# GROOT WINTERHOEK COMPLEX

## PART OF THE
## CAPE FLORAL REGION PROTECTED AREAS WORLD HERITAGE SITE
## Western Cape, South Africa

# Protected Area Management Plan 2021 – 2031

**DATE APPROVED: [Date]**
**MOST RECENT UPDATE: 07 April 2021**

CapeNature

Western Cape Government
Environmental Affairs and Development Planning

environment, forestry & fisheries
Department:
Environment, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA

United Nations Educational, Scientific and Cultural Organization

World Heritage Convention

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**CITATION**
CapeNature. 2021. Groot Winterhoek Complex: Protected Area Management Plan 2021-2031. Internal Report, CapeNature. Cape Town.

## AUTHORISATIONS

The National Minister is authorised under section 25(1) of the National World Heritage Convention Act, 1999 (Act No. 49 of 1999) to approve the management plan for a World Heritage Site, so nominated or declared under the Act. Furthermore, both the National Minister and Member of Executive Council (MEC) in a particular province, has concurrent jurisdiction to approve a management plan for a protected area submitted under section 39(2) and section 41(4) of the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003).

| TITLE | NAME | SIGNATURE | DATE |
|---|---|---|---|
| NATIONAL MINISTER: Forestry, Fisheries and the Environment | Ms Barbara Creecy | | |
| PROVINCIAL MINISTER: Department of Environmental Affairs and Development Planning | Mr Anton Bredell | Anton Bredell | Digitally signed by Anton Bredell Date: 2021.07.29 08:42:09 +02'00' |

**Recommended:**

| TITLE | NAME | SIGNATURE | DATE |
|---|---|---|---|
| CHAIRPERSON OF THE BOARD: Western Cape Nature Conservation Board | Assoc Prof Denver Hendricks | | 8 April 2021 |
| CHIEF EXECUTIVE OFFICER: CapeNature | Dr Razeena Omar | | 7 April 2021 |

**Review Date:** 10 years from the date of approval by the MEC or Minister.

## ACKNOWLEDGEMENTS

CapeNature would like to thank everybody who participated and had input into the formulation of the Groot Winterhoek Complex management plan.

The Groot Winterhoek Complex management plan was prepared by the core reserve management planning team consisting of Marius Wheeler, Antoinette Veldtman and Amukelani Nkuna. The planning team was supported with inputs from various internal and external partners. A special word of thanks to colleagues from Biodiversity Capabilities and Landscape West for their significant contributions.

Furthermore, acknowledgement is given to the many external partners and individuals that contributed to the development of this plan.

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Jaco van Deventer (CapeNature – Biodiversity Conservation Specialist) for technical and scientific review.

Riaan van der Walt – Fynbos Fish Trust for external review.

Cover page images courtesy of Jeanne Gouws and Marius Wheeler.

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# GLOSSARY

Derived from: Conservation Measures Partnership (CMP 2020).

| Term | Explanation |
|---|---|
| Adaptive Management | The incorporation of a formal learning process into conservation action to reduce uncertainty in decision-making. Specifically, it is the integration of knowledge, management, and monitoring, to provide a framework to systematically and efficiently test assumptions, promote learning, and supply timely information for management to make decisions and adjust actions based on outcomes of monitoring. The *Conservation Standards* explicitly bring adaptive management principles into conservation practice. |
| Factor | A generic term for an element of a conceptual model including direct and indirect threats, opportunities, and associated stakeholders. It is often advantageous to use this generic term since many factors – for example tourism – could be both a threat and an opportunity. Also known as root causes or drivers. |
| Conservation Target | An element of biodiversity (natural value) or heritage (cultural value) of the complex, which can be a species, habitat, ecological system, or heritage feature, that management strives to protect, and threats towards which management should strive to minimise. All focal conservation targets at a site should collectively represent the biodiversity and heritage features of concern at the site. |
| Human Well-being Value | In the context of a conservation project, human well-being values are those components of human well-being affected by the status of conservation targets. All human well-being values at a site should collectively represent the array of human well-being needs and outcomes dependent on the conservation targets. |
| Goal | A formal statement detailing a desired impact of a project, such as the desired future status of a target. A good goal meets the criteria of being *linked to targets*, *impact oriented*, *measurable*, *time limited*, and *specific*. |
| Indicator | A measurable entity related to a specific information need such as the status of a value / factor, change in a threat, or progress toward an objective, or association between one or more variables. A good indicator meets the criteria of being *measurable*, *precise*, *consistent*, and *sensitive*. |
| Key (Ecological) Attribute | An aspect of a focal value's biology or ecology that if present, define a healthy focal value and if missing or altered, would lead to the outright loss or extreme degradation of that focal value over time. |
| Objective | A formal statement detailing a desired outcome of a project such as reducing a critical threat. A good objective meets the criteria of being *results oriented*, *measurable*, *time limited*, *specific*, and *practical*. If the project is well conceptualized and designed, realization of a project's objectives should lead to the fulfilment of the project's goals and ultimately its vision. Compare to vision and goal. |
| Results Chain | A visual diagram of management's theory of change. A results chain includes core assumptions and the logical sequence linking interventions to one or more values. In scientific terms, it lays out hypothesized relationships or theories of change. |
| Vision | A description of the desired long-term future or ultimate condition that stakeholders see, and management strives to achieve for the Complex. |
| Heritage Resources | Means any place or object of cultural significance as per the National Heritage Resources Act, 1999 (Act No. 25 of 1999). |
| Situation Analysis | The purpose of a situation analysis is to understand the relationships between the biological environment and the social, economic, political, and institutional systems, associated stakeholders and drivers that affect the focal values of the complex. |

## ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| CBA | Critical Biodiversity Area |
| CFR | Cape Floristic Region |
| CFRPA | Cape Floral Region Protected Areas |
| CMP | Conservation Measures Partnership |
| CSIR | Council for Scientific and Industrial Research |
| DEA | Department of Environmental Affairs (Old National) |
| DEAT | Department of Environmental Affairs and Tourism (Old National) |
| DWAF | Department of Water Affairs and Forestry (Old National) |
| EPWP | Expanded Public Works Programme |
| ESA | Ecological Support Area |
| FEPA | Freshwater Ecosystem Priority Area |
| IDP | Integrated Development Plan |
| IUCN | International Union for Conservation of Nature |
| MEC | Member of Executive Council |
| METT-SA | Management Effectiveness Tracking Tool - South Africa |
| MTEF | Medium Term Expenditure Framework |
| NEM: BA | National Environmental Management: Biodiversity Act |
| NEM: PAA | National Environmental Management: Protected Areas Act |
| NFEPA | National Freshwater Ecosystem Priority Area |
| PAAC | Protected Area Advisory Committee |
| SANBI | South Africa National Biodiversity Institute |
| SANSA | South African National Survey of Arachnida |
| SDF | Spatial Development Framework |
| SG | Surveyor-General |
| UAMP | User Asset Management Plan |
| UNESCO | United Nations Educational, Scientific and Cultural Organisation |
| WCBSP | Western Cape Biodiversity Spatial Plan |
| WCDM | West Coast District Municipality |
| WCPAES | Western Cape Protected Area Expansion Strategy |
| WWF-SA | World Wide Fund for Nature – South Africa |

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# EXECUTIVE SUMMARY

In compliance with the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) and Chapter 4 of the National World Heritage Convention Act, 1999 (Act No. 49 of 1999), the management authority of a protected area is required to develop management plans for each of its protected areas.

The National Minister is authorised under section 25(1) of the National World Heritage Convention Act, 1999 (Act No. 49 of 1999) to approve the management plan for a protected area so nominated or declared under the Act. Both the National Minister and Member of Executive Council (MEC) in a particular province has concurrent jurisdiction to approve a management plan for a protected area submitted under section 39(2) of the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003).

In developing the management plan for the Groot Winterhoek Complex, CapeNature as the management authority strives to establish biodiversity conservation as a foundation for a sustainable economy, providing ecosystem services and to promote sustainable access and opportunities for all.

## An Overview of the Groot Winterhoek Complex

The Groot Winterhoek Complex is situated in the Western Cape, South Africa and is approximately 27 330 hectares of which 24 309 hectares were proclaimed as a wilderness area in 1985.

The Groot Winterhoek Complex was inscribed as a World Heritage Site by the World Heritage Convention, UNESCO (United Nations Educational, Scientific and Cultural Organisation) in 2004 and extended in 2015 as part of the Cape Floral Region Protected Areas (CFRPA) World Heritage Site. The latter comprises a serial property of ten protected areas covering a total area of 187 578 hectares. A buffer zone of approximately 92 295 hectares designed to facilitate functional connectivity and mitigate the effects of global climate change and other anthropogenic influences has also been identified. The Groot Winterhoek Complex is supported and buffered by a network of adjacent or surrounding conserved areas ranging from Provincial Nature Reserves, Private Nature Reserves, Stewardship sites and Mountain Catchment Areas.

The Groot Winterhoek Complex represents outstanding examples of significant ongoing ecological and biological processes in the evolution of terrestrial ecosystems and plant communities such as a natural fire regime, and natural flow of water through the area supporting unique indigenous freshwater fish assemblages and connectivity for species migration, gene flow and dispersal. In addition, the complex contains important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value.

Moreover, the Groot Winterhoek Complex serves as a local watershed for a part of the middle Berg and Olifants Water Management Areas. This catchment area is one of South Africa's National Strategic Water Source Areas and contributes significantly to water security within the region, providing water for human and agricultural development in no less than eight local municipalities as well as the Cape Metro.

## Planning, Policy, Implementation and Review

To develop this management plan CapeNature applied the Conservation Standards which is a Strategic Adaptive Management framework that is robust, yet flexible, multi-disciplinary in approach, and inclusive of internal and external stakeholders, as well as the public at large. It enables management teams to develop effective conservation plans, based on the best available traditional, expert and scientific knowledge. Furthermore, it promotes stakeholder and public engagement throughout the planning and implementation phase of the management plan. Key to this process is identifying the focal conservation targets and human well-being values representative of the protected area, determining what state they are in, and what threats they face. This forms the basis for establishing clear goals, strategies and objectives that are time bound.

This management plan provides the basis for the management, development and operation of the Groot Winterhoek Complex over a timeframe of 10 years. The implementation of the management plan it subject to legislation, regulations, policies and guidelines to ensure and promote sound financial and biodiversity management, effective compliance, safety, good neighbour relations and to promote sustainable access to the complex. The success of implementation of this plan is also subject to sufficient resources to manage the Groot Winterhoek Complex.

Fundamental to implementation is pursuing the achievement of conservation outcomes and regular review thereof. Strategic Adaptive Management integrates planning, management, and monitoring, and is used to systematically evaluate results, thus enabling management to "change direction" when required. Key to this process is the sharing of results, respectfully, honestly and transparently to facilitate learning through critical appraisal of conservation efforts. CapeNature uses an internationally recognised review system - The Management Effectiveness Tracking Tool for South Africa, adopted by the national Department of Forestry, Fisheries and the Environment, to assess the management effectiveness of all its protected areas at a strategic level. Additionally, mechanisms for monitoring and evaluation are built into each aspect highlighted in the strategic plan.

## Purpose, Vision and Desired State

CapeNature manages the Groot Winterhoek Complex in accordance with its organisational vision, and in agreement with the vision, goals and strategies derived through the planning process. The vision of the complex is:

***"A montane World Heritage, with a wilderness character, managed to sustain and promote water security, biodiversity, ecotourism and heritage, to promote ecological resilience through effective catchment management and partnerships."***

Protected area targets and values include healthy catchments, providing ecosystem services and human well-being benefits. Four focal conservation targets that incorporate several nested aspects have been selected for the Groot Winterhoek Complex. These are:

**1) Freshwater Ecosystems; 2) Terrestrial Ecosystems; 3) Pre-colonial Heritage, and 4) Artificial and Historic Structures.**

Freshwater Ecosystems comprise of all natural, seasonal rivers and riparian zones, streams, lowland and high-altitude wetlands (including wetland buffers), seeps and groundwater. It further includes freshwater invertebrate and fish communities (specifically the Endangered Berg River redfin (*Pseudobarbus burgi)*, Cape kurper (*Sandelia capensis)*, Cape galaxias (*Galaxias zebratus)*, and the Critically Endangered northern moss frog *(Arthroleptella subvoce*). Terrestrial Ecosystems comprises the terrestrial vegetation that consists of six distinct vegetation types, of which one is of conservation concern (Swartland Alluvium Fynbos – Critically Endangered), 22 highly restricted plant species, and all other associated flora and fauna species. Furthermore, it includes all associated priority faunal species. Pre-colonial heritage consists of all the rock art in the complex, as well as archaeological and palaeontological resources, while artificial and historic structures comprise tangible heritage features older than 70 years such as the buildings and grave sites within the complex.

