals. No fire should be permitted in fynbos until at least 50% of the population of the slowest-maturing species in an area have flowered for at least three successive seasons. Similarly, a fire is probably not necessary unless a third or more of the plants of these slow-maturing species are senescent (dying or no longer producing flowers and seeds). Prescribed burns

should generally not occur more often than every seven years as this may result in a loss of species that have not matured and produced seeds.

- The intensity of a fire is influenced by the fuel load, fuel moisture, relative humidity, and wind speed. The intensity can be manipulated by either reducing the fuel load by burning more often or by selecting the conditions that will lead to the desired type of fire.
- Burning must be undertaken with consideration of the biodiversity conservation requirements of the site and the need to protect rare and endangered species.
- The fire breaks should be prepared and maintained annually in a manner that is least damaging to the environment and aesthetics of the property. Current management roads and tracks should be utilised.
- Burning and fire management must be undertaken in a safe manner that is legally compliant with the National Veld and Forest Fire Act (No.101 of 1998).

To ensure that the above principles are adhered to, the following should be taken into consideration:

- Mountain Fynbos covers the higher elevations across the Machaseh, Bloutoring and Doringkloof Karoo Plaas Nature Reserves. This habitat has been captured as a fire-prone ecosystem and grouped as a management unit based on this ecological requirement.
- Minimal intensive agricultural land use transformed habitat in this management unit.
- Historical spatial fire data indicates that these fire prone ecosystems have not burnt in the past 50 years, and it can be expected that a natural fire occurrence could occur when weather conditions are favourable.
- The 2007 CEPF Klein Karoo Fire Frequency project implemented by Jan Vlok (Regalis Environmental Services janvlok@mweb.co.za) indicates that the recommended minimum fire frequency should be 20 – 50 years, while the maximum fire frequency should be 75 – 100 years. Plant community assessments in these ecosystems should be undertaken with a focus on the longest-lived plant species to determine what fire frequency should be adopted.
- A natural fire regime should be implemented, however, should too frequent fire occur within the landscape, a policy of fire exclusion should be adopted.

A primary outcome of fire readiness for the Touw Valley Cluster should not only be the development of a management strategy that promotes landscape level fire strategies to ensure the adoption of natural fire regimes but should also be to ensure legal requirements are met. The Touw Valley Cluster should be part of initiative to inform and promote stakeholder engagement and develop a Landscape-level Fire Management Strategy.

The key deliverables and management activities for Fire Management are given in Table 23.

Table 23 - Fire Management key deliverables and management activities required to meet the management objective.

Key Performance Area: Biodiversity and Ecological Components			
Management Objective: Fire Management			
Promote and maintain a natural fire regime that best serves the ecological functioning of fire driven ecosystems.			
Key Deliverable	Management Activities	Responsibility	Timeframe
Natural Fire Regime	Assess plant communities across fire-prone ecosystems and determine whether a natural fire regime should be adopted.	DKPNR / BNR / CN	01-Oct-26
	Should a natural fire regime be adopted, naturally occurring wildfires within fire prone ecosystems should be accepted and not suppressed.	DKPNR / BNR / MNR / KNR / CN / FPA	As Required
	Map the boundaries of natural wildfires across the reserve to capture current veld age and patch mosaics distribution.	DKPNR / BNR / MNR / KNR / CN	As Required
	Determine exclusion methodology to minimise the occurrence of natural wildfires once fire-prone ecosystems have undergone a natural burn. Too frequent fires should be actively managed against.	CN	As Required
	Implement pre- and post-burn monitoring of selected sites within fire-prone ecosystems.	DKPNR / BNR / MNR / KNR / CN	01-Oct-26
Fire Readiness	Ensure Membership of the local Fire Protection Association (FPA). Membership of the FPA must be maintained, and meetings attended as required.	DKPNR / BNR / MNR / KNR	Annually
	Fire readiness must be maintained as per the requirements of the FPA and relevant legislation (National Veld and Forest Fire Act No 1 of 1998) must be adhered to.	DKPNR / BNR / MNR / KNR	Ongoing

Landscape-level Fire Management Strategy	Firebreaks are required to protect infrastructure and to facilitate access in the event of combatting uncontrolled wildfires. As such firebreaks should be strategic and not follow property boundaries. Landowners will need to secure agreements with the direct neighbours to ensure legal compliance. Cross border firebreak agreements should be implemented under the direction of the FPA.	DKPNR / BNR / MNR / KNR / CN / FPA	01-Oct-26
	Develop a landscape-level fire strategy in partnership with the pertinent district municipalities, fire protection associations, CapeNature and neighbouring landowners where fire prone ecosystems occur.	DKPNR / BNR / MNR /CN	01-Oct-26

4.1.2 Alien Vegetation Management

Management Objective: *Minimise the spread of Invasive Alien Plant (IAP) species and target the clearing of priority species wherever they may be encountered.*

The National Environmental Management: Biodiversity Act (NEMBA), Act No 10 of 2004 places a legal responsibility on landowners to control invading alien plants on their properties. Section 70 of the Biodiversity Act assigns a category to invasive species that prescribes where the establishment and spread of each species must be curtailed. The species on the Touw Valley Cluster fall within Category 1b: Invasive species which must be controlled and wherever possible, removed and destroyed. Any form of trade or planting is strictly prohibited. Neighbouring properties, especially those upstream of the Nature Reserves with infestations of invasive alien plants, must be made aware of their responsibilities to clear these infestations that may invade the reserves as per the NEMBA.

CapeNature recommend the following principles in developing alien clearing programmes:

- Invasive alien plant control will require an ongoing programme that prioritises key infestations along water courses, drainage lines and upper catchment areas.
- Initial clearing efforts should focus on areas of young, less dense alien plants, as well as those areas containing infestations that are most likely to spread into new areas.
- All follow-up requirements must be strictly adhered to otherwise the problem will be exacerbated.

Invasive alien plant infestation on the Touw Valley Cluster is at a maintenance phase, and species should be targeted for removal wherever they are encountered. The list of alien plant species that occur or may occur on the Touw Valley Cluster include *Argemone ochroleuca* Mexican Poppy, *Atriplex lindleyi* Sponge-fruit Saltbush, *Atriplex nummularia* Old Man Saltbush, *Eucalyptus grandis* Saligna Gum, *Nicotonia glauca* Wild Tobacco, *Opuntia ficus-indica* Sweet Prickly Pear, *Prosopis glandulosa* Honey Mesquite, *Ricinus communis* Castor oil plant, *Schinus terebinthifolius* Brazilian Pepper Tree and *Xanthium spinosum* Spiny Cocklebur.

Where invasive alien plant species are encountered, the coordinates of the plant should be recorded and the plant mechanically cleared. Sites that have been cleared should be targeted for follow-up to ensure that germinating plants are removed before they have an opportunity to set seed. A best practice guide to managing invasive alien plants is available for download at: https://www.wwf.org.za/our_research/publications/?34703/practical-guide-invasive-alien-plants.

The key deliverables and management activities for Alien Vegetation Management are given in Table 24.

Table 24 - Alien Vegetation Management key deliverables and management activities required to meet the management objective.

Key Performance Area: Biodiversity and Ecological Components			
Management Objective: Alien Vegetation Management			
Minimise the spread of Invasive Alien Plant (IAP) species and target the clearing of priority species wherever they may be encountered.			
Key Deliverable	Management Activities	Responsibility	Timeframe
Implement Alien Clearing	Record the occurrence of IAP species (woody, succulent and annuals).	DKPNR / BNR / MNR / KNR	28-Feb-27
	Eradicate invasive alien plant species using mechanical control methods.	DKPNR / BNR / MNR / KNR	Ongoing
	Follow up on cleared invasive alien plants to ensure that germinating plants are cleared before they have an opportunity to set seed.	DKPNR / BNR / MNR / KNR	Ongoing
Ensure Legislative Compliance	Apply for permits to allow for the exclusion of specific trees that serve as heritage features on the Touw Valley Cluster as per the NEMBA regulations.	DKPNR / BNR / MNR / KNR	As Required

4.1.3 Soil Erosion Prevention and Control

Management Objective: *Halt the degradation of ecosystems caused by soil erosion by assessing problem erosion areas annually and combating erosion accordingly.*

Soil erosion is one of the most serious environmental threats facing human societies and directly leads to habitat degradation, biodiversity loss and desertification. While erosion is a natural geological process which takes place over extremely long periods, man-made erosion promotes the accelerated loss of soils and has become common across South Africa. The rate of soil loss is classified as excessive when soil loss exceeds the soil formation. Soil formation is extremely slow in arid and semi-arid regions, and it is estimated that it takes between 12 and 40 years to form 1 mm of soil in South Africa, a soil formation rate of 0.025 mm/year or 0.38 t/ha/year. Acceptable rates of soil loss in uncultivated soils vary between 0.5 t/ha/year to 1.0 t/ha/year, which is already in excess of soil formation rates. It is therefore imperative to ensure that soil conservation practices are a core principle on the Touw Valley Cluster.

Many of the erosion challenges facing the Touw Valley Cluster are directly linked to historical agricultural land use practices across the reserves the reserve. The discovery of gold and diamonds in South Africa in 1875 led to an enormous increase in immigrants to the country and an associated increase in agricultural production. Poor grazing and cultivation practices led to large-scale habitat degradation while land became increasingly scarce and expensive, leading to subdivisions of farms into ever smaller and smaller units. Soil was viewed as a non-degradable resource and coupled with poor farming practices, soil erosion reached immense proportions, especially in sensitive areas where soils have high erodibility.

Habitat exploitation increased even further when the Fencing Act (1912) and Drought Investigation Commission (1923) claimed that grazing capacities could be increased by fencing the veld into camps, while not implementing any forms of stock control or rotation. Stock numbers reached their peak in 1933, with 40.3 million animals, a number far in excess of safe stocking rates, leading to habitat degradation that South Africa has never recovered from.

Areas which have been impacted by human activities, such as roads, footpaths, overgrazing or alien vegetation clearing, can lead to ecosystem and habitat degradation, often through soil erosion. Best practice natural resource management interventions to prevent the loss of topsoil and to decrease water runoff on roads and footpaths should be implemented. Historically (pre-colonial times), animals would have roamed across the South African veld in response to grazing availability and forage availability would have directly controlled animal numbers, especially in times of drought when animal deaths would have taken time to recover, giving the veld adequate rest and restoration periods. But modern farming and conservation methods ignore this ecological relationship between habitat and grazers by artificially maintaining high stocking rates during drought periods through the provision of supplementary feed. As a result, veld is overgrazed, not only during

drought periods, but more importantly, and perhaps devastatingly, during the recovery period following droughts.

Overgrazing and poor grazing practices directly promotes soil erosion due to the basal and canopy cover reduction of plant communities. Basal cover protects soil from raindrop impact, which causes surface sealing and splash erosion, by reducing the energy of rainfall. As an example, a rainfall event of 25 mm/h will batter the soil surface with a mass of 200 t/ha at an average speed of 20 km/h. Basal cover also increases infiltration rates into the soil, thereby reducing erosion wash. Erosion wash and conspicuous erosion scars, caused by the decrease in infiltration, and sheet erosion, caused by an increase in surface sealing and splash erosion, are both evident on the Touw Valley Cluster.

One of the core principles of soil conservation should therefore be to encourage the development of as dense and stable plant cover as possible. The reduction of plant cover is directly linked to grazing animals. While overgrazing is the primary concern, hoof action plays a very important role in the initiation of erosion. Trampling is normally concentrated along game paths, where the powdering of the soil and denuding of vegetation becomes very evident. Piospheres, bare areas surrounding watering points (and supplementary feeding sites) are caused by hoof action, can have major destabilising impacts. Overgrazing also increases runoff, studies have shown that veld which is heavily grazed in the growth season leads to twice the amount of runoff from rested veld, an impact directly linked to soil compaction by animals.

To ensure that soil conservation is promoted on the Touw Valley Cluster it is necessary to develop a Soil Erosion Management Plan, which describes the distribution and cause of erosion (sheet and gully) on the reserve and develop effective interventions to halt habitat degradation and soil loss.

The Touw Valley Cluster displays evidence of historical overgrazing from livestock which has denuded plant cover and led to capping of soils and increased surface runoff with associated erosion concerns. Extreme rainfall events can occur in the Klein Karoo which then lead to flash flooding that drastically increases soil loss with and expansion in sheet and gully erosion areas. The following is recommended with respect to prioritising soil erosion prevention and control on the Touw Valley Cluster.