As the public entity responsible for biodiversity conservation within the Western Cape Province, CapeNature delivers a suite of core services to the public in support of the following outcomes: resilient ecosystems; the promotion of local economic development; job creation and skills development; growing diversified nature-based revenue streams; access to environmental education; advocacy and education; and access to natural and cultural heritage. Three focal human well-being values have been identified for the Groot Winterhoek Complex. These include:

**1) Water Security and Environmental Resilience; 2) Sustainable Natural Resource Use; and 3) Environmental Education and Awareness.**

Eight goals have been formulated to maintain or enhance the focal conservation targets and human well-being values of the Groot Winterhoek Complex. An asterisk * indicates the availability of detailed information in section 5. The goals are:

1. By 2031, the terrestrial ecosystems in the Groot Winterhoek Complex have an ecologically healthy fire regime* and comprises at least 95% indigenous species.
2. By 2031, the upper and middle river reaches in the Groot Winterhoek Complex support macro invertebrate species communities with an ASPT of 6 - ≥8, and viable indigenous fish communities are present in on-reserve rivers identified for fish conservation.
3. By 2031, the health of the wetland ecosystems in the Groot Winterhoek Complex will be in at least a near-natural* condition, and riparian zones and wetland buffers will have an indigenous vegetation cover of at least 95%.
4. By 2031, the state of all pre-colonial heritage sites has been determined and all unnatural disturbances to heritage features within the Groot Winterhoek Complex are managed to maintain or improve (where possible) the current conditions.
5. By 2031, all human disturbance to heritage structures within the Groot Winterhoek Complex is limited, maintained in the current state, or, if feasible, the condition is improved.

Achieving human well-being, derived from healthy responsibly managed ecological infrastructure and heritage, requires that:

6. By 2031 the Groot Winterhoek Complex will, through integrated catchment management, protect and enhance the provision of water quality and quantity contributing to the water resilience for the Berg and Olifants catchment areas.
7. By 2031, access to, and sustainable utilisation of, natural resources within the Groot Winterhoek Complex are in accordance with CapeNature policy and procedures.
8. By 2031, the Groot Winterhoek Complex environmental education and awareness programme will promote ecological targets and human well-being values.

## Threats

Threats and contributing factors that degrade or destroy the Groot Winterhoek Complex's conservation targets were identified and unpacked in a conceptual model to illustrate the current conservation situation and to guide the formulation of mitigating strategies. The main threats to the targets and values of the complex were identified as:

**1) Inappropriate fire regime; 2) Invasive alien plants; 3) Inappropriate roads and trails; 4) Invasive alien fish; 5) Agricultural water impacts; 6) Illegal resource use; 7) Illegal access; 8) Vandalism; 9) Fire damage to heritage features; 10) Lack of maintenance and 11) Climate change.**

To assist the Groot Winterhoek Complex to mitigate and manage threats and contributing factors effectively, both inside and outside the boundaries, the complex will incorporate spatial planning tools that include the sensitivity, zonation and zone of influence.

## Strategic Plan

A thorough analysis of the Groot Winterhoek Complex's conservation situation, inclusive of the biological, social, economic, cultural and institutional systems that affect the protected area's focal conservation targets and values, formed the basis for developing conservation strategies and action plans. The aim was to identify opportunities and strategic points where intervention is feasible and likely to have the biggest positive impact towards achieving goals. CapeNature will lead the implementation of the management plan, although achieving the complex's vision requires coordinated effort between various key external stakeholders. Five key strategies have been identified to assist the Groot Winterhoek Complex, these are:

**Strategy 1:** Ensure adequate fire, water and invasive alien species management within and around the Groot Winterhoek Complex to promote a healthy fire regime, biodiversity and strategic water production.

**Strategy 2:** Ensure legal and sustainable use and access to the natural and heritage features of the Groot Winterhoek Complex to reduce anthropogenic impacts.

**Strategy 3:** Promote and expand awareness of the Groot Winterhoek Complex's ecological and heritage targets and their contribution towards ecological infrastructure and human well-being.

**Strategy 4:** Enhance the management and protection of the Groot Winterhoek Complex's heritage features through effective partnerships.

**Strategy 5:** Promote responsible access to the he Groot Winterhoek World Heritage Site as a unique ecotourism destination and contribute to local economic development and social upliftment.

# 1 INTRODUCTION

In working towards CapeNature's vision of conserving nature for a sustainable future, CapeNature's protected area management, in accordance with the purpose of the protected area, strives to:

- Conserve and represent natural habitats and indigenous biodiversity including threatened species for their scientific and conservation value in the Western Cape Province;
- Conserve representative samples of significant ongoing ecological processes in the evolution and development of ecosystems and communities of plants and animals;
- Provide ecosystem services that benefit people of the Western Cape;
- Manage protected areas effectively and efficiently, including the interrelationships between biophysical, social and economic environments;
- Ensure that protected area planning and management is integrated and participatory;
- Provide for sustainable use and equitable access.

The management plan is a strategic adaptive management framework for the protected area, guided by the Open Standards for the Practice of Conservation (hereafter referred to as the Conservation Standards) (CMP 2020) adaptive management paradigm. The Conservation Standards is dependent upon and promotes stakeholder engagement and participatory planning in the development of the plan. The framework further stimulates the incorporation of mechanisms to facilitate stakeholder engagement and participation during operationalisation of the plan.

The Groot Winterhoek Complex protected area management plan serves as a reference to the management and development of the complex in its current and envisaged future state. It directs management at all levels. The management plan addresses:

- The mandate, human capacity and financial resources that are required to meet goals and objectives based on the condition of natural and cultural targets, and core service areas requiring a focused effort;
- The delivery of socio-economic benefits to neighbouring communities;
- Flexibility of service delivery that encourages innovation and involvement by a wide range of government, community and non-government sectors;
- Performance indicators and accountability measures that provides for regular review and adaptive management.

# 2 LEGAL STATUS AND BACKGROUND

This section provides a record of the legal status of the protected area, as well as its description, location and includes any areas designated by South Africa in terms of international agreements. Furthermore, it also provides an overview of the biophysical, biodiversity, heritage and socio-economic context.

## 2.1 Legal Status

### 2.1.1 Name and legal designations

The Groot Winterhoek Complex comprises the following, using the terminology as indicated in the declarations according to the Nature Conservation Ordinance, 1974 (Ordinance 19 of 1974), National Forest Act, 1998 (Act No. 84 of 1998) and the National Environmental Management: Protected Areas Act (NEM: PAA), 2003 (Act No. 57 of 2003) and as reflected on the Protected Areas Register held by the Department of Forestry, Fisheries and the Environment:

- Groot Winterhoek Wilderness Area

The following component forms part of the World Heritage Site and was inscribed by UNESCO as part of the 2015 extension to the Cape Floral Region Protected Areas World Heritage Site, but not declared:

- Groot Winterhoek Nature Reserve

A full list of the declarations and status of land appears in Table 2.1.

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**Table 2.1:** Land parcels and status that make up the Groot Winterhoek Complex.

| Title Deed | Farm Name | Farm No. | Portion No. | Extent (ha) | Registration Division | SG Code | Landowner | Proc. Date | Proc. No. | Govt. Gazette | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T852/1980 | Zuur Vlakte | 189 | 6 | 14.52 | Piketberg | C05800000000 018900006 * | Republic of South Africa | 20 Sept. 1985 | 2113/ 1985 | 9934 | Wilderness Area |
| T852/1980 | Zuur Vlakte | 189 | 6 | 892.66 | Piketberg | C05800000000 018900006 * | Republic of South Africa | 07 Dec. 1979 | 2753/ 1979 | 6764 | State Land released from State Forest |
| T2157/1941 | Kliphuis Vlakte | 192 | 0 | 4936.69 | Piketberg | C05800000000 019200 000 ** | Republic of South Africa | 20 Sept. 1985 | 2113/ 1985 | 9934 | Wilderness Area |
| T2157/1941 | Paarden Vallei | 193 | RE | 1453.68 | Piketberg | C05800000000 019300000 | Republic of South Africa | 20 Sept. 1985 | 2113/ 1985 | 9934 | Wilderness Area |
| T27899/1976 | Paarden Vallei | 193 | 1 | 469.35 | Piketberg | C05800000000 019300001 | Republic of South Africa | 20 Sept. 1985 | 2113/ 1985 | 9934 | Wilderness Area |
| T17469/1977 | Paarden Vallei | 193 | 2 | 1056.17 | Piketberg | C05800000000 019300002 | Republic of South Africa | 20 Sept. 1985 | 2113/ 1985 | 9934 | Wilderness Area |
| T29350/1976 | De Tronk | 194 | 0 | 2918.84 | Piketberg | C05800000000 019400000 | Republic of South Africa | 20 Sept. 1985 | 2113/ 1985 | 9934 | Wilderness Area |
| T3908/1936 | Louws Legplek | 195 | RE | 1107.21 | Piketberg | C05800000000 019500000 * | Republic of South Africa | 20 Sept. 1985 | 2113/ 1985 | 9934 | Wilderness Area |
| T12245/1962 | Driebosch | 17 | RE | 972.39 | Tulbagh | C07500000000 001700000 | Republic of South Africa | 20 Sept. 1985 | 2113/ 1985 | 9934 | Wilderness Area |
| T1246/1950 | Driebosch | 17 | 3 | 763.80 | Tulbagh | C07500000000 001700003 | Republic of South Africa | 20 Sept. 1985 | 2113/ 1985 | 9934 | Wilderness Area |
| G194/1951 | Bokvelds Kloof | 41 | 0 | 567.01 | Tulbagh | C07500000000 004100000 | Republic of South Africa | 20 Sept. 1985 | 2113/ 1985 | 9934 | Wilderness Area |
| Unregistered State Land | Bokvelds Kloof | 42 | 0 | 788.76 | Tulbagh | C07500000000 004200000 | Republic of South Africa | 20 Sept. 1985 | 2113/ 1985 | 9934 | Wilderness Area |
| Unregistered State Land | Farm 43 | 43 | 0 | 960.81 | Tulbagh | C07500000000 004300000 | Republic of South Africa | 20 Sept. 1985 | 2113/ 1985 | 9934 | Wilderness Area |

| Title Deed | Farm Name | Farm No. | Portion No. | Extent (ha) | Registration Division | SG Code | Landowner | Proc. Date | Proc. No. | Govt. Gazette | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Unregistered State Land | Great Winterhoek | 44 | 0 | 7790.46 | Tulbagh | C07500000000004400000 | Republic of South Africa | 20 Sept. 1985 | 2113/ 1985 | 9934 | Wilderness Area |
| Unregistered State Land | Farm 45 | 45 | 0 | 119.80 | Tulbagh | C07500000000004500000 | Republic of South Africa | 20 Sept. 1985 | 2113/ 1985 | 9934 | Wilderness Area |
| Unregistered State Land | Farm 46 | 46 | 0 | 390.10 | Tulbagh | C07500000000004600000 | Republic of South Africa | 20 Sept. 1985 | 2113/ 1985 | 9934 | Wilderness Area |
| T3908/1936 | Louws Legplek | 195 | RE | 1423.33 | Piketberg | C05800000000019500000 * | Republic of South Africa | 23 Dec. 1977 | 2579/ 1977 | 5837 | State Land released from State Forest |
| Unregistered State Land | De Trap | 68 | 0 | 704.81 | Tulbagh | C07500000000006800000 | Republic of South Africa | 06 Feb. 1913 | 235/ 1913 | 329 (11 Feb. 1913) | State Land released from State Forest |

*Split farm according to Gazette 9934, No. 2113 of 1985, 20 September 1985. Thus, a portion was Declared Wilderness Area, and the other portion is still State Forest Nature Reserve.

**Split farm according to Gazette 9934, No. 2113 of 1985, 20 September 1985. Thus, a portion was Declared Wilderness Area and the other portion's status is unknown.

### 2.1.2 Contractual agreements

There are no contractual land agreements with any private landowners, non-government organisations or government departments, for the Groot Winterhoek Complex.

### 2.1.3 Location, extent and highest point

The Groot Winterhoek Complex is situated in the Western Cape Province south of the Cederberg Wilderness Area in the central part of the north/south axis of the Cape Fold Belt, approximately 120 km northeast of Cape Town. The complex lies in the Groot Winterhoek Mountain range, north of Tulbagh and approximately five kilometres directly east of Porterville. The Groot Winterhoek Complex forms a core central part of a larger biodiversity stretch comprised of formally proclaimed protected areas and private Mountain Catchment Areas running from the Boland Mountain Complex in the south, up to the Cederberg Wilderness Area in the north.

The Groot Winterhoek office is reached via the main road (R44). Three kilometres north of Porterville one turns east onto the Dasklip Pass gravel road which runs over Dasklip Pass on the Voorberg Mountain. This road serves the complex office as well as some of the farms to the north of the complex.

The area covers approximately 27 330 hectares of which 24 309 hectares were proclaimed Wilderness Area in 1985. The Groot Winterhoek Complex is surrounded by private Mountain Catchment Areas that creates a buffer between the agricultural farmlands surrounding the complex. The highest point within the complex is Groot Winterhoek Peak at 2 077 meter above sea level. The location and extent of the Groot Winterhoek Complex is illustrated in Appendix 1, Map 1.

### 2.1.4 Municipal jurisdiction

The Groot Winterhoek Complex is situated within the following district and local municipal boundaries (Appendix 1, Map 1):

- Cape Winelands District Municipality
  - Witzenberg Local Municipality
- West Coast District Municipality
  - Bergrivier Local Municipality

### 2.1.5 International, national and provincial listings

UNESCO World Heritage Site:

The Cape Floral Region Protected Areas (CFRPA) was proclaimed as a World Heritage Site based on the outstanding universal value of its significant on-going ecological and biological processes and the presence of some of the world's most important natural habitats for the conservation of biodiversity, meeting criteria (ix) and (x), respectively (DEAT 2003). The widespread and exceptional plant richness and endemism of the Cape Floristic Region (CFR) is related to its biophysical diversity. Carefully considered protected areas, representative of all eight phytogeographic centres of endemism, were selected as the World Heritage Sites representative of this unique and globally significant region (DEAT 2003). The Groot Winterhoek Complex

constitutes one of these, namely the Northwest Phytogeographic Centre of Endemism (Goldblatt & Manning 2000).

Moreover, seven of the eight originally inscribed protected area complexes (DEAT 2003) in the CFRPA World Heritage Site conserve close to half the number of plant species and selected vertebrate taxa of the region (Lombard 2000). This figure is even higher for endemic plants (69%) and for Proteaceae elements (59%). Preliminary results from Bradshaw and Holness (2013) indicate that 27 vegetation types that are not conserved anywhere else in the CFR are conserved by the inscribed CFRPA World Heritage Site. A further 48 of the total 119 vegetation types currently recognised in the CFR (Mucina & Rutherford 2006), and that are not protected elsewhere, are protected by the extended CFRPA World Heritage Site bringing the total to 75 of 119 CFR vegetation types, protected nowhere else in the world.

The Groot Winterhoek Complex is inscribed as a World Heritage Site as part of the existing CFRPA World Heritage Site and part of the complex has also been included in the proposed extension of the CFRPA World Heritage Site. The CFRPA World Heritage Site comprises a serial property of eight initial protected areas with thirteen in the latest extension, covering a total area of approximately 557 584 ha (DEA 2015).

The Groot Winterhoek Complex represents outstanding examples of significant ongoing ecological and biological processes in the evolution of terrestrial ecosystems and plant communities (DEAT 2003) such as a natural fire regime and natural flow of water through the area, supporting unique indigenous freshwater fish assemblages and connectivity for species migration, gene flow, dispersal, *etc.* The Groot Winterhoek Complex contains important and significant natural habitats for *in-situ* conservation of biological diversity, including those containing threatened species of outstanding universal value (DEAT 2003). The complex is a centre of endemism for plants, amphibians, small mammals and importantly, endemic and threatened freshwater fish.

Wilderness Area:

The Groot Winterhoek Wilderness Area was proclaimed in terms of section 7(A) of the Forest Act, 1968 (Act No. 72 of 1968) on 20 September 1985, Notice No. 2113 of 1985. The protected area is managed as a primitive wilderness in which natural processes are encouraged to proceed and human numbers are restricted. Only those activities compatible with wilderness concepts are permitted and staff monitor the impacts of these activities.

## 2.2 Biophysical Description

### 2.2.1 Climate

The Groot Winterhoek Complex falls predominantly in the winter rainfall zone of South Africa, with hot, dry summers from October to April, and cold, wet winters from May to September. In winter, the rain-bearing frontal systems blows from the northwest and during summer, both north-easterly (hot, dry berg winds), and south-easterly winds prevail. Due to its geomorphological structure, the mountains receive considerable amounts of fog water, especially on the eastern slopes. The average annual rainfall for the complex for the period (2012-2019) was 1 043 mm, falling mainly during June-August (Figure 2.1). The rainfall gradient increases sharply towards the southeast as

the altitude increases (Figure 2.5). Snowfall is occasional and generally restricted to the higher mountain peaks towards the southeast (Figure 2.4).

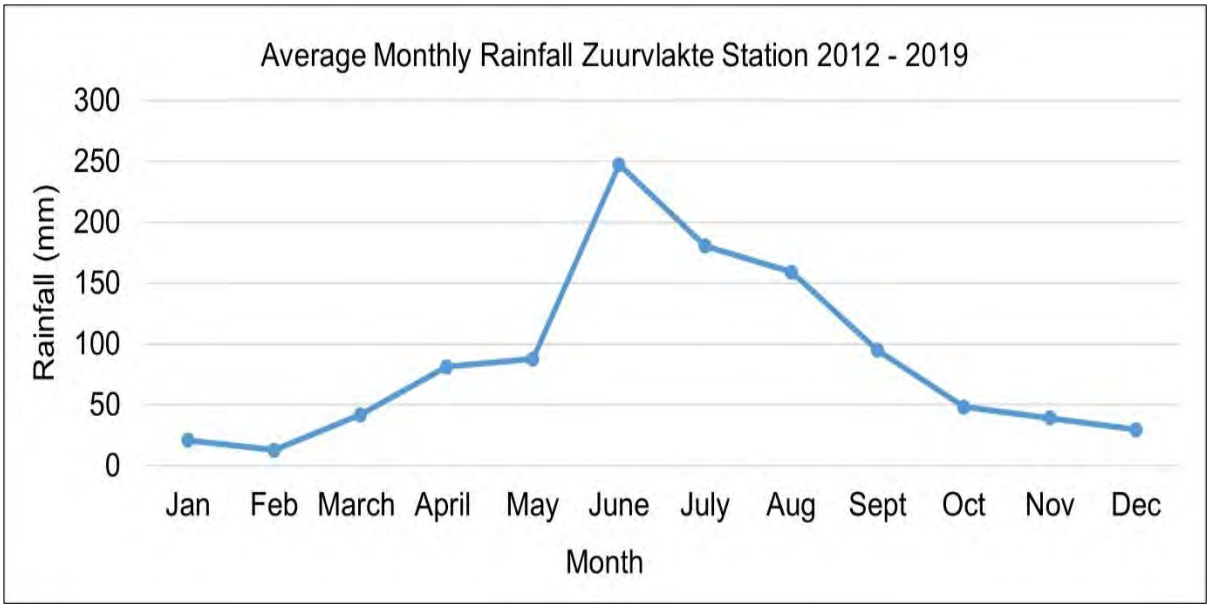


**Figure 2.1:** Average monthly rainfall for the Zuurvlakte station for the period 2012-2019. (Agricultural Research Council, 2020, unpublished data).

Total yearly rainfall showed a sharp decrease for 2015 (Figure 2.2). This is not surprising given the drought situation the Western Cape Province experienced at the time.

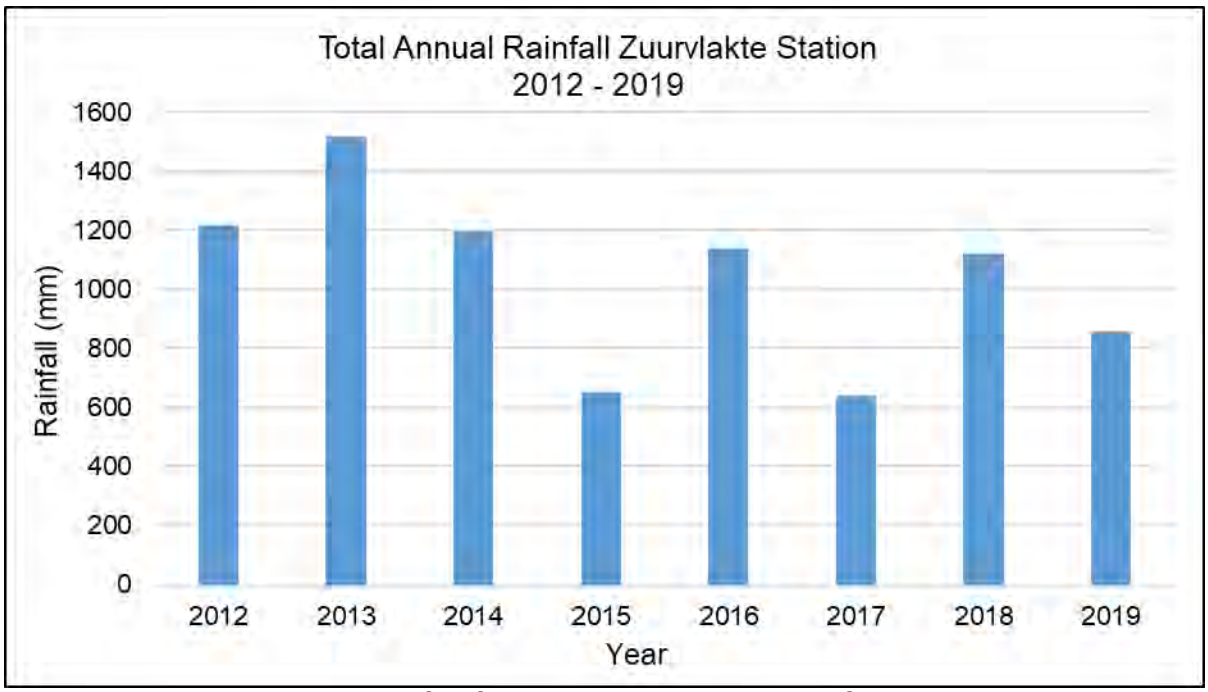


**Figure 2.2:** Total annual rainfall for the Zuurvlakte station for the period 2012-2019. (Agricultural Research Council, 2020, unpublished data).

Maximum average temperatures during summer seldom exceed 33°C and the nights are cool. The hottest month is January and the coldest period is from June-August (Figure 2.3). During winter, the average minimum temperature falls to 5°C, while during midday, average temperatures hover around 15°C. The temperatures in the southern part of the complex are more extreme and near Die Hel and Perdevlei the temperature may increase to over 35°C in January and fall to -3°C in July.

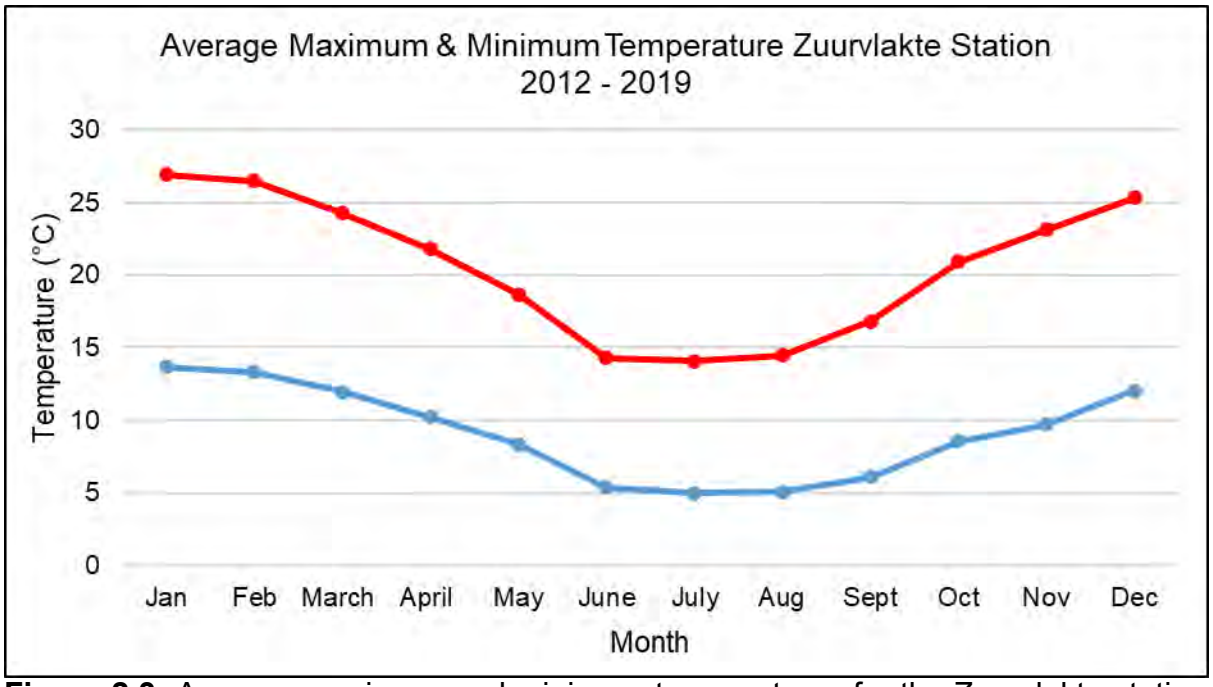


**Figure 2.3:** Average maximum and minimum temperatures for the Zuurvlakte station for the period 2012-2019. (Agricultural Research Council, 2020, unpublished data).