- Site Identification – collaborate with CapeNature, environmental agencies, and research institutions to gather information about areas that are prone to soil erosion, especially those in habitat types with a history of overgrazing such as lowlands on the Touw Valley Cluster. Use satellite imagery, aerial photographs, drone imagery, and field surveys to identify vulnerable sites. Look for signs such as capped soils, erosion gullies, denuded vegetation communities, and sediment deposition.
- Prioritization Criteria – develop criteria for prioritizing sites based on factors such as slope steepness, soil type, land use, vegetation cover, and proximity to water bodies. Consider the ecological

significance of the habitat and the occurrence of species of conservation concern to highlight the level of threat to ecosystem function.

- **Field Assessment** – conduct detailed field assessments of identified sites. Document the extent of soil erosion, the severity of overgrazing, and the characteristics of surface water runoff on a watershed scale. Use standardized assessment tools, such as erosion vulnerability indices, to quantify the level of degradation at each site.
- **Data Collection** – collect data on soil composition, vegetation cover, hydrological patterns, and climatic conditions. This information will help in understanding the underlying causes of erosion.
- **Spatial Mapping** – utilize Geographic Information System (GIS) technology and orthomosaic raster imagery captured with drones to map and analyze the spatial distribution of erosion-prone areas. This can help visualize the extent of the issue and assist in prioritization. Ideally spatial mapping should be conducted on a watershed level.
- **Prioritization Matrix** – develop a prioritization matrix that combines the identified criteria and field assessment results. Assign scores to each criterion and use them to rank the sites.
- **Emergency Response Planning** – identify sites that pose an immediate threat and require urgent intervention. Develop erosion control plans for these high-priority areas to mitigate the impact of soil loss.
- **Long-Term Management Strategies** – develop long-term soil conservation and erosion control strategies for each prioritized site. This may include drainage hollows or pits, erosion control fences, footpath treatment, shaping gully systems, use of geotextiles or gabion instalment.
- **Monitoring and Adaptive Management** – establish a monitoring system to track the effectiveness of implemented measures. Regularly reassess and update the prioritization based on changing conditions and the success of interventions.

Regular assessment of roads, footpaths, and bike trails, especially after heavy rainfall events will allow for the early detection of surface water runoff concerns. The proactive treatment of soil loss will ensure prevention of erosion prior to a major investment of time and money in dealing with a major threat to ecosystem structure and function in the Klein Karoo.

The key deliverables and management activities for Soil Erosion Prevention and Control are given in Table 25.

Table 25 - Soil Erosion Prevention and Control key deliverables and management activities required to meet the management objective.

Key Performance Area: Biodiversity and Ecological Components			
Management Objective: Soil Erosion Prevention and Control			
Halt the degradation of ecosystems caused by soil erosion by assessing problem erosion areas annually and combating erosion accordingly.			
Key Deliverable	Management Activities	Responsibility	Timeframe
Soil Erosion Management	Quantify the extent of erosion on a watershed level, paying specific attention to past land use practices, erodibility of soils, hydrology and drainage in the watershed and current rate of erosion.	DKPNR / BNR / MNR / KNR / EWT	28-Feb-27
	Develop a scoring system and apply across watersheds to indicate priority areas that require management intervention to halt degradation and promote rehabilitation of soil erosion areas.	DKPNR / BNR MNR / KNR / EWT	28-Feb-27
	Problem erosion areas highlighted in the prioritisation process should be assessed utilising orthomosaic drone imagery to visualise the extent of erosion, assist in prioritization and develop control plans.	DKPNR / BNR MNR / KNR / EWT	28-Feb-27
	Implement soil erosion control based on emergency control planning to ensure erosion in high-priority areas is mitigated and veld rehabilitation promoted.	DKPNR / KNR / MNR / KNR / EWT	28-Feb-28
Monitor Soil Erosion Sites	Monitor roads, footpaths, bike trails, sheet erosion sites and erosion gullies after heavy rainfall events to determine whether management interventions are required.	DKPNR / BNR / MNR / KNR	As Required
	Monitor effectiveness of management interventions and quantify rehabilitation effectiveness utilising orthomosaic drone imagery and habitat surveys.	DKPNR / BNR MNR / KNR / EWT	28-Feb-28

4.1.4 Terrestrial Habitat Management

Management Objective: *Conserve ecological function, biodiversity patterns and ecosystem structure and function of terrestrial ecosystems on the Touw Valley Cluster.*

The Vegetation of South Africa, Lesotho and Swaziland developed by SANBI provides a vegetation map that illustrates the complexity of vegetation on the macro-scale. The scale of 1:250 000 was selected as the primary working scale as many of the datasets required for developing the vegetation map, such as geology, land types and topography datasets, were available at the requisite precision at that scale.

A vegetation map for the Klein Karoo was developed during the CEPF funded Succulent Karoo Ecosystem Programme to prioritise the creation of a more detailed vegetation map for the region. The scale selected for the development of the Klein Karoo Vegetation Map was 1:50 000. The importance of scale in vegetation mapping and classification can be well illustrated as the SANBI SA Vegetation Map described 63 vegetation units in the Succulent Karoo biome at a scale of 1:250 000. The SKEP Klein Karoo vegetation map delineated 369 vegetation units within the Klein Karoo region alone.

Two of the major constraints for the development of a fine-scale vegetation map are resources and time. The vegetation map developed for the Klein Karoo required a 2 343 900-ha project area to be sampled and mapped within a six-month project period, which translated into an approximate 40 000 ha that would require sampling and mapping every single day. For this reason, the appropriate 1:50 000 scale was selected, as a finer scale map would have required more resources and time, while a coarser scale would not provide a reasonably valuable resource.

A fine-scale plant community map should be developed for the Touw Valley Cluster. The plant community map should provide detailed information about the common, rare, and threatened species found within each plant community, the typical species composition, the physical appearance and structure of the vegetation, and the physical environment with which each community is associated. A fine-scale plant community map for the Touw Valley Cluster will also allow for the development of thresholds of potential concern that will trigger specific natural resource management interventions, capture current veld condition to inform long-term monitoring projects, record threatened species assemblages that will inform management objectives for each plant community, and allow for the development of accurate ecological stocking rates and carrying capacities that will inform the offtake or intake of game species on the reserve.

The development of a fine-scale plant community map for the Touw Valley Cluster will also allow for the contribution towards knowledge gaps described in the SANBI South African Vegetation Map for specific ecosystems that occur on the reserve.

To ensure that the prerequisite knowledge is collected and collated to allow for the Terrestrial Habitat Management objective to be met, the Touw Valley Cluster should develop a plant community map for the reserves.

Veld condition and habitat quality should be assessed annually as it provides valuable insights into the health and vitality of ecosystems. Vegetation is a principal element in ecosystems, and its condition serves as an indicator of overall ecosystem health and habitat quality. The importance of veld condition assessments cannot be overstated as it provides the following insights which are important in conservation management:

- Veld condition serves as an indicator of the overall health of an ecosystem. Changes in vegetation can signal broader ecological issues, such as climate change impacts, invasive species encroachment, or habitat degradation.
- Monitoring veld condition helps conservation managers understand how changes may affect different plant and animal species within an ecosystem.
- Regular assessments enable the early detection of potential threats to vegetation, especially overgrazing or human-induced disturbances. Early intervention can prevent or mitigate the negative impacts on the ecosystem.
- Veld condition is closely tied to habitat quality. By assessing the health of vegetation, conservation managers can gauge the suitability of habitats for various species. This information is critical for managing and conserving threatened or endangered species.
- Understanding changes in veld condition allows conservation managers to implement targeted interventions. This might include habitat restoration, invasive species control, or grazing reduction to maintain ecosystem health and support biodiversity.
- Regular assessments contribute to an adaptive management approach. Conservation managers can use data on vegetation condition to adjust conservation strategies in response to changing ecological conditions or emerging threats.

Veld condition assessments should be implemented annually, and long-term monitoring datasets reviewed to provide a historical perspective on ecosystem dynamics. This long-term data is valuable for predicting future trends and developing sustainable management practices.

4.1.5 Wildlife Management

Management Objective: *Ensure effective conservation of faunal species, populations and inter-relationships in order to enhance biodiversity while maintaining and improving ecosystem structure and function.*

The Touw Valley Cluster recognises the importance of heterogeneity or ecosystem flux which views landscape patchiness, disturbance and change as important in the promotion of ecosystem resilience. A certain amount

of change to ecosystems is inevitable and the adoption of an adaptive management approach will ensure continuous learning. It is critical to ensure that adequate monitoring projects and veld condition assessments are implemented annually to ensure that thresholds of potential concern are not triggered, thereby allowing a system of flux to lead to habitat degradation.

Herbivores are capable of affecting biodiversity positively or negatively and herbivory should always be considered a key process in determining ecosystem dynamics. Herbivores should therefore be managed as ecosystem drivers and the Touw Valley Cluster must decide how much change within the desired state is acceptable. It is vital that botanical threatened species assemblages are mapped spatially to ensure that biodiversity patterns and species conservation is promoted and not degraded to facilitate herbivores and their predators within a complex and ecologically sensitive environment.

Evidence suggests that historically the Klein Karoo was better able to sustain a larger population of herbivores than presently as the region had a far greater grass component. Past land use practices have impacted drastically on the Klein Karoo with an increase in karroid shrub-land at the expense of sweet grassland. The selection of palatable species by grazers have also promoted the increase of non-palatable species and an associated decrease in biodiversity. The rate of consumption by domestic livestock exceeded annual production, resulting in a net loss of biomass of these species and a failure of a variety of species to set seed, reducing vegetation cover and increasing the exposure of the soil to erosion forces. This led to a loss of ground cover and perennial plant species in the Klein Karoo while the greatest loss of palatable plant species within the Karoo has been the loss of grasses and available forage for large grazing herbivores.

Over 55 % of the Klein Karoo is listed as moderately degraded, with only 18 % considered to be in a pristine condition. The Touw Valley Cluster is no exception, and the pattern is reflected on the reserve with respect to the present status of the quality and quantity of forage. The Touw Valley Cluster with its low rainfall, low soil nutrients and sparse and nutritionally poor plants can only support lower herbivore densities than would have been historically viable. The over utilisation of the food resource base has severe implications for the sustainable and responsible management of the reserves. The shrub component of the vegetation is the production base and if damaged through over-utilisation, will not recover. The herbaceous vegetation (grass and pioneers) is not a reliable source of forage as its production fluctuates widely with environmental conditions. It is sparse and predominantly non-perennial/annual and although it has moderate forage value (except after a series of good rains) it does play a role in enhancing infiltration and reducing run off and soil erosion.

The annual productivity of the vegetation is low and animals, if forced to do so, will consume years of accumulated growth within a short period. This is especially true during periods of recovery after droughts, where the impact on the vegetation community may be devastating. It is evident that the survival of the reserve depends on soil protection, the maintenance of existing plants and the recruitment of new individuals

into the plant community. If any of these factors are adversely affected, then vegetation degradation will occur.

Until the Touw Valley Cluster can accurately determine thresholds of potential concern for plant communities and the associated upper and lower limits of acceptable change within the ecosystem, it is of paramount importance to ensure that stocking rates are conservatively limited to ensure that the food resource is not negatively impacted. Constant monitoring and adaptive management strategies will allow the Touw Valley Cluster to move towards a complex system view with the focus shifting to ecological processes that influence biodiversity rather than species or population sizes.

Stocking rate is defined as the number of animals on a given amount of land over a certain period of time. Carrying capacity is the stocking rate that is sustainable over time per unit of land area, without significant negative impact. The rate will vary greatly depending both on the type of animal species, the fertility of the land, and the climatic conditions. Stocking rate is generally expressed as Animal Units (AU) per unit of land area or hectare per Large Stock Units (LSU). Game Reserves in the Klein Karoo are relatively new and very little information is available regarding stocking rates. These areas have been under agricultural utilisation for centuries and the stocking rate values have been determined by the Department of Agriculture as follows: Renosterveld 1 AU: 72 ha and Klein Karoo 1 AU: 54 ha.