The mean annual temperature and rainfall gradients across the Groot Winterhoek Complex is shown in Figures 2.4 and 2.5, respectively.

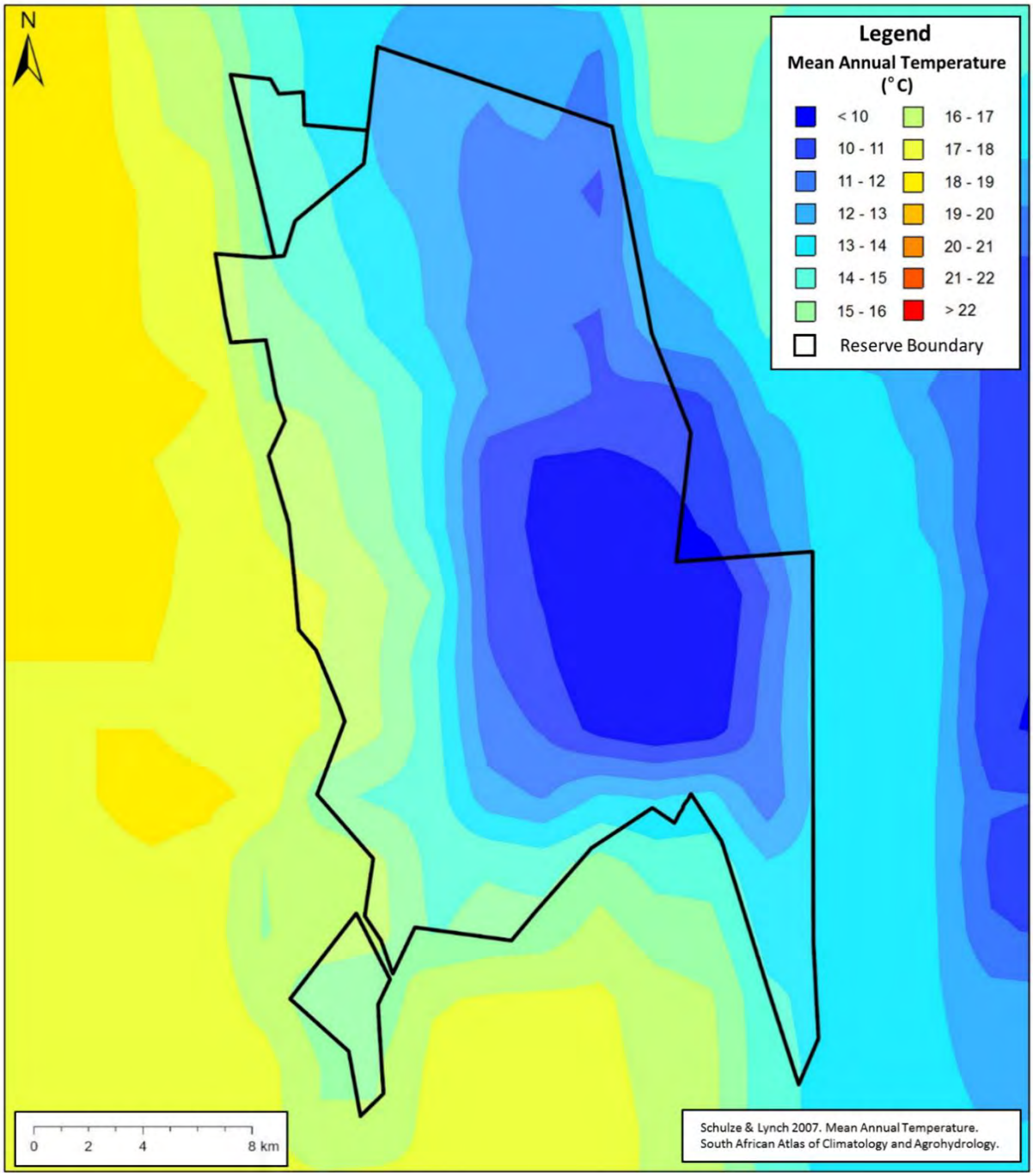


**Figure 2.4:** Mean annual temperature of the Groot Winterhoek Complex (Schulze *et al.* 2007).

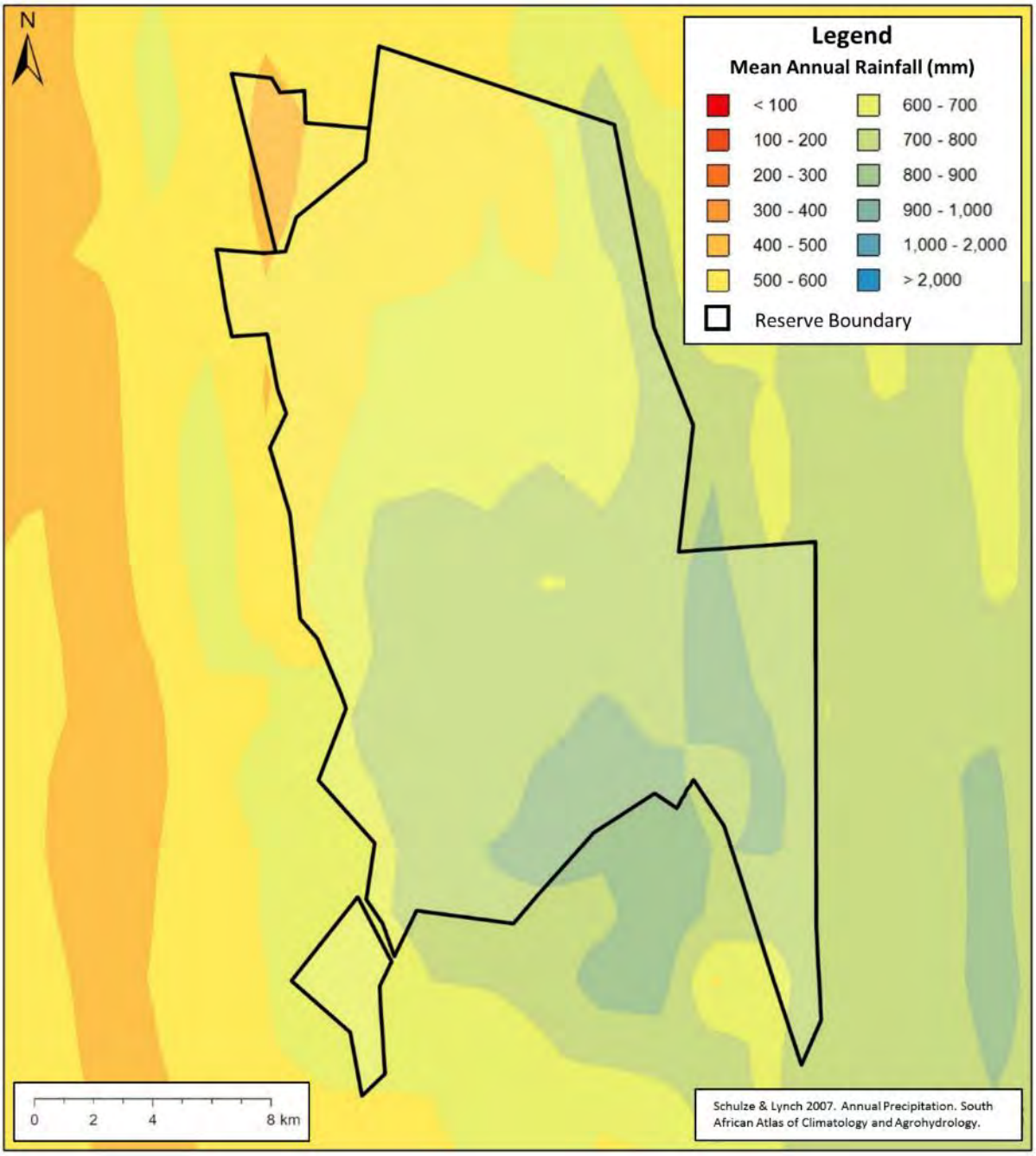


**Figure 2.5:** Mean annual rainfall of the Groot Winterhoek Complex (Schulze *et al.* 2007).

### 2.2.2 Topography

The Groot Winterhoek Complex is nestled within a broad open synclinal valley located in the high craggy mountaintops of the Groot Winterhoek Mountain. Here elevation ranges vary from 200 metres above sea level, in the Roodezand Valley, to a lofty 2 077 metres above sea level at the Groot Winterhoek Peak. A combination of the lithology and structural geology of the Groot Winterhoek Mountain has a strong control over the landforms, soils and drainage of the complex, which together has allowed for the development of extensive sandy wetlands in the area and its surrounds. This area

is typified by its dramatic landscape of grotesquely sculpted weathered sandstone ridges and terraces that are cut by a series of criss-crossing narrow-and steeply dipping fissures. These features may additionally be associated with occasional caves and hollows. These sculpted sandstones, caves, and hollows are karren-like in their appearance and (given the total lack of carbonate lithologies in which these features typically form) are pseudokarstic features (Quick and Eckardt 2015) that form primarily in rocks of the Table Mountain Group, specifically the Nardouw Subgroup.

The trunk of the Groot Kliphuis River follows the main axis of a major northward dipping synclinal fold that is present at the top of the Groot Winterhoek Mountain. Tributaries that feed into this river draw their headwaters from non-perennial water sources at the flanks of this fold as well as Groot Winterhoek Peak to the south. At the core of this fold are sandstones of the Nardouw Subgroup which weather to form coarse-grained highly leached nutrient poor and well-drained acidic soils (Barnard, 1996). In addition to these soils, loose deep Aeolian sands have collected in the area in the past. These erosion prone sands are located primarily on flatter run-on areas such as Zuurvlakte and Kliphuisvlakte. A combination of these sandy, well-drained, substrates and the saucer-shaped morphology of the synclinal fold in which the Groot Winterhoek Mountain is formed has allowed for the development of extensive wetlands in the area. Moving outwards from the core of the fold (and in rocks that are stratigraphically lower than the Nardouw Subgroup) are shales and diamictites of the Winterhoek Subgroup. These rocks tend to weather negatively with respect to the quartzitic sandstones of the overlying Nardouw Subgroup and underlying Peninsula Formation. The soils derived from shales of the Winterhoek Subgroup are finer-grained and more fertile than those derived from the Nardouw Subgroup. According to Barnard (1996) these finer-grained soils are often concealed by an over-burden of quartzitic debris from a sandstone source further upslope.

The Groot Winterhoek Complex topography is depicted in Appendix 1, Map 2.

### 2.2.3 Geology and soils

The geological evolution of the Groot Winterhoek Complex began some 450 million years ago with the deposition of sediments that would later lithify and form the Table Mountain Group of the Cape Supergroup and is summarised in Table 2.2.

These sediments were deposited in a broad shallow seaway atop of older metamorphic rocks of the Malmesbury Group (Porterville Formation in the Groot Winterhoek Mountains) and extended from South Africa into South America and Antarctica when these continents were a part of Gondwana. In the Groot Winterhoek Complex the oldest of these rocks are conglomerates and pebbly sandstones of the Piekenierskloof Formation that were deposited in a series of fluvial braidplains which deposited sediment as the land gradually subsided (Vos and Tankard 1981; Thamm 1993; Bordy *et al.* 2016). With continued subsidence, marine waters gradually transgressed and encroached upon southern Africa causing the energy of these fluvial braidplains to back up; forming extensive tidal flats and shallow marine beach environments (Tankard and Hobday 1977; Thamm 2000; Flemming 2016). In the complex, these deposits are represented by reddish shales that are interbedded with sandstones and are referred to as the Graafwater Formation. With continued rising seawaters, outboard sandy shoreface deposits gradually began to encroach upon the muddy tidal flats and sandy beach deposits of the Graafwater Formation (Tankard and

Hobday 1977; Hobday and Tankard 1978; Turner *et al.* 2011). These deposits would form the thick sandstone and conglomerate rich Peninsula Formation which forms the major western flank of the Groot Winterhoek Mountain and through which the majority of the Dasklip Pass snakes through.

**Table 2.2:** Stratigraphy summary for the Groot Winterhoek Complex.

| Period | Super-group | Group | Sub-group | Formation | Description | Map Code |
|---|---|---|---|---|---|---|
| Silurian-Devonian | Cape | Table Mountain | Nardouw | Rietvlei<br>Skurweberg<br>Goudini | Lower interbedded fine-grained quartzitic sandstones and shales (Goudini Fm) that coarsen upwards into coarser grained quartzitic sandstones (Skurweberg Fm). These coarse-grained sandstones fine upwards into fine-grained sandstones (Rietvlei Fm). | S-Dn |
| Ordovician | | | Winterhoek | Cedarberg<br>Pakhuis | Lower sandy diamictites and sandstones (Pakhuis Fm) that fine upwards into shale (Cedarberg Fm). | Ope |
| | | | | Peninsula | Quarzitic sandstones. | |
| | | | | Graafwater | Interbedded fine-grained sandstone and shale. | Op |
| | | | | Piekenierskloof | Quartzitic sandstones and conglomerates. | |
| **Formation of the Saldanian Fold Belt and erosional hiatus (~ 650-480 Ma)** | | | | | | |
| Cryogenian | | Malmesbury | Boland | Porterville | Phyllitic shale, greywacke, limestone, dolostone. | CRp |

During the Late Ordovician, approximately 444 million years ago, Earth experienced a major cooling event that allowed for the development of extensive glaciers and a severe drop in sea level. During this time period, South Africa was located at low (30° S) subequatorial latitudes and experienced this glaciation, meaning that global cooling was so severe that it affected areas usually associated with warm subtropical climates (Gabbott *et al.* 2010, 2016; Penn-Clarke *et al.* 2020) (Figure 2.6). This glacial event is represented by rocks of the Winterhoek Subgroup and is appropriately named after the Groot Winterhoek Mountains itself given that exposures of these rocks form the basis for their characterisation. The lowermost unit of the Winterhoek Subgroup is the Pakhuis Formation. The Pakhuis Formation is characterised as being a sandy diamictite and sandstone rich succession that represent the deposits of the actual glaciers themselves as they carried rocky debris from the north into the area (Blignault and Theron 2010; Gabbott *et al.* 2010, 2016). As temperatures began to rise once again and the glaciers melted and receded. These meltwaters pooled as a shallow

marine offshore environment ahead of the melting glaciers. The calm water conditions allowed for the gentle suspension settling of fine-grained clays that would form shales and mud rocks of the Cedarberg Formation (Gabbott *et al.* 2010, 2016; Penn-Clarke *et al.* 2020). The Cedarberg Formation itself is world-renowned for its rich and highly endemic fossil fauna of exceptionally well-preserved invertebrates and early vertebrates, collectively referred to as the Hirnantian Fauna and indeed the earliest known terrestrial fossil pollen spores (Gabbott *et al.* 2010, 2016; Penn-Clarke *et al.* 2020). The Groot Winterhoek Complex itself is home to several very important fossil sites and finds. At the turn of the Silurian Period, some 443 million years ago, evidence in the rocks of the Table Mountain Group indicate a gradual drop once more in sea levels. This is marked by a return to increasingly shallower marine and probable terrestrial braid plain environments as represented by sandstones of the Nardouw Subgroup that gradationally overlie the Cedarberg Formation (Malan and Theron 1989).

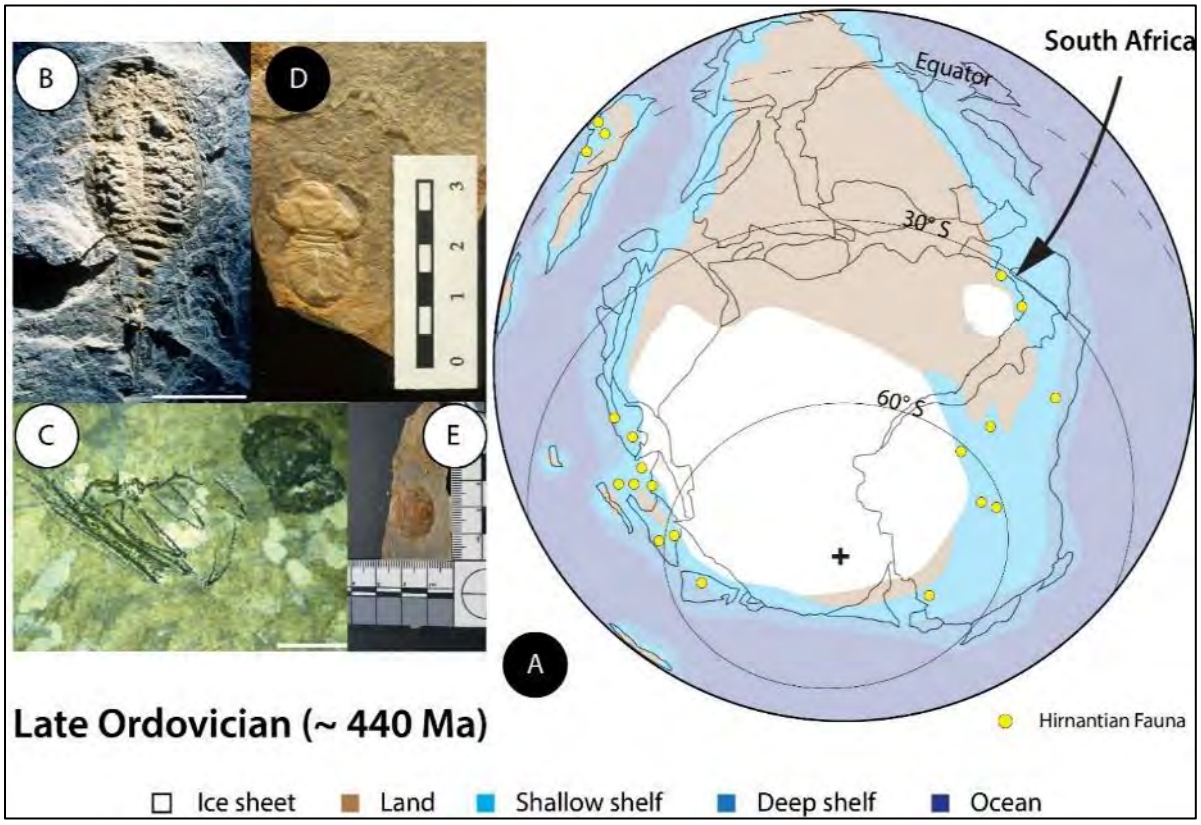


**Figure 2.6:** A) Palaeogeographic reconstruction of Earth during the Late Ordovician during sedimentation of the Pakhuis and Cedarberg formations, B) The eurypterid *Onychopterella augusti*, C) The conodont, *Promissum pulchrum*, D) *A naroiid* arthropod, E) The brachiopod, Eostropheodonta. Image modified after Penn-Clarke *et al*. (2020).

At some point during the Late Palaeozoic (mid Carboniferous-Late Permian), the rocks of the Cape Supergroup were tectonically deformed into the Cape Fold Mountains seen in the present. This period of tectonic activity began some 300-260 million years ago and ended at least 250 million years ago. This event was due to the collision of South America, specifically Patagonia, along the southern margin of South Africa. Here, the rocks of the Cape Supergroup were folded and faulted along similar zones

of structural weakness suspected to be present in pre-Cape rocks of the Malmesbury Group. Later during the Late Jurassic-Early Cretaceous (180-130 Ma), the structural fabric of the Cape Fold Mountains was reactivated as a series of northwest trending normal faults that formed with the rifting of Gondwana and the opening of the Atlantic Ocean. Appendix 1, Map 3 shows the geology of the Groot Winterhoek Complex.

## 2.3 Biodiversity Context: Ecosystems

The Groot Winterhoek Complex is situated in the Greater Cape Floristic Region (CFR) and forms part of the CFRPA World Heritage Site. The complex is a unique wilderness area and particularly important in terms of threatened plants. The complex is part of the Northwest Phytogeographic Centre of Endemism, which is delimited by high numbers of plant species endemic to each centre (Goldblatt & Manning 2000). Mountain peaks and other inaccessible places in the complex provide protection to representative samples of the original vegetation. The plant species and plant communities of the Groot Winterhoek Complex are relatively unique and differ from other areas that are characteristic of the CFR.

The area is part of a larger water catchment zone protected to produce water for human consumption. This is achieved through the maintenance of natural processes including water flow rates, fire and natural vegetation cover. Owing to the geomorphology of the Groot Winterhoek Mountains, this complex acts as a sponge and releases water in a controlled manner.

### 2.3.1 Vegetation

The Groot Winterhoek Complex falls within the Core Cape Subregion (previously termed the Cape Floristic Kingdom) of the Greater Cape Floristic Region (Manning & Goldblatt 2012). The Core Cape Subregion has a flora that differs sharply from the immediate surrounds (Manning & Goldblatt 2012). The immediate surrounds fall within the Extra Cape Subregion that includes the Tanqua, Western Mountain Karoo, Knersvlakte, Namaqualand Hardeveld, Namaqualand Sandveld, the Kamiesberg Mountains, Gariep and southern Namib (Snijman 2013).

The Core Cape Subregion is one of the Earth's smallest but richest floral kingdoms, encompassing a land area of approximately 90 760 km² (less than 4% of the southern African subcontinent). An estimated 9 383 species of vascular plants (ferns and other spore-bearing vascular plants, gymnosperms, and flowering plants) are known to occur here, of which just over 68% are endemic. Most of these species are flowering plants. The Core Cape Flora of the Greater Cape Floristic Region is characterised by six endemic or near-endemic families and by the conspicuous presence of Asteraceae and Fabaceae (two largest families), and the Iridaceae, Aizoaceae, Ericaceae, Proteaceae and Restionaceae (Manning & Goldblatt 2012). The Core Cape Subregion is notable for its range of ecosystems ranging from coastal foredunes through strandveld, lowland and mountain fynbos.

The vegetation of the area has been mapped nationally at a 1:1 000 000 scale (Mucina & Rutherford 2006; SANBI 2006). The original 2006 national vegetation map (Mucina & Rutherford 2006) was recently updated with substantive changes to vegetation units in the Namaqualand area and the Subtropical Thicket vegetation units in the Western Cape and Eastern Cape Provinces (SANBI 2006). According to this map a total of six

different vegetation units occurs within the Groot Winterhoek Complex. These are listed in Table 2.3 and illustrated in Appendix 1, Map 4.

South Africa recognises that different ecosystems have differing species compositions and to effectively conserve biodiversity, the country has set targets for each ecosystem (Table 2.3 for the Groot Winterhoek Complex). The biodiversity target is the minimum proportion of each ecosystem type that needs to be kept in a natural or near-natural state over the long term to maintain viable representative samples of all ecosystem types and most species associated with those ecosystems. The biodiversity target is calculated based on species richness, using species–area relationships, and varies between 16% and 36% of the original extent of each ecosystem type (Desmet & Cowling 2004).

Threat status is provided for each ecosystem (Table 2.3) according to the assessment of criterion A1 (habitat loss), which is considered the best available status for the Western Cape Province (Pence 2016). Ecosystem threat statuses are provided in the most recent National Biodiversity Assessment (NBA) of 2018 (http://bgis.sanbi.org/Projects/Detail/221).