As veld condition and composition vary between reserves, broad calculations of grazing capacity based on agricultural large-animal stock units can never be more than guidelines for determining any area's grazing capacity for game species. These values do not take factors such as slope, rainfall, or previous utilisation into account. Species on fenced reserves cannot be rotated like livestock on agricultural farms. Therefore, game stocking rates should be kept at even more conservative levels. These agricultural guideline values may, however, be used to determine a base line stocking rate for the Touw Valley Cluster. It is recommended, however, that the development of a plant community map for the Touw Valley Cluster should review current stocking rates and recommend new carrying capacities that will adopt the precautionary principle to ensure that habitat degradation caused by animals is limited, and that thresholds of potential concern are not triggered.

The Touw Valley Cluster has an important role to play in the conservation of biodiversity within the region, especially in conserving habitat in low-lying areas that typically support ecosystems that have been historically degraded, and the introduction and management of herbivores to the reserve must, therefore, take the suitability and extent of the available habitat in consideration to prevent ecological degradation. Habitat transformation through historical agricultural cultivation and grazing on the reserves has affected the potential for large animal species to be supported and the potential ecological benefits of 'rewilding' such as performing of key ecological functions may instead lead to habitat degradation.

Damage causing animals on the Touw Valley Cluster include Chacma Baboon, *Papio ursinus*, and Common Ostrich, *Struthio camelus*. Chacma Baboon damage is limited to impact on cultivated lands and infrastructure and control is limited to keeping individuals out of these areas through a variety of control methods. Common Ostrich, on the other hand, can have significant ecological consequences in the Klein Karoo, by trampling vegetation during foraging and through their feeding behaviour, particularly their consumption of succulent plants, which can lead to the degradation of important plant species in the region. The Succulent Karoo is a biodiversity hotspot with many endemic plant species. Damage caused by browsing and trampling can negatively affect these unique species, potentially leading to declines in their populations and compromising the ecological integrity of the region.

If the impact of damage causing animals becomes too significant, conservation managers may implement control measures to maintain ecosystem balance and prevent ecological degradation. Control measures can include implementing habitat management practices to protect vulnerable areas from excessive browsing or trampling, such as fencing or designated protected zones; controlled culling or culling of damage causing animals where populations become unsustainable; implementing strategies to modify the behaviour of these animals, such as deterrents or habitat modifications that discourage them from entering sensitive areas.

It is important to note that discharging firearms can pose significant dangers to both human safety and the overall guest/landowner experience. The following considerations must be considered prior to any cropping or hunting activities:

- Human Safety – discharging firearms in a nature reserve increases the risk of accidental injuries or fatalities. Stray bullets can travel over long distances, posing a danger to visitors, staff, or nearby residents. Uncontrolled or unauthorized shooting activities can result in a lack of supervision, heightening the potential for unsafe behaviour, such as mishandling firearms or engaging in risky shooting practices.
- Impact on Wildlife – gunfire can cause significant disturbance to animals, affecting their natural behaviours, feeding patterns, and breeding activities. This disturbance can have long-term consequences on the ecological balance of the reserve.
- Guest Experience – discharging firearms can lead to diminished recreational enjoyment of residents and visitors. Nature Reserves are designed to provide a peaceful and immersive experience. The sound of gunfire can disrupt the tranquillity and diminish the recreational enjoyment for nature enthusiasts, birdwatchers, and those seeking a quiet outdoor experience.
- Lead Contamination – if firearms involve the use of lead-based ammunition, there is a risk of lead contamination in the environment. Lead can be harmful to both wildlife and humans and may accumulate in the soil, water, or plants.

- Community Relations – the discharge of firearms may lead to negative perceptions within local communities, neighbouring residents, and the broader public. This can strain relationships and lead to conflicts over land use and conservation efforts.

Legislation pertaining to hunting or cropping of animals must be adhered to, as well as the legislation and regulations pertaining to controlling damage causing animals.

Within the Touw Valley Cluster, hunting, whether as a methodology for controlling population numbers of herbivores or for enjoyment, is only allowed on the Kruisrivier Nature Reserve. The Bloutoring, Doringkloof Karoo Plaas and Machaseh Nature Reserves are no-go zones from a hunting perspective.

The key deliverables and management activities for Wildlife Management are given in Table 26.



Table 266 - Wildlife Management key deliverables and management activities required to meet the management objective.

Key Performance Area: Biodiversity and Ecological Components			
Management Objective: Wildlife Management			
Ensure effective conservation of faunal species, populations and inter-relationships in order to enhance biodiversity while maintaining and improving ecosystem structure and function.			
Key Deliverable	Management Activities	Responsibility	Timeframe
Wildlife Stocking Rates and Faunal Impact	Determine stocking rates based on the ecological carrying capacities developed for the Little Karoo by CapeNature and review annually.	KNR / CN	28-Feb-27
	Review the stocking rates and manage offtake or intake of game accordingly based on annual veld condition assessments across the Touw Valley Cluster.	KNR /	28-Feb-27
	Conduct annual game census (October) and adapt wildlife management strategy accordingly.	KNR / CN	Annually
	Monitor and evaluate the impact of fauna on the ecosystem, monitor and evaluate the health of faunal populations and promote effective management of faunal SoCC.	DKPNR / BNR/ MNR / KNR / CN	28-Feb-27
	Stocking rates should be conservative to promote rehabilitation of ecosystems that have been historically overgrazed. Offtake can be managed through hunting (cropping) to control herbivore numbers, or through game capture. No hunting may take place within Nature Reserves that do not allow it as a practice, namely Bloutoring, Doringkloof and Machaseh.	DKPNR / BNR / MNR / KNR	As Required
Damage Causing Animals	Damage Causing Animals include Chacma Baboon, <i>Papio ursinus</i> , and Common Ostrich, <i>Struthio camelus</i> . The control of these species is limited but must always be compliant with relevant legislation, must always ensure the safety of guests and staff on surrounding reserves, and must take guest experience of surrounding reserves into consideration.	DKPNR / BNR / MNR / KNR	As Required

Legislative Compliance	Ensure relevant legislation such as NEMA, NEMBA, Nature Conservation Ordinance and Threatened and Protected Species Regulations are adhered to.	DKPNR / BNR / MNR / KNR / CN	Ongoing
	Ensure that Certificate of Adequate Enclosure permits, where relevant, are valid.	KNR / CN	As Required

4.1.6 Biodiversity Security

Management Objective: *Ensure proactive security measures are in place to effectively address biodiversity security threats to faunal and floral species.*

Biodiversity Security management on the Touw Valley Cluster encompasses not only biodiversity, but also human and infrastructural safety and security, as well as loss management and risk control. The Succulent Karoo, a biodiversity hotspot with a wealth of rare, threatened and endemic species is under massive threat from illegal harvesting and poaching of succulent plants, insects, scorpions, and baboon spiders.

Biodiversity security involves a comprehensive and multi-faceted approach. The goal is to protect threatened species, particularly succulent plants, and associated fauna, and to control access to the area. The following should be implemented to ensure adequate and proactive security:

Threat Assessments – conduct a thorough assessment of the specific threats, including the types of succulent plants and associated species targeted, the methods used for illegal harvesting, and the scale of the poaching problem.

Stakeholder Engagement – identify and engage with key stakeholders, including local communities, conservation organizations, law enforcement agencies, and government authorities. Collaboration is essential for a holistic and effective biodiversity security.

Law Enforcement Collaboration – coordinate with law enforcement agencies to enhance patrols and monitoring efforts within the reserve. This may involve establishing surveillance systems and working closely with local authorities to enforce conservation laws.

Technological Solutions – implement technology-based solutions such as CCTV cameras, camera traps, drones, and sensor networks to enhance surveillance and monitoring capabilities. These tools can help identify and track illegal activities, providing valuable data for law enforcement.

Access Control Measures – establish controlled access points to the nature reserves. This may involve installing gates or barriers at strategic locations. Only authorized individuals should have access to sensitive areas.

Visitor Education and Regulation – implement educational programs for visitors, highlighting the importance of respecting the reserve's rules and regulations. Enforce strict penalties for those caught engaging in illegal activities and encourage responsible ecotourism practices.

Biodiversity Monitoring – implement regular biodiversity monitoring programs to assess the health of the ecosystem and track changes in populations of threatened species. This information is crucial for adaptive management strategies.

Partnerships with Research Institutions – collaborate with research institutions to conduct studies on the ecology of threatened species. This research can inform conservation strategies and help identify areas that require special protection such as ex-situ populations.

Emergency Response Plan – develop an emergency response plan to address immediate threats. This may involve rapid deployment of resources, communication protocols, and coordination with emergency services.

Regular Evaluation and Adaptation – periodically evaluate the effectiveness of biodiversity security on the Touw Valley Cluster and make necessary adaptations based on changes in threat levels, ecological conditions, or the success of implemented measures.

By integrating these elements into biodiversity security across the Touw Valley Cluster, the nature reserves can significantly enhance their capacity to combat illegal harvesting and poaching, ensuring the long-term survival of threatened species in the Succulent Karoo. Access control points on public roads should be upgraded to gate control points which can be electronically opened by members of the public, but which will be monitored by cameras to capture the make, model and licence plates of vehicles accessing the protected area, thereby increasing the security levels to proactively protect biodiversity assets. The key deliverables and management activities for Biodiversity Security are given in Table 27.



Table 277 - Biodiversity Security key deliverables and management activities required to meet the management objective.

Key Performance Area: Biodiversity and Ecological Components			
Management Objective: Biodiversity Security			
Ensure proactive security measures are in place to effectively address biodiversity security threats to faunal and floral species.			
Key Deliverable	Management Activities	Responsibility	Timeframe
Biodiversity Security	Enhance Biodiversity Security on the Touw Valley Cluster by conducting threat assessments, engaging with stakeholders, collaborating with local law enforcement, implementing technological solutions, controlling access points, educating and regulating visitors, monitoring biodiversity, formulating partnerships with research institutions and developing an emergency response plan.	DKPNR / BNR / MNR / KNR / EWT / CN	28-Feb-27
Access Control	Maintain clearly, demarcated boundaries at access points.	DKPNR / BNR BNR / MNR / KNR	28-Feb-27
	Ensure appropriate signage, access control or security cameras are in place at access points.	DKPNR / BNR BNR / MNR / KNR	28-Feb-27
Record Keeping	Maintain records of illegal trespassing and poaching incidents and assist law enforcement in the prosecution of transgressors.	DKPNR / BNR BNR / MNR / KNR	As Required

4.1.7 Species of Conservation Concern

Management Objective: *Identify, collate data, monitor, and develop research projects for Species of Conservation Concern.*

To ensure the optimal long-term population health and ecological function of any plants and animals of special concern, it is key to 1) identify specific endemic, threatened and rare species of conservation concern; 2) set thresholds of potential concern for prioritised species; 3) develop monitoring programmes to ensure thresholds are not crossed; and 4) mitigate threats which could compromise recruitment.

Faunal Species of Conservation Concern (SoCC) have been recorded on the Touw Valley Cluster: Grey Rhebok *Pelea capreolus* NT, Honey Badger *Mellivora capensis* NT, Leopard *Panthera pardus* VU, Riverine Rabbit *Bunolagus monticularis* CR, Karoo Dwarf Tortoise *Chersobius boulengeri* EN, Tent Tortoise *Psammobates tentorius* NT, Karoo Korhaan *Eupodotis vigorsii* NT, Lanner Falcon *Falco biarmicus* VU, Secretarybird *Sagittarius serpentarius* VU, Southern Black Korhaan *Afrotis afra* VU, Verreaux's Eagle *Aquila verreauxii* VU, Ludwig's Bustard *Neotis ludwigii* EN, and Martial Eagle *Polemaetus bellicosus* EN. Botanical SoCC include *Crotalaria lebeckioides* Rare, *Crassula congesta* subsp. *laticephala* Rare, *Eriocephalus grandiflorus* Rare, *Tritonia securigera watermeyeri* Rare, *Agathosma adenadriflora* NT, *Agathosma foetidissima* NT, *Hoodia pilifera* NT, *Leucospermum pluridens* NT, *Glottiphyllum suave* NT, *Blepharis inermis* VU, *Gibbaeum pilosulum* VU, *Gibbaeum velutinum* VU, *Calobota elongata* VU, *Drosanthemum giffenii* VU, *Lotononis venosa* VU, *Lotononis argentea* VU, *Lotononis rigida* VU, *Babiana karooica* VU, *Brunsvigia josephinae* VU, *Duvalia parviflora* VU, *Octopoma octojuge* VU, *Octopoma quadrisepalum* VU, *Wurmbea compacta* VU, *Euphorbia pseudoglobosa* VU, *Mesembryanthemum expansum* VU, *Ornithogalum perpavum* VU, *Drosanthemum micans* EN, *Glottiphyllum carnosum* EN, *Mesembryanthemum strictum* EN, *Zeuktophyllum suppositum* EN, *Anisodonteia dissecta* CR, *Gibbaeum nebrownii* CR, *Mesembryanthemum tortuosum* (Trade), *Tylecodon reticulatus* (Trade) and *Conophytum truncatum* (Trade).