**Table 2.3:** Vegetation types and status conserved within the Groot Winterhoek Complex (SANBI 2019).

| Vegetation Unit | Extent in the WC Province (ha) | WC Provincial Conservation Target (%) | Target Conserved Inside Groot Winterhoek Complex (%) | Target Conserved Inside Groot Winterhoek Complex (ha) | Ecosystem Status (2018) |
|---|---|---|---|---|---|
| Swartland Alluvium Fynbos | 46 987.21 | 30 | 0.02 | 8.49 | Critically Endangered |
| Breede Shale Fynbos | 31 805.89 | 30 | 2.58 | 822.03 | Least Concern |
| Northern Inland Shale Band Vegetation | 27 269.95 | 29 | 5.36 | 1 461.76 | Least Concern |
| Olifants Sandstone Fynbos | 49 171.06 | 29 | 0.64 | 312.32 | Least Concern |
| Western Altimontane Sandstone Fynbos | 3 751.03 | 29 | 5.42 | 203.44 | Least Concern |
| Winterhoek Sandstone Fynbos | 113 467.13 | 29 | 21.61 | 24 522.28 | Least Concern |

#### 2.3.1.1 Vegetation type descriptions

The following is a description of the various vegetation types occurring within the Groot Winterhoek Complex as shown in Table 2.3 and Appendix 1, Map 4. Of the six

vegetation units, one is listed as Critically Endangered (Swartland Alluvium Fynbos), and the other five are listed as of Least Concern (Table 2.3).

***Swartland Alluvium Fynbos*** *(FFa 3)*

This vegetation unit is listed as Critically Endangered and Poorly Protected. It occurs on the Swartland lowlands at west-facing piedmonts of the Groot Winterhoek Mountains at altitudes of 60-250 m. The landscape comprises moderately undulating plains, adjacent mountains and river basins. The vegetation is a matrix of low, evergreen shrubland with emergent sparse, moderately tall shrubs and a conspicuous graminoid layer. Proteoid, restioid and asteraceous fynbos types are dominant.

A very small area of this vegetation unit is conserved in the Groot Winterhoek Complex. More than 75% of the vegetation unit is already transformed for vineyards, orchards, pine plantations, dams and urban settlements. (Mucina & Rutherford 2006). The provincial conservation target for this vegetation unit is 30%. The complex contributes 8.49 ha (0.02%) of the target (Table 2.3).

***Breede Shale Fynbos*** *(FFh 4)*

This vegetation unit is listed as Least Concern and Moderately Protected. It occurs in the Breede River and Slanghoek Valleys, discontinuously from Tulbagh to Swellendam on the lower southern slopes of mountains, including the Groot Winterhoek Mountains, at altitudes of 150-750 m.

The landscape comprises steep upper slopes below mountains grading to slightly undulating plains, well dissected by rivers. The vegetation is a moderately tall and dense shrubland – mostly restioid, proteoid and asteraceous fynbos. Sections are conserved in CapeNature and other statutory reserves as well as Mountain Catchment Areas. Approximately 30% of the area has been transformed, mostly for cultivation. Cluster Pine (*Pinus pinaster*) and Silky Hakea (*Hakea sericea*) are the most serious woody invasive alien species. Erosion is low and moderate (Mucina & Rutherford 2006). The provincial conservation target for this vegetation unit is 30%. The complex contributes 822.03 ha (2.58%) of the target (Table 2.3).

***Northern Inland Shale Band Vegetation*** *(FFb 1)*

This vegetation unit is listed as Least Concern and Well Protected. It occurs in a narrow shale band from near the Pakhuis Pass in the Cederberg (north) to the Groot Winterhoek Mountains and Hex River Mountains (south), at altitudes of 400-1 650 m.

The landscape is a narrow 80-200 m linear feature, smooth and flat in profile compared to surrounding areas, and thus favoured for paths and roads. The vegetation encompasses diverse shrublands ranging from karoo and renosterveld, to fynbos. It is often quite grassy in character, and usually Waboom (*Protea nitida*) occurs at the lowest altitudes. Heuweltjies are prominent in some portions.

A large section is statutorily conserved within the Groot Winterhoek Complex. Only 4% of the vegetation unit is transformed due to cultivation. The only alien invasive species of concern is Monterey Pine (*Pinus radiata*) (Mucina & Rutherford 2006). The provincial conservation target for this vegetation unit is 29%. The complex contributes 1 461.76 ha (5.36%) of the target (Table 2.3).

***Olifants Sandstone Fynbos*** *(FFs 3)*

This vegetation unit is listed as Least Concern and Well Protected. It occurs from the western Cederberg and Koue Bokkeveld Mountains to Saron on the lower western slopes of the 24 Rivers Mountains, at altitudes of 200-1 200 m.

The landscape comprises gentle to steep slopes as well as broad valley bottoms. Bare rock and cliffs provide fire protection, resulting in the dominance of Cape thicket and asteraceous fynbos with interspersed low trees and tall shrubs. Proteoid fynbos is most prominent on the lowermost slopes and sandy plateaus and restioid fynbos occur on deeper sands and shallower soils.

Large areas are statutorily conserved in nature reserves and private conservation areas. Some 8% has been transformed due to cultivation. Monterey Pine (*Pinus radiata*) occurs as an alien invasive species in some places (Mucina & Rutherford 2006). The provincial conservation target for this vegetation unit is 29%. The complex contributes 312.32 ha (0.64%) of the target (Table 2.3).

***Western Altimontane Sandstone Fynbos*** *(FFs 30)*

This vegetation unit is listed as Least Concern and Well Protected. It occurs on summits and top ridges from around 1 800 m upwards including Groot Winterhoek Peak (2 078 m), Sneeugat Peak (1 884 m) and Klein Winterhoek Peak (1 955 m).

The landscape comprises high-altitude summit peaks, generally fragmented and localised, but relative extensive. Vegetation in these high-altitude positions is low, open to medium dense restioid fynbos, with ericaceous and asteraceous fynbos occurring locally. Proteoid fynbos is relatively absent.

This vegetation unit is statutorily conserved *inter alia* in the Groot Winterhoek and Cederberg Wilderness Areas with no signs of transformation (Mucina & Rutherford 2006). The provincial conservation target for this vegetation unit is 29%. The complex contributes 203.44 ha (5.42%) of the target (Table 2.3).

***Winterhoek Sandstone Fynbos*** *(FFs 5)*

This vegetation unit is listed as Least Concern and Well Protected. It occurs in the Groot Winterhoek Mountains from Dasklip Pass in the north to Saronsberg, Nuwekloof Pass and Ceres, at altitudes of 350- 1 800 m.

The landscape comprises moderately undulating high plains in the west with rugged high peaks in the south and southeast. Vegetation is mainly closed restioland in deeper moister sands, with low, sparse shrubs that become denser and restio less in the drier habitats. Proteoid and ericaceous fynbos are found on higher slopes while asteraceous fynbos is more common on lower slopes. Cape thicket is prominent on the lowest slopes.

This vegetation unit is statutorily conserved in the Groot Winterhoek Complex, with an additional 59% protected in private reserves. Approximately 5% is transformed due to cultivation for protea nurseries and fruit orchards. Alien invasive species, specifically *Pinus radiata, P. pinaster* and *Hakea sericea* are scattered. Erosion is very low (Mucina & Rutherford 2006).

The provincial conservation target for this vegetation unit is 29%. The complex contributes 24 522.28 ha (21.61%) of the target (Table 2.3) and is therefore very important in terms of the long-term conservation of Winterhoek Sandstone Fynbos.

#### 2.3.1.2 Plant species of conservation concern

A list of 22 species of conservation concern that occur in the Groot Winterhoek Complex is given in Table 2.4 (Raimondo *et al.* 2009). This list may not be exhaustive.

**Table 2.4:** Summary of highly restricted plant species within the Groot Winterhoek Complex (Raimondo *et al*. 2009).

| Species | Family | Threatened Status |
|---|---|---|
| *Leucadendron chamelaea* (Lam.) I. Williams | Proteaceae | Critically Endangered |
| *Sorocephalus imbricatus* (Thunb.) R. Br | Proteaceae | Critically Endangered |
| *Sorocephalus scabridus* Meisn | Proteaceae | Critically Endangered |
| *Geissorhiza esterhuyseniae* | Iridaceae | Critically Rare |
| *Erica abietina* L. subsp. *petraea* E.G.H. Oliv. & I.M. Oliv | Ericaceae | Endangered |
| *Leucadendron diemontianum* I. Williams | Proteaceae | Endangered |
| *Leucadendron gydoense* I. Williams | Proteaceae | Endangered |
| *Leucospermum catherinae* Compton | Proteaceae | Endangered |
| *Protea rupicola* Mund ex Meisn | Proteaceae | Endangered |
| *Spatalla caudata* (Thunb.) R. Br | Proteaceae | Endangered |
| *Spatalla tulbaghensis* (E. Phillips) Rourke | Proteaceae | Endangered |
| *Serruria confragosa* Rourke | Proteaceae | Endangered |
| *Moraea variabilis* | Iridaceae | Endangered |
| *Serruria reflexa* Rourke | Proteaceae | Rare |
| *Anthochortus insignis* (Mast.) H.P. Linder | Restionaceae | Vulnerable |
| *Anthochortus singularis* Esterh | Restionaceae | Vulnerable |
| *Aspalathus lanifera* R. Dahlgren | Fabaceae | Vulnerable |
| *Aspalathus recurva* Benth | Fabaceae | Vulnerable |
| *Cannomois anfracta* H.P. Linder | Restionaceae | Vulnerable |
| *Erica oxysepala* Guthrie & Bolus | Ericaceae | Vulnerable |
| *Euryops serra* DC | Asteraceae | Vulnerable |
| *Indigofera triquetra* E. Mey | Fabaceae | Vulnerable |
| *Isolepis leucoloma* (Nees) C. Archer | Cyperaceae | Vulnerable |
| *Lachnaea grandiflora* (L.f.) Baill | Thymelaeaceae | Vulnerable |
| *Metalasia serrulata* P.O. Karis | Asteraceae | Vulnerable |
| *Moraea incurva* G.J. Lewis | Iridaceae | Vulnerable |
| *Phylica plumosa* L. var. *horizontalis* (Vent.) Sond | Rhamnaceae | Vulnerable |

#### 2.3.1.3 Fire regime

Fynbos is a fire-driven ecosystem, and all fynbos species require periodic fires to stimulate regeneration and maintain species richness (Van Wilgen & Forsyth 2008; Forsyth *et al.* 2010; Holmes *et al.* 2016) (Figure 2.7). However, in an increasingly fragmented, transformed and risk-averse landscape, natural fire cycles are becoming rare (Holmes *et al.* 2016). Research indicates that globally and within the CFR, many areas have experienced increases in fire frequency and size (Kraaij & van Wilgen 2014). Ecologically sound fire management is thus imperative and involves managing fire regimes, which includes varying the frequency, season, intensity and size of fires, and reconciling ecological and practical requirements.

According to the CapeNature fire management guideline (CapeNature 2016a), fire management practices (such as prescribed burning, adaptive intervention management and natural burning zones) can be collapsed into a single model that simply varies with regard to the degree to which intervention (in the form of fire suppression, containment or prescribed burning) is practiced. Fire management should be adapted more to the circumstances a protected area finds itself in than the eco-zone in which it is situated (Van Wilgen & Forsyth 2008). Van Wilgen and Forsyth (2008) divided the Western Cape into five fire eco-zones based on the fire potential as defined by climate (Van Wilgen 1984). The Groot Winterhoek Complex falls within the western inland zone, which is characterized by strong seasonal variation in fire potential and a high mean fire potential in summer (Van Wilgen & Forsyth 2008).

Fire regime is a landscape level attribute and should thus be analysed across the larger catchment area. Therefore, the fire data of the Groot Winterhoek Complex and the surrounding Mountain Catchment Area was used to determine the current fire regime (Appendix 1, Map 5).

**Figure 2.7:** *Kniphofia uvaria* regenerating after a fire in Groot Winterhoek Complex. Photo: Marius Wheeler.

#### 2.3.1.3.1 Fire history

Over the last 40 years 51 fires have burnt approximately 145 2544 ha in the Groot Winterhoek Complex catchment area. Figure 2.8 shows the number of fires and the total area burnt per year from 1980-2020. The highest number of fires were recorded in 1994. Nonetheless, a very small areas burnt during that year. In contrast, the largest area burnt per year was recorded in 2009 and 2017, where only three fires per year burnt approximately 30 435 ha (21% of the catchment area) and 27 229 ha (19% of the catchment area) respectively.

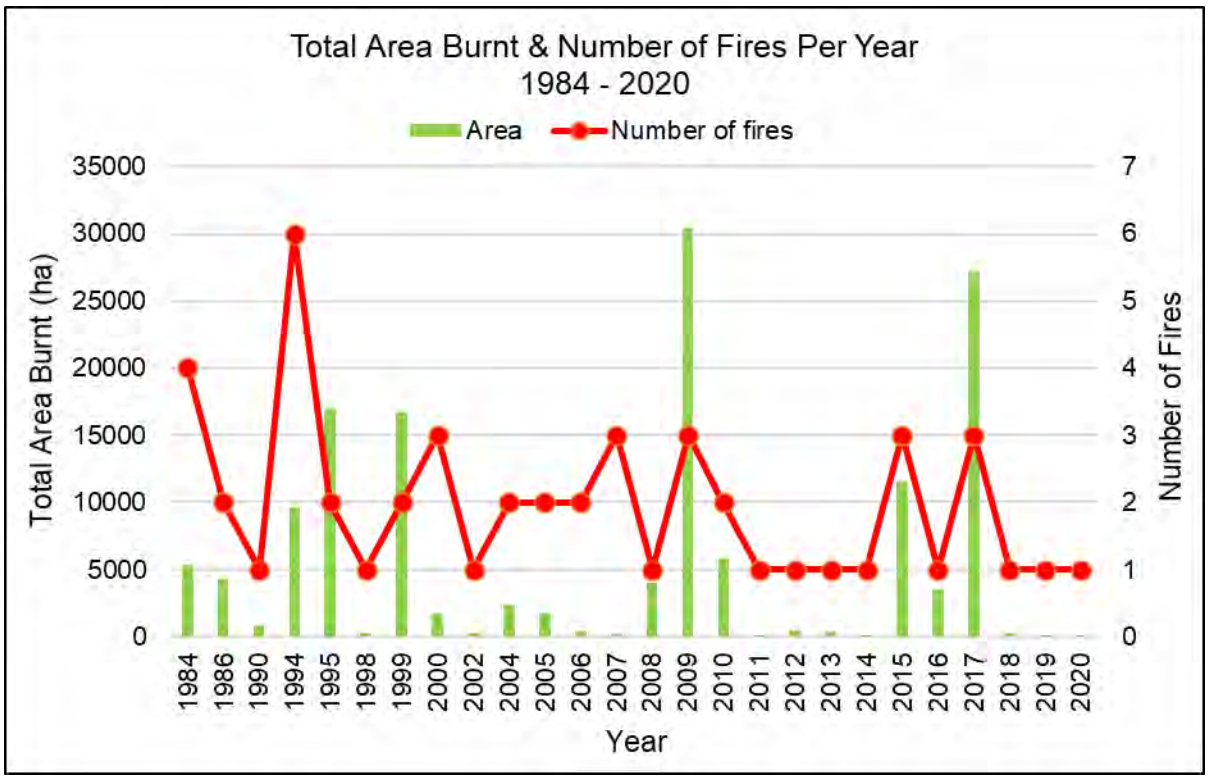


**Figure 2.8:** Total area burnt and number of fires per year from 1980-2020 within the Groot Winterhoek Complex catchment area.

Between 1980 and 2020 most fires were started by lightning (Table 2.5). However, a large proportion of the area burnt in fires of which the cause is unknown. Over the last 40 years only approximately 13% of the Groot Winterhoek Complex catchment area burnt due to human causes.

**Table 2.5:** Fire ignition causes within the Groot Winterhoek Complex catchment area from 1980-2020.

| Ignition Type | Area Burnt (ha) | Area Burnt (%) | Number of Fires |
|---|---|---|---|
| Lightning | 57 339.51 | 39.48 | 12 |
| People | 18 631.13 | 12.83 | 6 |
| Fire operations | 217.27 | 0.15 | 1 |
| Other | 187.07 | 0.13 | 1 |
| Unknown | 68 879.40 | 47.42 | 31 |

#### 2.3.1.3.2 Fire season

Fynbos in the Groot Winterhoek Complex is adapted to a fire regime of fires in the dry summer and autumn. Winter fires are possible under exceptional, rare circumstances, but rarely occur (Van Wilgen & Forsyth 2008). Maximum flowering activity occurs in late winter and spring (Van Wilgen *et al.* 1992), and optimal seedling regeneration of serotinous Proteaceae is achieved after fires that occur between December and early April. Furthermore, research has shown that even the fynbos animal species are adapted to late summer - early autumn fires (Viviers 1983) and that their breeding habits are generally synchronised with the non-fire season. For example, various fynbos bird species generally breed in winter (May to October), so winter fires would wipe out a whole year's breeding attempt (Winterbottom 1968). Adults of the typical fynbos reptiles survive summer fires by variably hiding in deep crevices, under rocks, boulders and rock slabs, in the ground, or in deep plant litter. Most of these species lay eggs in summer that hatch in early autumn, or are viviparous, with the young being produced in early autumn (Broadley 1983; Branch 1998). With both these reproductive strategies the young have the winter months to grow and become mobile before the fires of the next summer.

The proportion of area in the Groot Winterhoek Complex catchment area that burns in summer should be >80% (*i.e.,* less than 20% of the area should burn in winter fires) (Van Wilgen & Forsyth 2008). According to the data from the last 40 years (1980-2020) approximately 97% of the area has burnt during summer (Figure 2.9) and most of the fires occur in January to April.

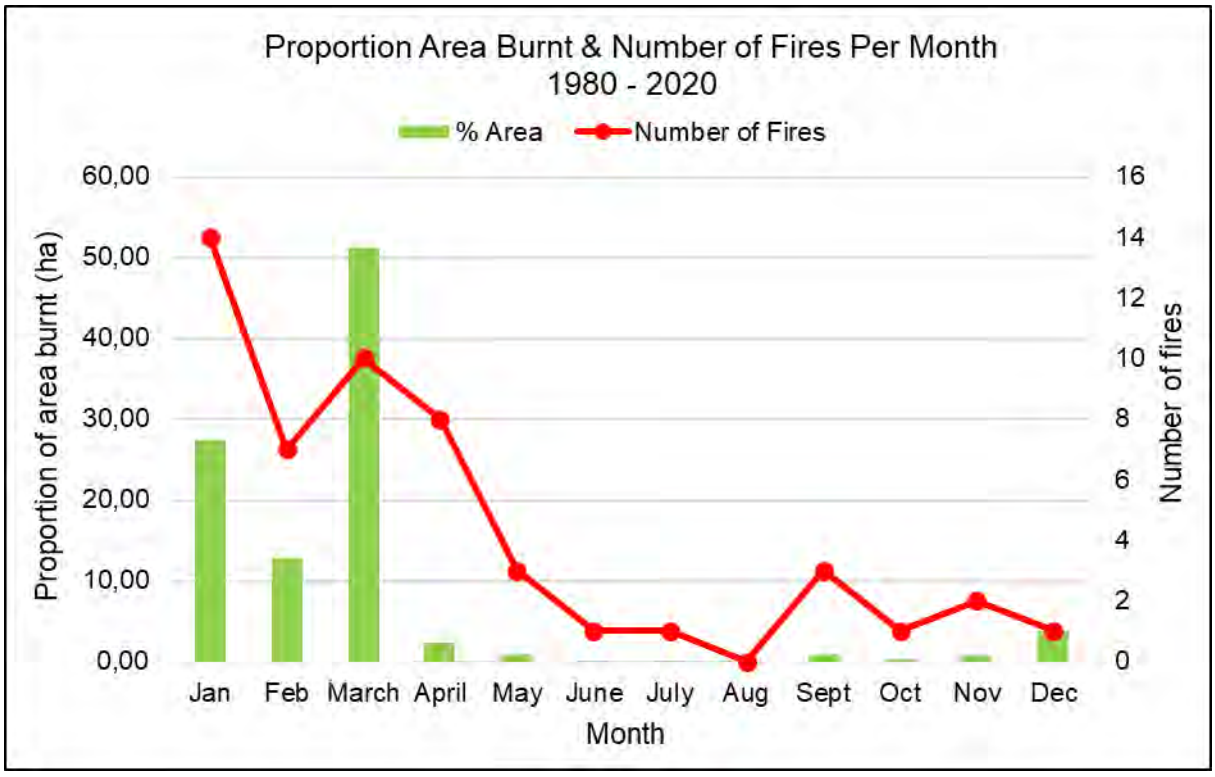


**Figure 2.9:** Proportion of area within the Groot Winterhoek Complex that burnt in each month between 1980-2020.

#### 2.3.1.3.3 Fire size

A few large fires, or many small fires will both have undesired effects. Too many small fires are difficult and costly to manage and will result in greater edge effects (*e.g.,* predation of seed by rodents) and very large fires will upset the desired goal of maintaining an even distribution of veld ages (Van Wilgen & Forsyth 2008). Fire size is also important to the faunal elements of the fynbos. Large fires that result in vast areas of young veld can reduce food availability and pose a problem to the dispersal of animals if the distance between older veld becomes too large. It is therefore critical to have a size mosaic of young and old veld (De Klerk *et al.* 2009). Large fire size and a lack of mosaics also create difficulties for seed dispersal into the burnt area and may leave large areas vulnerable to seed production collapse. Consequently, it would be imperative to keep fire out of such an area (De Klerk *et al.* 2009).

Large fires became increasing common in recent times with fynbos fire regimes typically dominated by a few, very large fires (Kraaij & van Wilgen 2014). According to Van Wilgen and Forsyth (2008) the proportion of area that burns in fires larger than 1 000 hectares should constitute more than 75% of the total burn area. Since 1980 most of the fires in the Groot Winterhoek Complex were small to medium with approximately 92% of the catchment burnt in fires larger than 1 000 ha. The latter constituted 18 fires (35% of all fires between 1980 and 2020). However, it was also suggested that no fires should exceed 5 000 hectares (Van Wilgen & Forsyth 2008). The catchment area has experienced six fires larger than this since 1980. These large fires typically burn during December to March.

#### 2.3.1.3.4 Veld age

The 2020 veld age map for the Groot Winterhoek Complex is shown in Appendix 1, Map 5, and the proportions of veld in different veld age classes in Table 2.6. CapeNature uses seven veld age categories (1-2 years, 3-4 years, 5-6 years, 7-10 years, 11-15 years, 16-25 years and >25year) and the desired state is an even distribution of area in the different veld age classes. The proportion of area in each veld age category should be greater than 5% but less than 20% (van Wilgen & Forsyth 2008). This should provide sufficient habitat for a full range of species requiring access to vegetation of different ages.

However, more than 80% the catchment has a veld age of six years and younger (Figure 2.10). It has been shown that fynbos can burn from three to five years of age under suitable conditions (Van Wilgen *et al.* 1990; Brown *et al.* 1991), which means that only 0.05% of the catchment area is too young to burn.