Species flagged in the screen tool (Section 1.8) as well as important taxa highlighted by SANBI (Section 2.4) are prioritised for surveys to determine the presence or absence of the taxa on the Touw Valley Cluster. If these species are recorded on the reserves, it should be determined whether they warrant inclusion as SoCC.

Not all of these species have been highlighted for monitoring and research as priority Species of Conservation Concern and priority species should be selected where capacity exists.

The key deliverables and management activities for the SoCC are given in Table 28.

Table 28 - Species of Conservation Concern key deliverables and management activities required to meet the management objective.

Key Performance Area: Biodiversity and Ecological Components			
Management Objective: Species of Conservation Concern			
Identify, collate data, monitor, and develop research projects for Species of Conservation Concern.			
Key Deliverable	Management Activities	Responsibility	Timeframe
Manage Species of Conservation Concern	Determine Species of Conservation Concern and develop monitoring strategies for prioritised species.	DKPNR / BNR / MNR / KNR / EWT	28-Feb-28
	Implement monitoring protocols and develop thresholds of potential concern for prioritised SoCC.	DKPNR / BNR / KNR / EWT	28-Feb-28
	Develop mitigation interventions based on thresholds of potential concern and implement when required.	DKPNR / BNR / EWT	28-Feb-30
Grow Species of Conservation Concern Database	Implement surveys to determine the presence or absence of potential Species of Conservation Concern highlighted as possibly occurring on the Touw Valley Cluster by the Department of Environmental Affairs and the South African National Biodiversity Institute.	DKPNR / BNR / MNR / KNR / EWT	Ongoing

4.1.8 Baseline Data Collection and Monitoring

Management Objective: *Ensure the collation of long-term monitoring projects to increase management knowledge for ecosystems and species on the Touw Valley Cluster.*

Information on the locality of rare, threatened, and endemic species is necessary to ensure effective management and monitoring of populations. This objective aims to improve the biological knowledge base through the implementation and promotion of effective baseline data collection and research opportunities.

To better understand the ecosystems, habitats and species that require conservation effort, it is necessary to develop an ecological understanding for Species of Conservation Concern and their associated ecosystems. Decisions on how best to implement effective conservation management interventions that will ensure the resilience and persistence of these species, ecological process and ecosystem function can then be made based on sound data.

The development of a baseline resource inventory is necessary to capture the full range of faunal and floral species recorded on the Touw Valley Cluster. A cost-effective method of developing an inventory is to utilise citizen science projects such as iNaturalist, the South African Bird Atlas Project and the Virtual Museum. Where priority species are identified, it is necessary to implement monitoring projects to ensure that partnerships can be developed to garner expert input and support in the conservation of the identified species.

iNaturalist is an online citizen science platform that records all observations of plants, insects, mammals, reptiles, amphibians, birds etc. made by citizen scientists, or specialist experts that visit an area and submit their sightings on the platform. This is valuable for scientific and resource management, assisting with the understanding of the occurrence, distribution, and habitat preferences of biota in our natural environments. iNaturalist offers the opportunity to define a project on a specific property, whereafter all observations made within the boundary set for that property will be allocated to the project and can be used to create a dynamic biodiversity inventory – which is always available to the landowner to advise and support management of the property.

The Southern African Bird Atlas Project (SABAP2) is a citizen science project designed to map the distribution of birds across South Africa. SABAP2 is the follow-up project to the Southern African Bird Atlas Project (SABAP1), which took place from 1987-1991. The second bird atlas project began in 2007 and is ongoing. Data is collected when volunteers select a geographical 'pentad' on a map and record all the bird species seen within a set time frame. The data is uploaded to the SABAP2 database and is used for research and analysis by several different agencies, including SANBI and BirdLife South Africa.

Determining the spatial distribution of plant communities on the Touw Valley Cluster will provide the most accurate fine-scale composition of habitat structure and species distribution on the reserves. This research component will directly feed into prioritising Species of Conservation Concern on the Touw Valley Cluster and

provide an opportunity to assess veld condition, estimate population health of threatened plant species and monitor Species of Conservation Concern.

Where knowledge gaps in the baseline database inventory exist, it is necessary to implement targeted biodiversity surveys. This is especially true for invertebrates which are often neglected, even though the Succulent Karoo biodiversity hotspot is renowned for botanical and invertebrate diversity and endemism, not to mention the key ecological role that invertebrates play in pollination.

All specific monitoring projects that are required for implementation in specific management programmes must be undertaken as required. This includes, but is not limited to, fire management, alien vegetation management, soil erosion prevention and control, terrestrial habitat management, wildlife management, species of conservation concern, and research and management knowledge.

The key deliverables and management activities necessary to achieve the Baseline Data Collection and Monitoring are given in Table 29.



Table 29 - Baseline Data Collection and Monitoring key deliverables and management activities required to meet the management objective.

Key Performance Area: Biodiversity and Ecological Components			
Management Objective: Baseline Data Collection and Monitoring			
Ensure the collation of long-term monitoring projects to increase management knowledge for ecosystems and species on the Touw Valley Cluster.			
Key Deliverable	Management Activities	Responsibility	Timeframe
Develop and Implement Monitoring Projects	Develop and Populate a Baseline Database Inventory	DKPNR / BNR / MNR / KNR / EWT	28-Feb-27
	Isolate knowledge gaps in Baseline Database Inventory and facilitate targeted bio-surveys to populate the inventory.	BNR / KNR / EWT	28-Feb-27
	Populate Species of Conservation Concern Database	DKPNR / BNR / KNR / EWT	Ongoing
	Implement monitoring projects highlighted in the Fire Management Strategy, Alien Vegetation Management Plan, Soil Erosion Management Plan and Terrestrial Habitat Management, and Wildlife Management Programmes.	DKPNR / BNR / MNR / KNR / EWT	As Required

4.1.9 Research and Management Knowledge

Management Objective: *Research projects are designed to promote knowledge towards the achievement of conservation management objectives.*

To effectively achieve the intended outcomes of the management objectives, the Management Authority needs to apply sound knowledge and, at times, the findings of scientific research to determine the most effective management strategy. Much of this knowledge may historically reside with the Management Authority. However, some specialised insights may need to be gathered from partner organisations and subject matter experts.

In some cases, specific research may be required to determine the best course of action to achieve the desired outcome. Establishing partnerships with academic institutions, making the Touw Valley Cluster an attractive site for researchers, and compiling a list of management problems that research projects can address, will help grow the knowledge base through scientific research. Knowledge on how to achieve management objectives should be gathered, documented, and shared with management authorities of the nature reserves comprising the Touw Valley Cluster to increase management effectiveness and build skills. Utilization of the increased knowledge and research will improve management effectiveness.

The key deliverables and management objectives necessary to achieve Research and Management Knowledge are given in Table 30.



Table 29 - Research and Management Knowledge key deliverables and management activities required to meet the management objective.

Key Performance Area: Biodiversity and Ecological Components			
Management Objective: Research and Management Knowledge			
Research projects are designed to promote knowledge towards the achievement of conservation management objectives.			
Key Deliverable	Management Activities	Responsibility	Timeframe
Develop and Grow Research Partnerships and Projects to inform Conservation Management on the Touw Valley Cluster.	Review monitoring protocols and identify knowledge gaps that stimulate research questions.	EWT / CN	28-Feb-30
	Establish and maintain strategic relationships with academic institutions to address knowledge gaps through research projects.	EWT / CN	28-Feb-30
	Ensure that the findings of all research projects are translated into practical conservation management best-practice guidelines.	EWT	As Required
	Source and maintain records of all research projects and address knowledge gaps through desk-top research, scientific research and sourcing advice from specialists.	EWT	As Required
	Use increased knowledge and research findings to improve management effectiveness.	DKPNR / BNR / MNR / KNR / EWT	Ongoing

4.2 Sustainable utilisation of Natural Resources

4.2.1 Grazing and browsing of livestock and game

Vegetation (natural rangelands) has evolved with indigenous grazers and browsers, and it is best to maintain or simulate this ecosystem process. Under natural conditions in which browsing and grazing mammals were not fenced in, one would encounter a high concentration of animals of mixed feeding habits (bulk, selective and concentrate feeders) exerting high pressure on the vegetation and when the quantity of forage decreased, they moved off. The veld then had a period in which to recover and because all plants had been utilised equally the composition was not altered.

Where grazers and browsers have been contained, mismanagement of game numbers and game composition can not only alter vegetation species composition, reduce cover and cause erosion, but can also threaten biodiversity and the long-term financial viability of this production. The correct utilisation of vegetation by livestock and game is an essential tool to maintain vegetation health and composition. Within the Touw Valley Cluster, only Kruisrivier Nature Reserve have an enclosure close to the homestead with springbok stocked. These animals are fed supplementary, and they do not roam outside of the fenced enclosure in which they are housed. On Kruisrivier, there are camps (agricultural lands) that are utilised for livestock grazing. On occasion, these animals might be utilised as a management tool when required and will be monitored accordingly.

On the Touw Valley Cluster there are free-roaming wildlife (*res nullis*) that traverse the properties and are often found on the neighbouring Anysberg World Heritage Site and Nature Reserve. A corridor approach to management of these free roaming animals will be done in collaboration with CapeNature where feasible to address grazing and browsing potential. This can be covered by long-term veld condition monitoring to ensure that grazing and browsing activities have the desired outcome.

See Annual Plan of Operation per Management Authority within the Touw Valley Cluster.

4.2.2 Recreation / Responsible Tourism

Management Objective: *Develop a sustainable business model that supports the implementation of management activities and the conservation of biodiversity on the Nature Reserves comprising the Touw Valley Cluster.*

The primary objective for responsible tourism is to generate income from tourism businesses that can make a sustainable contribution towards the conservation management costs each Nature Reserve in the Touw Valley Cluster. This objective may be achieved by implementing the following deliverables:

- Develop a viable tourism business model to guide tourism development and operations and incorporate a range of appropriate eco-tourism products and services.

- Ensure that tourism infrastructure and operations do not harm any of the conservation objectives of the Touw Valley Cluster.
- Ensure that infrastructure design and construction comply with legislative requirements.
- Ensure that profits from tourism operations contribute to management costs.

Recreation in natural areas is an excellent tool for reconnecting people with the environment and is also a possible income stream. Opportunities can be developed without compromising the conservation integrity of the area. In developing tourism within the Touw Valley Cluster, the following guiding principles should be adhered to:

- Tourism products must be appropriate to the Touw Valley Cluster's values and must not threaten its biodiversity or ecological function.
- In developing products, requirements for legislative requirements must be adhered to.
- Tourism products should be designed to capitalise on the unique beauty and biodiversity features of the Touw Valley Cluster.

The Touw Valley Cluster strives towards sustainable exclusive nature-based tourism that promotes the region's biodiversity, cultural heritage, and wilderness attributes. The benefits of nature-based tourism to nature conservation in the reclamation of degraded land, the restoration of biodiversity and the creation of employment opportunities have been proven repeatedly. The Touw Valley Cluster is committed to achieving sustainable and responsible tourism as well as setting a benchmark within the nature-based tourism industry within the Klein Karoo.

The key deliverables and management objectives necessary to achieve the Responsible Tourism are given in Table 31.

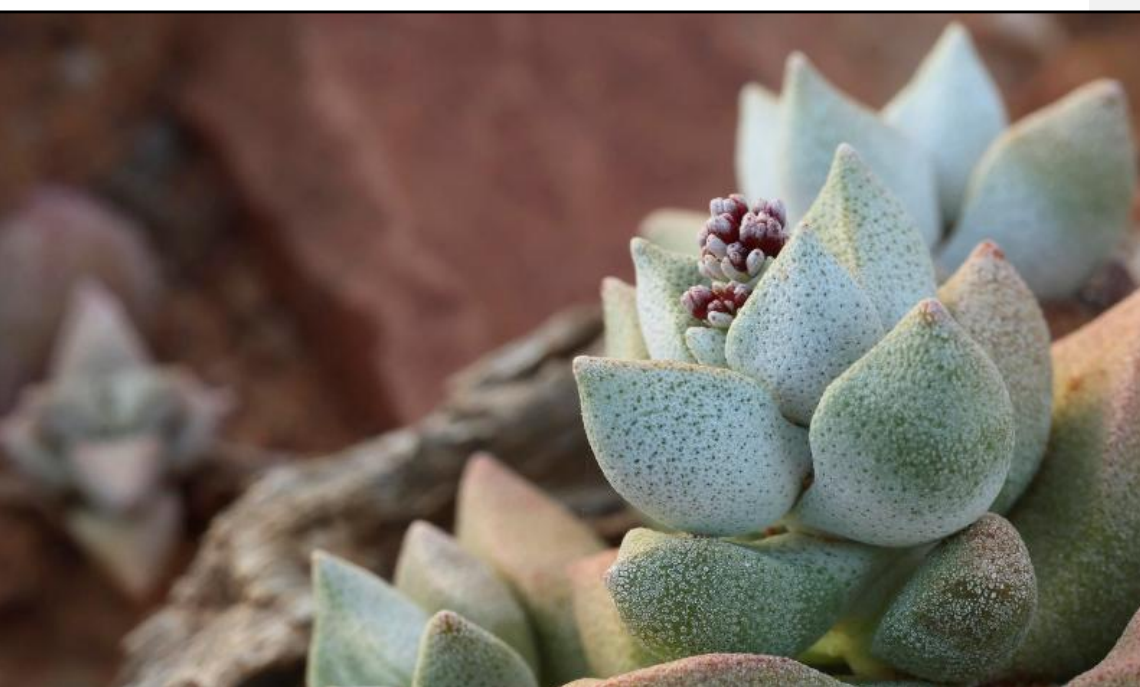


Table 30 - Responsible Tourism key deliverables and management activities required to meet the management objective.

Key Performance Area: Management Effectiveness and Sustainability			
Management Objective: Responsible Tourism			
Develop a sustainable business model that supports the implementation of management activities and the conservation of biodiversity on the Nature Reserves comprising the Touw Valley Cluster.			
Key Deliverable	Management Activities	Responsibility	Timeframe
Tourism Business Plan	Develop a viable tourism business model to guide tourism development and operations and incorporate a range of appropriate eco-tourism products and services	DKPNR / MNR / KNR	As Required
	Ensure that tourism infrastructure and operations do not harm any of the conservation objectives of the Touw Valley Cluster.	DKPNR / MNR / KNR	As Required
	Ensure that infrastructure design and construction comply with legislative requirements.	DKPNR / MNR / KNR	As Required
	Ensure that profits from tourism operations contribute to management costs.	DKPNR / MNR / KNR	As Required

4.2.3 Sustainable Harvesting

Currently all properties do not allow any harvesting. However, if harvesting becomes an activity on these properties in future, the managing authorities will monitor harvesting, make sure permits are in place and ensure harvesting is conducted sustainably.

See Annual Plan of Operation per Management Authority within the Touw Valley Cluster.

4.2.4 Socio-economic and heritage

4.2.4.1 Environmental Awareness and Education

The protected area provides the ideal practical learning space to teach people about the value of nature and conservation. Whilst a degree of awareness and knowledge is likely to flow outwards from the reserve through the engagement of employees with the broader community, future dated environmental awareness and education programmes have not been established, but Management Authorities are investigating.

See Annual Plan of Operation per Management Authority within the Touw Valley Cluster.

4.2.4.2 Socio-economic development initiatives

Poverty and the associated social issues are prevalent in most rural communities in South Africa, and the protected area offers a location that can serve as a development node within the rural landscape. It is recommended that the Management Authority partner with other organisations and community groups to identify socio-economic development needs and then decide in which area to play a role. Currently the 4 Management Authorities are only employing staff on a temporary basis, and once funding become available this will be addressed. As part of ongoing management tasks on the property, casual labour is assisted to ensure that adequate health and safety is maintained and protective equipment provided.

See Annual Plan of Operation per Management Authority within the Touw Valley Cluster.

4.2.4.3 Heritage features

The various Management Authorities are not only a custodian of the reserve in space, but also in time. The landscape in which the reserve is located may have a number of paleontological, archaeological and cultural features that need to be discovered, understood and shared. Partnering with specialists in these fields is necessary to identify these features and ensure they are not damaged and that the sites are suitably preserved for further study. Include link to SAHRA for assistance with this.

The key deliverables and management objectives necessary to document and conserve local heritage are given in Table 32. Additionally, please see the Annual Plan of Operation per Management Authority within the Touw Valley Cluster.

Table 31 - Heritage key deliverables and management activities required to meet the management objective.

Key Performance Area: Socio-Economic & Heritage			
Management Objective: Heritage			
To locate, document, and conserve archaeological, paleontological and cultural heritage features on the Touw Valley Cluster.			
Key Deliverable	Management Activities	Responsibility	Timeframe
To document and conserve heritage features found on the Touw Valley Cluster	Identify and document heritage features on the Touw Valley Cluster	DKPNR / BNR / MNR / KNR	As Required
	Partnering with specialists to ensure the identified features are not damaged and that the sites are suitably preserved for further study.	DKPNR / BNR / MNR / KNR	As Required



OPERATIONAL MANAGEMENT GUIDELINES



4.3 Management Authority effectiveness and sustainability

Natural resource management must be based on the principles of adaptive management whereby management decisions are made using the best available information and performance is monitored with the aim of obtaining better information. Decision making is therefore aimed at achieving the best outcome based on current understanding, while assessing impact to inform and improve future management interventions.

4.3.1 Legal Compliance

Management Objective: *Ensure that all relevant South African legislation is adhered to by the Nature Reserves comprising the Touw Valley Cluster.*

The Constitution of the Republic of South Africa, Act No. 108 of 1996 (Section 24), states that: 'The environment must be protected for present and future generations through reasonable legislation and other measures that will prevent pollution and environmental degradation, promote conservation and will ensure ecologically sustainable development and sustainable use of natural resources while striving for justifiable economic and social development.'

The management of the Touw Valley Cluster is further guided by the principles outlined in Section 2 of the NEMA and Section 17 of NEMPA. Detailed legislation applicable to the nature reserves are given as Addendum 1. However, all relevant legislation governing public entities as employers, implementers of government mandate and managers of public finance, are excluded from this list, but still applicable to the Management Authority.

The Management Authority is to ensure all legal documentation is in order and that all activities are compliant with relevant legislation and policies and any internal policies.

The key deliverables and management objectives necessary to achieve Legal Compliance are given in Table 33.

Table 32 - Legal Compliance key deliverables and management activities required to meet the management objective.

Key Performance Area: Management Effectiveness and Sustainability			
Management Objective: Legal Compliance			
Ensure that all relevant South African legislation is adhered to by the Nature Reserves comprising the Touw Valley Cluster.			
Key Deliverable	Management Activities	Responsibility	Timeframe
Legislative Compliance	Ensure that all proposed projects and management interventions are compliant with all relevant legislation (NEMA, SEMAs, Nature Conservation Ordinance, TOPS Regulations, Water Act, Veld and Forest Fire Act).	DKPNR / BNR / MNR / KNR	Ongoing

4.3.2 Formal Proclamation as a S23 Nature Reserve

Management Objective: *Ensure all reserve declaration documentation is in order and that all activities are compliant with relevant legislation and policies.*

In the process of formalising the proclamation of the four nature reserves comprising the Touw Valley Cluster as a statutorily protected Nature Reserves it is necessary to ensure that all stages of the process have been completed. These formal steps of formal proclamation process are implemented by the Management Authorities with the CapeNature Biodiversity Stewardship Programme and are highlighted in Table 34 below.

A further requirement of the NEMPA is to ensure that a Protected Area Management Plan has been developed and is being implemented on site. To ensure that the Protected Area Management Plan's objectives are effectively implemented, it is necessary for each Nature Reserve that comprises the Touw Valley Cluster to undertake an annual review of the respective management authority's implementation of the management plan. The annual review will allow each management authority to 1) determine how effectively the management plan has been implemented; 2) assist in determining the focus for the annual plan of operation and the setting of appropriate time frames and budgets; and 3) enable effective adaptive management by identifying changes and modifying management interventions.

The annual audit will form the basis of the management plan review. This should include records of recommendations for update/changes to the annual revision of the management schedules and the ten-year plan. The annual plan of operations (APO) is the basis for measuring implementation and performance. Every action in the APO has a key deliverable and timeframe. Monitoring and reporting on these targets enable the assessment of management effectiveness. These targets can also be used to measure the increase in biodiversity value of the Touw Valley Cluster through the implementation of effective natural resource management interventions. During the annual review and planning workshop attended by the Protected Area Advisory Committee, performance against targets must be assessed to inform the actions in the following year's APO accurately.

The key deliverables and management objectives necessary to achieve the Formal Proclamation as a S23 Nature Reserve are given in Table 34.

Table 33 - Formal Proclamation as a S23 Nature Reserve key deliverables and management activities required to meet the management objective.

Key Performance Area: Management Effectiveness and Sustainability			
Management Objective: Formal Proclamation as a S23 Nature Reserve			
Ensure all reserve declaration documentation is in order and that all activities are compliant with relevant legislation and policies.			
Key Deliverable	Management Activities	Responsibility	Timeframe
Notarise Title Deed	Ensure Notarial Deed with surveyor diagram and title deed restrictions are executed by the Notary and registered at the Deeds Office.	DKPNR / BNR / MNR / KNR / CN	As Required
Formal Proclamation	Intention to Declare advertising completed.	DKPNR / BNR / MNR / KNR / CN	As Required
	Memorandum of Understanding (MOU) and Protected Area Management Agreement (PAMA) signed by relevant parties.	DKPNR / BNR / MNR / KNR / CN	As Required
	Declaration of Nature Reserve in Provincial Gazette.	DKPNR / BNR / MNR / KNR / CN	As Required
Rezoning	Ensure that the nature reserve is rezoned to appropriate conservation zoning (OSIII).	DKPNR / BNR / MNR / KNR / CN	As Required

Protected Area Management Plan	Ensure that PAMP is adopted by all relevant parties.	DKPNR / BNR / MNR / KNR / EWT / CN	Ongoing
	Implement the Management Plan.	DKPNR / BNR / MNR / KNR / EWT	Ongoing
Annual Review	Review the Annual Plan of Operations annually and submit to CapeNature.	DKPNR / BNR / MNR / KNR / EWT / CN	Annually
	Revise the Protected Area Management Plan as necessary.	DKPNR / BNR / MNR / KNR / CN	As Required

Management Objective: *Ensure the reserve has the necessary infrastructure and equipment to enable the cost-effective achievement of the management objectives.*

The Management Authorities for each Nature Reserve comprising the Touw Valley Cluster must ensure that infrastructure and required equipment to enable the cost-effective achievement of the management objectives is in place. All infrastructure and equipment must be kept in working order to ensure that personnel can implement relevant management activities. The Touw Valley Cluster must ensure that:

- Infrastructure is adequately maintained, equipment serviced, and kept in safe working order.
- A development plan is maintained to show all infrastructure on the Touw Valley Cluster, including campsites, roads, and trails.

For the Touw Valley Cluster to operate appropriately, adequate infrastructure and equipment must be in place and maintained for implementing all projects, general management, and implementation of the objectives of this PAMP as well as for tourism purposes. This includes, but is not limited to the following:

- Roads – the supportive road infrastructure consists of primary and secondary roads as well as tracks, trails, and footpaths. Primary roads are divisional public roads, linking access points across the reserves. These roads are maintained by the Roads Department. Secondary roads and tracks are old farm roads, of which only viable tracks should be used, and unfeasible/detrimental tracks closed and rehabilitated. All roads, tracks, trails, and footpaths must be assessed to determine if there are any signs of damage or deterioration. Where necessary repairs must be implemented.
- Fences – external and internal fences exist across the nature reserves comprising the Touw Valley Cluster. Fence maintenance should prioritise the upgrading of fences, when necessary, repairs and vegetation control.
- Buildings – homesteads, staff, and guest accommodation are located on each nature reserve in the Touw Valley Cluster. It is the responsibility of the respective Management Authority to ensure that accommodation is maintained, and any new development are compliant with relevant legislation.

The key deliverables and management objectives necessary to achieve the Management Infrastructure and Equipment objectives are given in Table 35.

Table 34 - Management Infrastructure and Equipment key deliverables and management activities required to meet the management objective.

Key Performance Area: Management Effectiveness and Sustainability			
Management Objective: Management Infrastructure and Equipment			
Ensure the reserve has the necessary infrastructure and equipment to enable the cost-effective achievement of the management objectives.			
Key Deliverable	Management Activities	Responsibility	Timeframe
Infrastructure Maintenance	Road Infrastructure - roads, tracks, trails and footpaths should be assessed regularly for any signs of degradation and repairs should be implemented if they are damaged or in a state of deterioration.	DKPNR / BNR / MNR / KNR	Ongoing
	Fence Infrastructure - maintenance should prioritise the upgrading of fences where necessary, and when necessary, repairs and vegetation control. Where Management Authorities agree with the removal of fences on shared boundaries, all infrastructure must be removed from the veld and disposed of accordingly.	DKPNR / BNR / MNR / KNR	Ongoing
	Building Infrastructure - maintenance of all building across the reserve is the responsibility of the relevant Management Authority.	DKPNR / BNR / MNR / KNR	Ongoing
	Infrastructure Removal - infrastructure utilised in past agricultural practices which is no longer required should be removed from Critical Biodiversity and Ecological Support Areas in the Touw Valley Cluster.	DKPNR / BNR / MNR / KNR	Ongoing

4.3.3 Signage, access control and security

Access to the Nature Reserve needs to be controlled and conditions of entry for visitors into the Nature Reserve should be clearly stipulated on signboards at access points. Fencing needs to be effective in terms of demarcating the property boundary, restricting or allowing the movement of wildlife and livestock and performing a security function if required. Law enforcement efforts should be coordinated with the relevant authorities including CapeNature and the South African Police Service in addressing offences and breaches of the law. Law enforcement at the site will be undertaken through surveillance, monitoring and appropriate reaction in the event of an offence.

See Annual Plan of Operation per Management Authority within the Touw Valley Cluster.

4.3.4 Research and management knowledge

To effectively achieve the intended outcomes of the management objectives, the Management Authority needs to apply sound knowledge and, at times, the findings of scientific research to determine the most effective management strategy. Much of this knowledge may historically reside with the management authority; however, some specialised insights may need to be gathered from partner organisations and/or subject matter experts.

In some cases, specific research may be required to determine the best course of action to achieve a desired outcome. Establishing partnerships with academic institutions, making the reserve an attractive site for student researchers and compiling a list of management problems that can be addressed by research projects will help to grow the knowledge base through scientific research.

See Annual Plan of Operation per Management Authority within the Touw Valley Cluster.

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ADDENDUMS ▢

Addendum 1. List of relevant environmental legislation.

- Animals Protection Act [No. 71 of 1962]
- Atmospheric Pollution Prevention Act [No. 45 of 1965]
- Conservation of Agricultural Resources Act [No. 43 of 1983]
- Constitution of the Republic of South Africa [No. 108 of 1996]
- Criminal Procedures Act [1977]
- Environment Conservation Act [No. 73 of 1989]
- Forest Act [No. 122 of 1984]
- Hazardous Substances Act [No. 15 of 1973]
- Western Cape Heritage Management Act [No. 10 of 1997]
- Western Cape Nature Conservation Management Act [No. 9 of 1997]
- National Environmental Management Act [No. 107 of 1998]
- National Environmental Management: Biodiversity Act [No. 10 of 2004]
- National Environmental Management: Protected Areas Act [No. 57 of 2003] read with the Regulations for the Proper Administration of Nature Reserves.
- National Forests Act [No. 84 of 1998]
- National Heritage Resources Act [No. 25 of 1999]
- National Water Act [No. 36 of 1998]
- National Water Amendment Act [No. 45 of 1999]
- National Veld and Forest Fire Act [No 101 of 1998]
- Nature Conservation Ordinance [No. 15 of 1974]

General Management:

- Companies Act [No.71 of 2008]
- Promotion of Access to Information Act [No. 2 of 2000]
- Occupational Health and Safety Act [No. 85 of 1993]
- Western Cape Planning and Development Act [No. 5 of 1998]
- Development Facilitation Act [No. 67 of 1995]
- Disaster Management Act [No. 57 of 2002]
- Fire Brigade Services Act [No. 99 of 1987]
- Local Government: Municipal Systems Act [No. 32 of 2000]

- National Road Traffic Act [No. 93 of 1996]
- National Building Standards Act [No. 103 of 1977]
- Water Services Act [No. 108 of 1997]

Human Resource Management:

- Basic Conditions of Employment Act [No. 75 of 1997]
- Broad-Based Black Economic Empowerment Act [No. 53 of 2003]
- Compensation for Occupational Injuries and Diseases Act [No. 130 of 1993]
- Employment Equity Act [No. 55 of 1998]
- Labour Relations Act [No. 66 of 1995]
- Occupational Health and Safety Act [No. 85 of 1993]
- Pension Funds Act [No. 24 of 1956]
- Skills Development Act [No. 97 of 1998]
- Skills Development Levies Act [No. 9 of 1999]
- Unemployment Insurance Act [No. 63 of 2001]

Addendum 2. Land Type Memoir Ic52.

LAND TYPE	LANDFORM	1442	1443	1444	1445	1446	1447	1448	1449	1450	1451	1452	1453	1454	1455	1456	1457	1458	1459	1460	1461	1462	1463	1464	1465	1466	1467	1468	1469	1470	1471	1472	1473	1474	1475	1476	1477	1478	1479	1480	1481	1482	1483	1484	1485	1486	1487	1488	1489	1490	1491	1492	1493	1494	1495	1496	1497	1498	1499	1500	1501	1502	1503	1504	1505	1506	1507	1508	1509	1510	1511	1512	1513	1514	1515	1516	1517	1518	1519	1520	1521	1522	1523	1524	1525	1526	1527	1528	1529	1530	1531	1532	1533	1534	1535	1536	1537	1538	1539	1540	1541	1542	1543	1544	1545	1546	1547	1548	1549	1550	1551	1552	1553	1554	1555	1556	1557	1558	1559	1560	1561	1562	1563	1564	1565	1566	1567	1568	1569	1570	1571	1572	1573	1574	1575	1576	1577	1578	1579	1580	1581	1582	1583	1584	1585	1586	1587	1588	1589	1590	1591	1592	1593	1594	1595	1596	1597	1598	1599	1600	1601	1602	1603	1604	1605	1606	1607	1608	1609	1610	1611	1612	1613	1614	1615	1616	1617	1618	1619	1620	1621	1622	1623	1624	1625	1626	1627	1628	1629	1630	1631	1632	1633	1634	1635	1636	1637	1638	1639	1640	1641	1642	1643	1644	1645	1646	1647	1648	1649	1650	1651	1652	1653	1654	1655	1656	1657	1658	1659	1660	1661	1662	1663	1664	1665	1666	1667	1668	1669	1670	1671	1672	1673	1674	1675	1676	1677	1678	1679	1680	1681	1682	1683	1684	1685	1686	1687	1688	1689	1690	1691	1692	1693	1694	1695	1696	1697	1698	1699	1700	1701	1702	1703	1704	1705	1706	1707	1708	1709	1710	1711	1712	1713	1714	1715	1716	1717	1718	1719	1720	1721	1722	1723	1724	1725	1726	1727	1728	1729	1730	1731	1732	1733	1734	1735	1736	1737	1738	1739	1740	1741	1742	1743	1744	1745	1746	1747	1748	1749	1750	1751	1752	1753	1754	1755	1756	1757	1758	1759	1760	1761	1762	1763	1764	1765	1766	1767	1768	1769	1770	1771	1772	1773	1774	1775	1776	1777	1778	1779	1780	1781	1782	1783	1784	1785	1786	1787	1788	1789	1790	1791	1792	1793	1794	1795	1796	1797	1798	1799	1800	1801	1802	1803	1804	1805	1806	1807	1808	1809	1810	1811	1812	1813	1814	1815	1816	1817	1818	1819	1820	1821	1822	1823	1824	1825	1826	1827	1828	1829	1830	1831	1832	1833	1834	1835	1836	1837	1838	1839	1840	1841	1842	1843	1844	1845	1846	1847	1848	1849	1850	1851	1852	1853	1854	1855	1856	1857	1858	1859	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869	1870	1871	1872	1873	1874	1875	1876	1877	1878	1879	1880	1881	1882	1883	1884	1885	1886	1887	1888	1889	1890	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2423	2424	2425	2426	2427	2428	2429	2430	2431	2432	2433	2434	2435	2436	2437	2438	2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Addendum 3. Land Type Memoir Ic34.

LAND TYPE	LANDTYPE	Code	Occurrence (range) and mean	Frequency (range) as appropriate	Inventories by	Inventories due to
CLD444-0012	ALD44470012	1001W	1231-1234	1231-1234	2014-2015 & 2016	2014-2015 & 2016
Area	Open-leaf	7921ha			Global profiles	Global profiles
Estimated area available for agriculture					Geology	Geology
Relevant opportunities on the island						
Terrestrial zone	Terrestrial zone					
% of land type	% of land type					
Area	Open-leaf (ha)					
Slope	Slope (%)					
Slope length	Slope length (m)					
Slope aspect	Slope aspect					
Mean (SD) (ha)						
Mean (SD) (ha)						
Soil cover or land classes						
Geology of land class						
Rock type	Rock type					
Shale (ha)						
Granite (ha)						
Basalt (ha)						
Quartzite (ha)						
Amphibolite (ha)						
Other (ha)						
Terrestrial zone	Terrestrial zone					
Terrestrial zone	Terrestrial zone					

For an explanation of the table, consult LAND TYPE INVENTORY (table of contents)

Geology: Shale and granite of the Tumbler Group

Geology: Shale and granite of the Tumbler Group

Addendum 4. Land Type Memoir Ib76.

[illegible]

Addendum 5. Land Type Memoir Fc64.

LAND TYPE	LANDTYPE	EXTENSION	Feet	Occurrence (range) and area				Thickness (Range) in approximation		Direction by		Direction along		Tension		Depth	
CLIMATE ZONE	Area	Approximate	18000	1200 Limestone (100-400)						SSEA Subsea & C/U/vas Hierarchy		Subsidiary profile					
Area	Approximate	15000															
Estimated area available for agriculture																	
Remains appropriate to the climate																	
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Addendum 8. Copy of Declarations

PROVINCIAL NOTICE

P.N. 9/2026

13 February 2026

DEPARTMENT OF ENVIRONMENTAL AFFAIRS AND DEVELOPMENT PLANNING

NATIONAL ENVIRONMENTAL MANAGEMENT: PROTECTED AREAS ACT, 2003 (ACT 57 OF 2003)

DECLARATION OF BLOUTORING NATURE RESERVE

I, Anton Wilhelm Bredehl, Provincial Minister of Local Government, Environmental Affairs and Development Planning in the Western Cape, under section 23(1)(a)(i) of the National Environmental Management: Protected Areas Act, 2003 (Act 57 of 2003) (the Act), declare a nature reserve on

- (a) The Farm Geen Bedrog No. 18, situated in the Langeberg Municipality, Division of Montagu, Western Cape Province; in extent: 1738,8728 (One Thousand Seven Hundred and Thirty-Eight comma Eight Seven Two Eight) hectares; held by Deed of Transfer No. T1922/1987;
- (b) The Farm Blands Hoek No. 163, situated in the Cape Winelands District Municipality, Division of Worcester, Western Cape Province; in extent: 798,0566 (Seven Hundred and Ninety-eight comma Zero Five Six Six) hectares; held by Deed of Transfer No. T1922/1987;
- (c) Portion 2 of the Farm Lettas Kruis No. 162, situated in the Cape Winelands District Municipality, Division of Worcester, Western Cape Province; in extent: 2068,2900 (Two Thousand and Sixty-Eight comma Two Nine Zero Zero) hectares; held by Deed of Transfer No. T1922/1987; and
- (d) Portion 1 (Bloutoring Siding) of the Farm Lettas Kruis No. 162, situated in the Cape Winelands District Municipality, Division of Worcester, Western Cape Province; in extent: 5,6822 (Five comma Six Eight Zero Two) hectares; held by Deed of Transfer No. T65494/1988.

Under section 23(1)(b) of the Act, I assign the name "Bloutoring Nature Reserve" to the nature reserve, the boundaries of which are reflected on the map set out in the Schedule. The Surveyor-General diagrams 257/1870, 2610/1879, 1388/1950 and 4417/1925 of the respective properties may be viewed at <https://www.capeature.co.za/protected-areas-and-stewardship>.

Signed at Cape Town on this 9th day of February 2026.

AW BREDELL

PROVINCIAL MINISTER OF LOCAL GOVERNMENT, ENVIRONMENTAL AFFAIRS AND DEVELOPMENT PLANNING

PROVINSIALE KENNISGEWING

P.K. 9/2026

13 Februarie 2026

DEPARTEMENT VAN OMGEWINGSAKKE EN ONTWIKKELINGSBEPLANNING

NATIONAL ENVIRONMENTAL MANAGEMENT: PROTECTED AREAS ACT, 2003 (WET 57 VAN 2003)

VERKLARING VAN BLOUTORING NATUURRESERVAAT

EK, Anton Wilhelm Bredehl, Provinsiale Minister van Plaaslike Regering, Omgewingsake en Ontwikkelingsbeplanning in die Wes-Kaap, kragtens artikel 23(1)(a)(i) van die *National Environmental Management: Protected Areas Act, 2003 (Wet 57 van 2003)* (die Wet), verklaar 'n natuurreservaat op—

- (a) Die Plaas Geen Bedrog Nr. 18, geleë in die Langeberg-munisipaliteit, Afdeling Montagu, Provinsie Wes-Kaap; groot: 1738,8728 (Eenduisend Sewehonderd Agt en Dertig komma Agt Sewe Twee Agt) hektaar; gehou kragtens Transporekte Nr. T1922/1987;
- (b) Die Plaas Blands Hoek Nr. 163, geleë in die Kaapse Wynland-distrikmunisipaliteit, Afdeling Worcester, Provinsie Wes-Kaap; groot: 798,0566 (Sewehonderd Agt-en-Negentig komma Nul Vyf Ses Ses) hektaar; gehou kragtens Transporekte Nr. T1922/1987;
- (c) Gedeelte 2 van die Plaas Lettas Kruis Nr. 162, geleë in die Kaapse Wynland-distrikmunisipaliteit, Afdeling Worcester, Provinsie Wes-Kaap; groot: 2068,2900 (Twee duisend Agt-en-Sestig komma Twee Nul Nul Nul) hektaar; gehou kragtens Transporekte Nr. T1922/1987; en
- (d) Gedeelte 1 (Bloutoring Siding) van die Plaas Lettas Kruis Nr. 162, geleë in die Kaapse Wynland-distrikmunisipaliteit, Afdeling Worcester, Provinsie Wes-Kaap; groot: 5,6822 (Vyf komma Ses Agt Nul Twee) hektaar; gehou kragtens Transporekte Nr. T65494/1988.

Kragtens artikel 23(1)(b) van die Wet, ken ek die naam "Bloutoring Natuurreservaat" toe aan die natuurreservaat, waarvan die grense weergegee word op die kaart in die Bylae uitgesit. Die Landmeter-generaal diagramme 257/1870, 2610/1879, 1388/1950 en 4417/1925 van die onderskeie eiendomme kan by <https://www.capeature.co.za/protected-areas-and-stewardship> gesien word.

Gedeken te Kaapstad op hierdie 9de dag van Februarie 2026.

AW BREDELL

PROVINSIALE MINISTER VAN PLAASLIKE REGERING, OMGEWINGSAKKE EN ONTWIKKELINGSBEPLANNING

PROVINCIAL NOTICE

P.N. 128/2025

14 November 2025

DEPARTMENT OF ENVIRONMENTAL AFFAIRS AND DEVELOPMENT PLANNING
NATIONAL ENVIRONMENTAL MANAGEMENT: PROTECTED AREAS ACT, 2003 (ACT 57 OF 2003)
DECLARATION OF DORINGKLOOF KAROO PLAAS NATURE RESERVE

I, Anton Wilhelm Brodell, Provincial Minister of Local Government, Environmental Affairs and Development Planning in the Western Cape, under section 23(1)(a)(i) of the National Environmental Management: Protected Areas Act, 2003 (Act 57 of 2003) (the Act), declare a nature reserve on:

(a) Portion 2 of the Fara Krus Rivier No. 20, situated in the Langeberg Municipality, Division of Montagu, Western Cape Province; in extent: 43,3433 (Forty Three comma Three Four Three Three) hectares; and

(b) Portion 5 (portion of Portion 1) of the Fara Krus Rivier No. 20, situated in the Langeberg Municipality, Division of Montagu, Western Cape Province; in extent: 165,8594 (One Hundred and Sixty Five comma Eight Five Nine Four) hectares,

held by Deed of Transfer No. T31092/2021.

Under section 23(1)(b) of the Act, I assign the name "Doringkloof Karoo Plaas Nature Reserve" to the nature reserve, the boundaries of which are reflected on the map set out in the Schedule. The Surveyor-General diagrams 4954/44 and 2416/58 of the respective properties may be viewed at <https://www.capeature.co.za/protected-areas-and-stewardship>.

Signed at Cape Town on this 30th day of October 2025.

AW BREDELL

PROVINCIAL MINISTER OF LOCAL GOVERNMENT, ENVIRONMENTAL AFFAIRS AND DEVELOPMENT PLANNING

PROVINSIALE KENNISGEWING

P.K. 128/2025

14 November 2025

DEPARTEMENT VAN OMGEWINGSKE EN ONTWIKKELINGSBEPLANNING
NATIONAL ENVIRONMENTAL MANAGEMENT: PROTECTED AREAS ACT, 2003 (WET 57 VAN 2003)
VERKLARING VAN DORINGKLOOF KAROO PLAAS NATUURRESERVAAT

Ek, Anton Wilhelm Brodell, Provinsiale Minister van Plaaslike Regering, Omgewingsake en Ontwikkelingsbeplanning in die Wes-Kaap, kragtens artikel 23(1)(a)(i) van die *National Environmental Management: Protected Areas Act, 2003* (Wet 57 van 2003) (die Wet), verklaar 'n natuurreservaat op—

(a) Gedeelte 2 van die Plas Krus Rivier Nr. 20, geleë in die Langeberg-munisipaliteit, Afdeling Montagu, Provinsie Wes-Kaap; groot: 43,3433 (Drie-en-Versig komma Drie Vier Drie Drie) hektaar; en

(b) Gedeelte 5 (gedeelte van Gedeelte 1) van die Plas Krus Rivier Nr. 20, geleë in die Langeberg-munisipaliteit, Afdeling Montagu, Provinsie Wes-Kaap; groot: 165,8594 (Eenhonderd Vyf en Sesig komma Agt Vyf Nege Vier) hektaar,

gehou kragtens Transpormakte Nr. T31092/2021.

Kragtens artikel 23(1)(b) van die Wet, kan ek die naam "Doringkloof Karoo Plaas Natuurreservaat" toe aan die natuurreservaat, waarvan die grense weergegee word op die kaart in die Bylae intesgeest. Die Landmeter-generaaldiagnose 4954/44 en 2416/58 van die onderskeie eiendomme kan by <https://www.capeature.co.za/protected-areas-and-stewardship> gevind word.

Gesteek te Kaapstad op hierdie 30ste dag van Oktober 2025.

AW BREDELL

PROVINSIALE MINISTER VAN PLAASLIKE REGERING, OMGEWINGSKE EN ONTWIKKELINGSBEPLANNING

ISAZISO SEPHONDO

I.S. 128/2025

14 kweyeNkanga 2025

ISEBE LEMICIMBI YOKUSINGQONGILEYO NOCWANGCISO LOPHULISO
UMTHETHO WOKULONDOLOZWA KWENDALO YESIZWE: UMTHETHO WEENDAWO ZOLONDOLOZO
IZIKHUSRIWRYO, 2003 (UMTHETHO 57 KA-2003)

ISIBHNGEZO NGENDAWO YOLONDOLOZONDALE IDORINGKLOOF KAROO PLAAS

Mna, Anton Wilhelm Brodell, uMphathiswa wePhondo woRhulumente beNingqi, iMincimbi yokuSingqongileyo noCwangciso loPhuhliso eNtshona Koloni, ngaphantsi kweendalo 23(1)(a)(i) loMthetho wokuLondolozwa kweNdalo yeSizwe: UMthetho weendawo zolondolozo ezikhuseleyo, 2003 (uMthetho 57 ka-2003) (uMthetho), ndibhengeza ulondolozondalo—

(a) kwiNzaloonye 2 yeFama iKrus Rivier enguNombolo 20 emi kuMasipala waseLangeberg, kwiCandelo laseMontagu, kwiPhondo leNtshona Koloni; kubungakanani: 43,3433 (amaShumi amaNe aresi Thathu khona esiThathu esiNe esiThathu esiThathu) hehekhthere;

(b) kwiNzaloonye 5 (injaloonye yeNzaloonye 1) yeFama iKrus Rivier enguNombolo 20 emi kuMasipala waseLangeberg, kwiCandelo laseMontagu, kwiPhondo leNtshona Koloni; kubungakanani: 165,8594 (iKintu elinamaShumi amaThandathu aesiThathu khona iSilobozo esiLham iThoba naNe) hehekhthere.

ophantsi kweSigqinisekiso seNikenzelo leMhlaba esingunombolo T31092/2021.

Phantsi kweendalo 23(1)(b) loMthetho, ndinika igama elithi "INdawo yolondolozondalo iDoringkloof Karoo Plaas" kwindawo yolondolozondalo, leyo inika yayo ibonisiwe kwimaphu ehaswe kwiShedyuli. Imizobo kaNocanda-likelole yosipathi ezibaphazekileyo ezingunombolo 4954/44 no 2416/58 nokubonwa ku-<https://www.capeature.co.za/protected-areas-and-stewardship>.

Siyikitywe eKapa ngalo mha wama20 kweyeDwaZha 2025.

AW BREDELL

UMPHATHISWA WEPHONDO WOORHULUMENTE BEENGINGQI IMINCIMBI YOKUSINGQONGILEYO NOCWANGCISO LOPHULISO

PROVINCIAL NOTICE

The following Provincial Notice is published for general information.

DR IIC MALILA,
DIRECTOR-GENERAL

Provincial Legislature Building,
Wale Street,
Cape Town.

PROVINSIALE KENNISGEWING

Die volgende Provinsiale Kennisgewing word vir algemene inligting gepubliseer.

DR IIC MALILA,
DIREKTEUR-GENERAAL

Provinsiale Wetgewer gebou,
Walestraat,
Kaapstad.

ISAZISO SEPHONDO

Esi Saziso sePhondo siladcklayo sipapushelwa ntsika ntwazi ngokubaazi.

uGOIK IIC MALILA,
MLAWULI-JIKELELE

Isakhiwo sePhondo,
Wale Street,
eKapa.

PROVINCIAL NOTICE**P.N. 158/2026****24 July 2026****DEPARTMENT OF ENVIRONMENTAL AFFAIRS AND DEVELOPMENT PLANNING****NATIONAL ENVIRONMENTAL MANAGEMENT PROTECTED AREAS ACT, 2003 (ACT 57 OF 2003)****DECLARATION OF KRUISRIVIER NATURE RESERVE**

I, Anton Wilhelm Bredehl, Provincial Minister of Local Government, Environmental Affairs and Development Planning in the Western Cape, under section 23(1)(a)(i) of the National Environmental Management: Protected Areas Act, 2003 (Act 57 of 2003) (the Act), declare a nature reserve as—

- (a) Remainder of Portion 3 of the Farm Kruis Rivier No. 20, situated in the Cape Winelands District Municipality, Division of Montagu, Western Cape Province; in extent: 1996,9563 (One Thousand Nine Hundred and Ninety Six comma Nine Five Six Three) hectares; held by Deed of Transfer No. T80863/2002; and
- (b) Portion 4 (a portion of Portion 3) of the Farm Kruis Rivier No. 20, situated in the Cape Winelands District Municipality, Division of Montagu, Western Cape Province; in extent: 1379 (One Thousand Three Hundred and Seventy-Nine) square meters [0,1379 (Zero comma One Three Seven Nine) hectares]; held by Deed of Transfer No. T80863/2002,

totaling 1997,0942 (One Thousand Nine Hundred and Ninety Seven comma Zero Nine Four Two) hectares.

Under section 23(1)(b) of the Act, I assign the name "Kruisrivier Nature Reserve" to the nature reserve, the boundaries of which are reflected on the map set out in the Schedule. The Survey General diagrams 4955/1944 and 8066/1949 of the respective properties may be viewed at <https://www.capenature.co.za/protected-areas-and-stewardship>.

Signed at Cape Town on this 20th day of July 2026.

AW BREDELL**PROVINCIAL MINISTER OF LOCAL GOVERNMENT, ENVIRONMENTAL AFFAIRS AND DEVELOPMENT PLANNING****PROVINSIALE KENNISGEWING****P.N. 158/2026****24 Julie 2026****DEPARTEMENT VAN OMGEWINGSKE EN ONTWIKKELINGSBEPLANNING****NATIONAL ENVIRONMENTAL MANAGEMENT PROTECTED AREAS ACT, 2003 (WET 57 VAN 2003)****VERKLARING VAN KRUISRIVIER NATUURRESERVAAT**

Ek, Anna Wilhelm Bredehl, Provinsiale Minister van Plaaslike Regering, Omgewingsake en Ontwikkelingsbeplanning in die Wes-Kaap, kragtens artikel 23(1)(a)(i) van die *National Environmental Management: Protected Areas Act, 2003* (Wet 57 van 2003) (die Wet), verklaar 'n natuurreservaat op—

- (a) Restant van Gedeelte 3 van die Plaas Kruis Rivier Nr. 20, geleë in die Kaapse Wynland-distriksmunisipaliteit, Afdeling Montagu, Provinsie Wes-Kaap; groot: 1996,9563 (Eenduisend Negehonderd Ses-en-Sewentig komma Negen Vyf Ses Drie) hektaar; gehou kragtens Transporkarte Nr. T80863/2002; en
- (b) Gedeelte 4 (’n gedeelte van Gedeelte 3) van die Plaas Kruis Rivier Nr. 20, geleë in die Kaapse Wynland-distriksmunisipaliteit, Afdeling Montagu, Provinsie Wes-Kaap; groot: 1379 (Eenduisend Driehonderd Negen-en-Sewentig) vierkante meter [0,1379 (Nul komma Een Drie Sewen Negen) hektaar]; gehou kragtens Transporkarte Nr. T80863/2002.

altesaam 1997,0942 (Eenduisend Negehonderd Sewen-en-Neëndig komma Nul Negen Vier Twee) hektaar.

Kragtens artikel 23(1)(b) van die Wet, ken ek die naam "Kruisrivier Natuurreservaat" toe aan die natuurreservaat, waarvan die grense weergegee word op die kaart in die Bylae intesgeesit. Die Landmeter-generaalingsnummers 4955/1944 en 8066/1949 van die onderskeie eiendomme kan by <https://www.capenature.co.za/protected-areas-and-stewardship> gesien word.

Gedeken te Kaapstad op hierdie 20ste dag van Julie 2026.

AW BREDELL**PROVINSIALE MINISTER VAN PLAASLIKE REGERING, OMGEWINGSKE EN ONTWIKKELINGSBEPLANNING**

PROVINCIAL NOTICE

P.N. 155/2025

12 December 2025

DEPARTMENT OF ENVIRONMENTAL AFFAIRS AND DEVELOPMENT PLANNING
NATIONAL ENVIRONMENTAL MANAGEMENT: PROTECTED AREAS ACT, 2003 (ACT 57 OF 2003)

DECLARATION OF MACHASEH NATURE RESERVE

I, Anton Wilhelm Bredell, Provincial Minister of Local Government, Environmental Affairs and Development Planning in the Western Cape, under section 23(1)(a)(i) of the National Environmental Management: Protected Areas Act, 2003 (Act 57 of 2003) (the Act), declare a nature reserve on

Portion 1 of the Ixora Islands Farm No. 17, situated in the Langeberg Municipality, Division of Montagu, Western Cape Province, in extent: 844,8371 (Eight Hundred and Forty-Four octanna Eight Three Seven One) hectares, held by Deed of Transfer No. T17422/2019.

Under section 23(1)(b) of the Act, I assign the name "Machaseh Nature Reserve" to the nature reserve, the boundaries of which are reflected on the map set out in the Schedule. The Landmaster-General Diagram 2341/2018 of the property may be viewed at <https://www.capeature.co.za/protected-areas-and-stewardship>.

Signed at Cape Town on this 4th day of December 2025.

AW BREDELL

PROVINCIAL MINISTER OF LOCAL GOVERNMENT, ENVIRONMENTAL AFFAIRS AND DEVELOPMENT PLANNING

PROVINSIALE KENNISGEWING

P.K. 155/2025

12 Desember 2025

DEPARTEMENT VAN OMGEWINGSAKKE EN ONTWIKKELINGSBEPLANNING
NATIONAL ENVIRONMENTAL MANAGEMENT: PROTECTED AREAS ACT, 2003 (WET 57 VAN 2003)

VERKLARING VAN MACHASEH NATUURRESERVAAT

Ek, Anton Wilhelm Bredell, Provinsiale Minister van Plaaslike Regering, Omgewingsake en Ontwikkelingsbeplanning in die Wes-Kaap, kragtens artikel 23(1)(a)(i) van die *National Environmental Management: Protected Areas Act, 2003* (Wet 57 van 2003) (die Wet), verklaar 'n natuurreservaat op—

Geodesie 1 van die Ixora Eilande Farm No. 17, geleë in die Langeberg munisipaliteit, Afdeling: Montagu, Provinsie Wes-Kaap, groot: 844,8371 (Aghonderd Vier-en-Voertig kommas Agt Drie Sewe Een) hektaar, gehou kragtens Transpaskte Nr. T17422/2019.

Kragtens artikel 23(1)(b) van die Wet, ken ek die naam "Machaseh Natuurreservaat" toe aan die natuurreservaat, waarvan die grense weergegee word op die kaart in die Bylae niteengesit. Die Landmaster-generaaldiagram 2341/2018 van die eiendom kan by <https://www.capeature.co.za/protected-areas-and-stewardship> gesien word.

Gedeken te Kaapstad op hierdie 4de dag van Desember 2025.

AW BREDELL

PROVINSIALE MINISTER VAN PLAASLIKE REGERING, OMGEWINGSAKE EN ONTWIKKELINGSBEPLANNING

ISAZISO SEPHONDO

I.S. 155/2025

12 kweyoMnga 2025

ISEBE LEMICIMBI YOKUSINGQONGILEYO NOCWANGCISO LOPHULISO
UMTHETHO WOKULONDOLOZWA KWENDALO YESIZWE: UMTHETHO WOKUNDAWO ZOLONDOLOZO
IZIKHUSULWRYO, 2003 (UMTHETHO 57 KA-2003)

ISIBHENGKZO NGENDAWO YOLONDOLOZONDALO IMACHASEH

Mas, Anton Wilhelm Bredell, uMphatlisa wephondo woRholumente beeNgingqi, iMincimbi yokuSingqongileyo noCwangciso loPhuhliso eNobhona Koloni, ngaphantsi kwecandelo 23(1)(a)(i) loMthetho wokulondolozwa kweNdalo yeSizwe: UMthetho weNdawo zoLondolozo zeKhushulwryo, 2003 (uMthetho 57 ka-2003) (uMthetho, isibhengiso ulondolozondalo).

kwiNtsebenye 1 yeFama iIixora Fontein engeNombolo 17, emi kuMasipala waseLangeberg, kwCaandlo laseMontagu, kwiphondo laseNobhona Koloni, kubungakaneni: 844,8371 (AmaKhulu aSibhozo amaneShumi amane aNane khona iSibhozo esiPhulu isixhenxe nesNye) hektekhezo; ephantsi kweSiquiniso soSikezelo loMabha esingeNombolo T17422/2019.

Phantsi kwecandelo 23(1)(b) loMthetho, ndinika igama elithi "iNdawo yoLondolozondalo iMachaseh" kwindawo yolondolozondalo, leyo inida yayo ibonisa kwimaphi echazwe kwiShedyuli. Umzobo kaNocanda jikelele wepropasithi enganombolo 2341/2018 unokabonwa ku-<https://www.capeature.co.za/protected-areas-and-stewardship>.

Siyikinywe eKapa ngelo mha wo4 kweyoMnga 2025.

AW BREDELL

UMPHATLISA WEPHONDO WOORHULUMENTE BEENGINGQI, IMICIMBI YOKUSINGQONGILEYO NOCWANGCISO LOPHULISO

Doringkloof Karoo Plaas Nature Reserve (DKPNR)

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										SWW	SWW	SWW	Medium	Planned																																																																																																																																																																																																																																																																																																																																																																																								
										SWW	SWW	SWW	Low	Advised																																																																																																																																																																																																																																																																																																																																																																																								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16																																																																																																																																																																																																																																																																																																																																																																																							
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32																																																																																																																																																																																																																																																																																																																																																																																							
33	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25																																																																																																																																																																																																																																																																																																																																																																																							
34																17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25	17-12-25

Bloutoring Nature Reserve (BNR)

Annual Plan of Operation				Range Period		Priority		Annual	
CM	CM/M	Tw/M	Low	Medium	CM	CM/M	Tw/M	Low	Medium
CM	CM/M	Tw/M	Low	Medium	CM	CM/M	Tw/M	Low	Medium
Blank	Blank	Blank	Blank	Blank	Blank	Blank	Blank	Blank	Blank
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Machaseh Nature Reserve (MNR)

Annual Plan of Operation Machiasch Nature Reserve 2026										 Resp. Person CSM CSM/BSA BSA/BSA SACS SACS/BSA/BSA SACS/BSA SACS/BSA/BSA SACS/BSA/BSA SACS/BSA			 Priority High Critical (None)		 Annual Review Completed Ongoing (None)	
2026	2026	2026	2026	2026	2026	2026	2026	2026	2026	2026	2026	2026	2026	2026	2026	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		
31	32	33	34	35	36	37	38	39	40	41	42	43	44	45		
46	47	48	49	50	51	52	53	54	55	56	57	58	59	60		
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75		
76	77	78	79	80	81	82	83	84	85	86	87	88	89	90		
91	92	93	94	95	96	97	98	99	100	101	102	103	104	105		
106	107	108	109	110	111	112	113	114	115	116	117	118	119	120		
121	122	123	124	125	126	127	128	129	130	131	132	133	134	135		
136	137	138	139	140	141	142	143	144	145	146	147	148	149	150		
151	152	153	154	155	156	157	158	159	160	161	162	163	164	165		
166	167	168	169	170	171	172	173	174	175	176	177	178	179	180		
181	182	183	184	185	186	187	188	189	190	191	192	193	194	195		
196	197	198	199	200	201	202	203	204	205	206	207	208	209	210		
211	212	213	214	215	216	217	218	219	220	221	222	223	224	225		
226	227	228	229	230	231	232	233	234	235	236	237	238	239	240		
241	242	243	244	245	246	247	248	249	250	251	252	253	254	255		
256	257	258	259	260	261	262	263	264	265	266	267	268	269	270		
271	272	273	274	275	276	277	278	279	280	281	282	283	284	285		
286	287	288	289	290	291	292	293	294	295	296	297	298	299	300		
301	302	303	304	305	306	307	308	309	310	311	312	313	314	315		
316	317	318	319	320	321	322	323	324	325	326	327	328	329	330		
331	332	333	334	335	336	337	338	339	340	341	342	343	344	345		
346	347	348	349	350	351	352	353	354	355	356	357	358	359	360		
361	362	363	364	365	366	367	368	369	370	371	372	373	374	375		
376	377	378	379	380	381	382	383	384	385	386	387	388	389	390		
391	392	393	394	395	396	39										

Annual Plan of Operation										Krukskriver Nature Reserve		2026												Priority		Annual...	
																								Plan		Key	
																								Implement		Check	
																								Monitor		Review	
																								Evaluate		Report	
																								Plan		Review	
																								Plan		Review	
																								Plan		Review	
																								Plan		Review	