**Table 2.6:** Veld age summary for the Groot Winterhoek Complex as of 2020.

| Veld Age Categories (years) | Area (ha) | Proportion (%) |
|---|---|---|
| 1-2 | 32.84 | 0.05 |
| 3-4 | 27 600.85 | 42.96 |
| 5-6 | 24 178.98 | 37.64 |
| 7-10 | 1 081.13 | 1.68 |
| 11-15 | 6 558.84 | 10.21 |
| 16-25 | 3 312.24 | 5.16 |
| >25 | 1 480.89 | 2.31 |

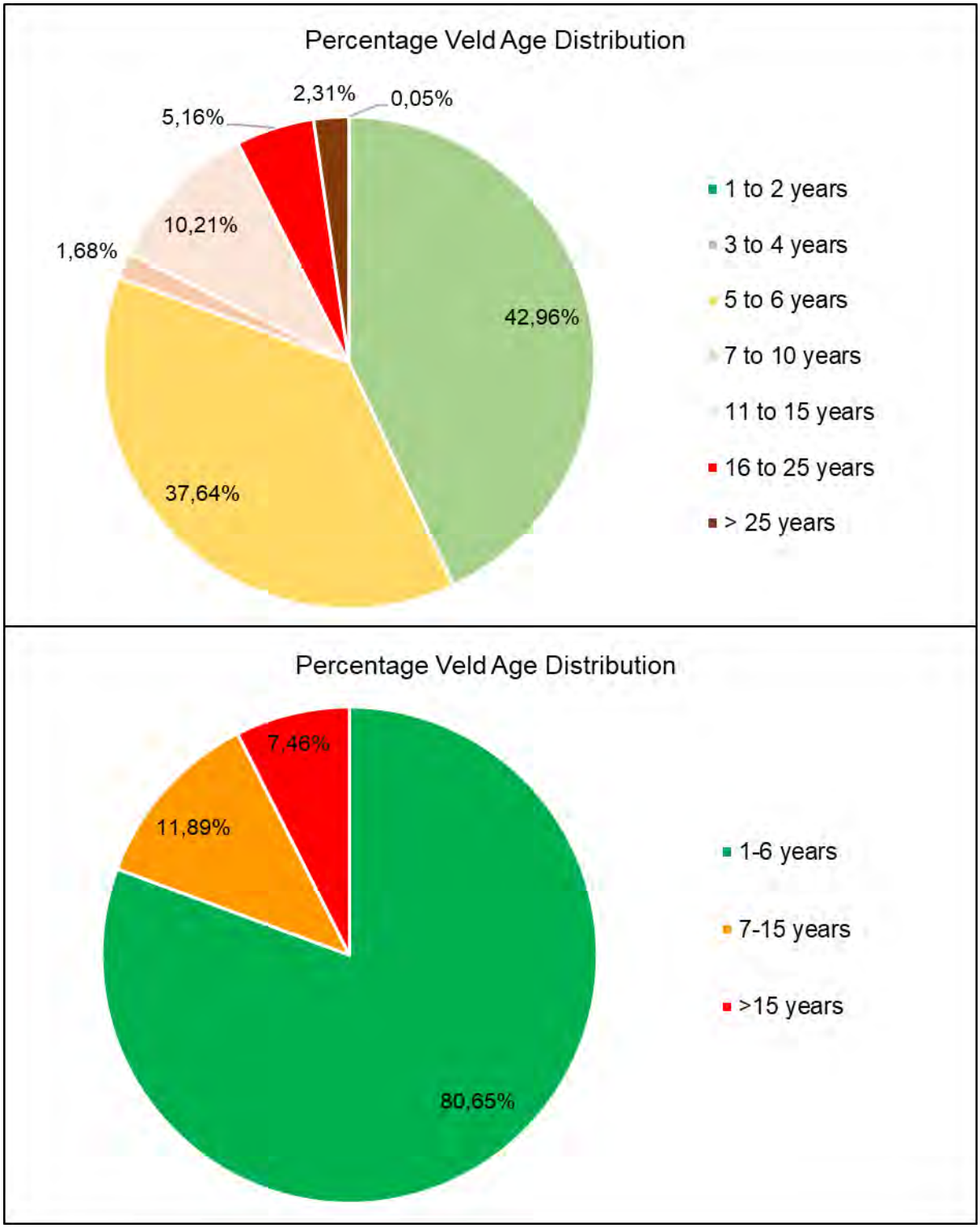


**Figure 2.10:** Veld age distribution percentage within the Groot Winterhoek Complex as of 2020.

#### 2.3.1.3.5 Fire frequency and return interval

Fire return intervals should neither be too long nor too short (Holmes *et al.* 2016). Slow maturing, serotinous Proteaceae species are used as indicator species to determine acceptable fire return intervals (Van Wilgen *et al.* 1992). These species have been

shown to be good indicators for total ecosystem diversity (Vlok & Yeaton 1999, 2000). The minimum fire return period is dependent on the time it takes before 100% of the slowest maturing non-sprouting Proteaceae species in the population have flowered at least once, or when 50% of the slowest maturing Proteaceae species in the population have flowered at least three times (Kruger & Lamb 1978; Kruger 1983, Le Maitre & Midgley 1992).

On the rare occasion when the fire return periods become too long, populations of serotinous Proteaceae will reach senescence, which result in declines in seed production. Short return interval fires that occur before insufficient numbers of serotinous Proteaceae have reached maturity and set seed can lead to population declines or local extinction and cause dramatic structural changes in communities (Van Wilgen 1984; Van Wilgen & Forsyth 2008). It has also been shown that increased fire frequency can benefit sprouting species and that increases in resprouting species lead to overall decreases in plant diversity (Vlok & Yeaton 1999).

Many areas have experienced recent increases in fire frequency (Keeley *et al.* 1999, Forsyth & Van Wilgen 2007, 2008; Seydack *et al.* 2007; Kraaij *et al.* 2013). Within the Groot Winterhoek Complex the required fire return interval is estimated at 15-20 years based on flowering of the slowest growing indicator species grey-leaf sugarbush (*Protea laurifolia*). This should provide sufficient habitat for a full range of species requiring access to vegetation of different ages. The fire frequency across the Groot Winterhoek Complex catchment is shown in Figure 2.11 and Appendix 1, Map 5.

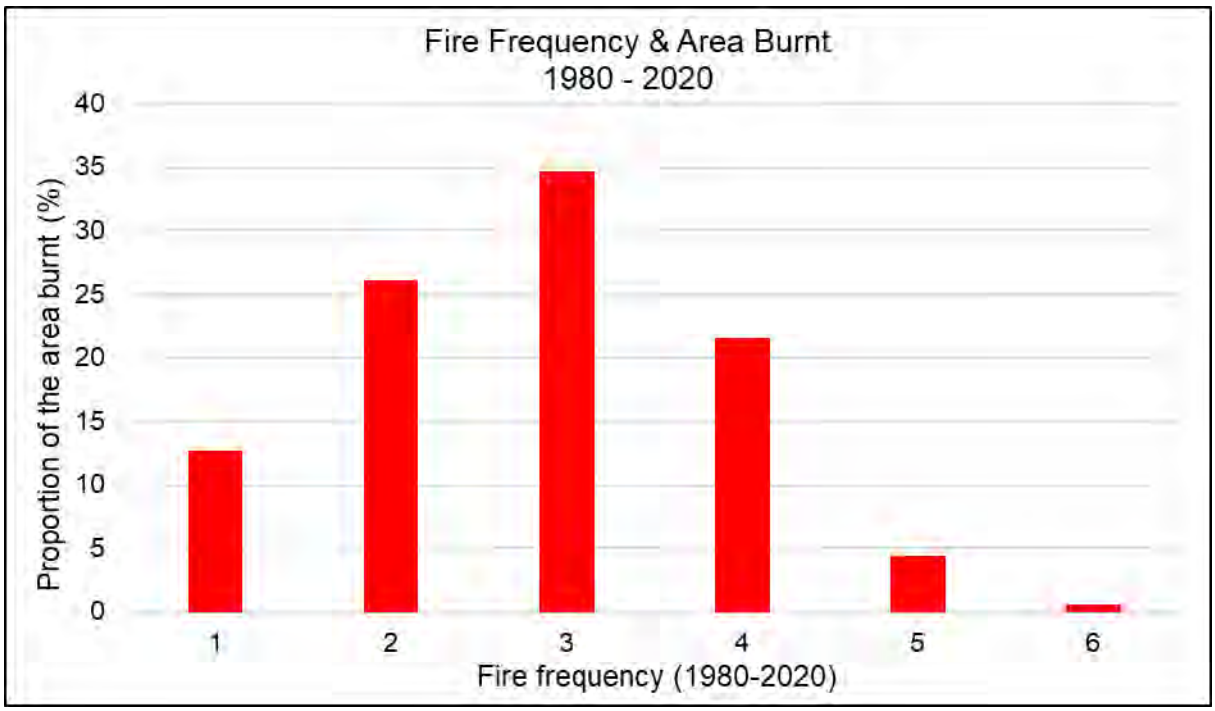


**Figure 2.11:** Proportion of the Groot Winterhoek Complex catchment with a fire frequency of 1-6 for the period 1980-2020.

The way in which species regenerate after fire, determines the composition of fynbos vegetation after a fire. Post-fire regeneration success of fynbos species can vary a lot and is dependent on several factors. These include *inter alia* fire intensity, seed viability and water availability. To improve and refine the fire control measures and

management techniques for the complex, data collection on post-fire recruitment of re-seeding Proteaceae is important. The recruitment success of serotinous Proteaceae species which do not re-sprout after fire is used as the indicator of post-fire regeneration success of fynbos vegetation. Only non-sprouting Protea and Leucadendron species are used in these surveys. The ratio of seedlings to re-seeding parent plants measured 12 -18 months after a fire should be more than 1:5 (Van Wilgen & Forsyth 2008).

The management of fire in fynbos habitats has two main goals: 1) to ensure ecosystem health to conserve biodiversity and deliver vital ecosystem services; and 2) to ensure safety and security in this fire-prone environment (Kraaij & van Wilgen 2014). However, several challenges exist in maintaining a healthy fire regime in fynbos habitats. These include the presence of fire-adapted invasive alien plants, the widespread dominance of unplanned fires, conflict between ecological and safety requirements, altered patterns of ignition and fire spread and global climate change (Kraaij & van Wilgen 2014). Therefore, an adaptive fire management approach is imperative.

#### 2.3.1.4 Invasive alien plants

The most problematic invasive alien plants present in the Groot Winterhoek Complex and surrounding catchment area are pines, Australian *Acacia* and *Hakea* species, with grey poplar (*Populus canescens*) and some *Eucalyptus* species also occurring in some areas. Invasive tree species had invaded an estimated 10 million hectares in South Africa by 1997 with the fynbos biome being the worst affected (Le Maitre *et al.* 2000; Van Wilgen *et al.* 2001). Furthermore, invasive alien trees have a major negative impact on our limited water resources, and it is estimated that 6.7% of the water runoff of the entire country is used by these plants (Le Maitre *et al.* 2000; Van Wilgen *et al.* 2008; Van Wilgen & De Lange 2011). Moreover, it has been argued that the future impacts of invasive alien species may be much higher than anticipated, especially on surface water runoff, groundwater recharge and biodiversity (Van Wilgen *et al.* 2008), and will likely continue to spread faster than they can be cleared (Van Wilgen *et al.* 2016). The water yield from mountain catchments invaded by invasive alien species may reduce by more than 30% over 20 years of invasion (Van Wilgen *et al.* 2001). Moreover, apart from the impact on surface and groundwater, invasive alien plants increase the fire hazard and contributes to the intensity of fires, which have an impact on the soil structure and destroys resprouting plants and the seedbank in the soil.

The presence of invasive alien plant species within the riparian zones and wetland buffers has also been identified as a threat to freshwater ecosystems in the Groot Winterhoek Complex. The removal of invasive alien trees should be prioritised for maintenance of these areas, especially for rivers in the high-water yield catchments within the complex. Not only will this improve the health of the freshwater ecosystems, but it will also allow for the release of additional good quality water. Moreover, the establishment of indigenous vegetation after alien clearing should also be encouraged to enable the re-establishment of faunal groups, such as for aquatic macro-invertebrates for example (Samways *et al.* 2010).

Alien vegetation densities in the Groot Winterhoek Complex are classified as rare to very scattered (0-5 % invaded) with small areas of medium densities (25-50% invaded) and dense infestations (50-75% invaded) in the south (Appendix 1, Map 6). Alien

plants are generally associated with some of the old farm steads located within the complex. There are also some scattered alien plants species located along the boundary within the zone of influence. Section 10 (strategy 1) highlights actions needed to address this threat.

The spread of most invasive alien plant species is affected by fire, which in turn influences clearing activities and prioritisation thereof. Clearing and controlling invasive alien plant species is costly and given the limited funding available, prioritisation of areas to be cleared must be undertaken to maximise benefit. Invasive alien plant clearing prioritisation maps are generated annually to support the compilation of annual plans of operation for alien plant clearing.

Within the Groot Winterhoek Complex there are some scattered pines located on a few of the high-laying mountainous peaks. The localities of these are generally known and the clearing of these plants have been prioritised.

### 2.3.2 Freshwater ecosystems

The Groot Winterhoek Complex serves as a local watershed for a part of the middle Berg and Olifants Water Management Areas. This catchment area, together with the Cederberg Mountain Catchment Area is listed as National Strategic Water Source Areas (SWSA; WWF 2013a and b) see Appendix 1, Map 7). The Groot Winterhoek complex catchment provides water to various local municipal areas including surrounding towns such as Porterville, Saron, Tulbagh and Ceres. The Kliphuis/24 River's system contributes significantly to the Voëlvlei Dam which serves the greater Cape Metro. Other towns further afield such as Moorreesburg, Piketberg and Velddrif receive water via the Berg River system and Citrusdal, Clanwilliam and Vredendal via the Olifants River system. Through the production of clean quality water from the Groot Winterhoek catchment, the complex contributed significantly to water security within the Western Cape Province.

#### 2.3.2.1 Groundwater

Groundwater systems associated with the Groot Winterhoek Complex are dominated by the Table Mountain Group aquifers, consisting mainly of the quarzitic sandstones of the Peninsula and Skurweberg formations (Dylan Blake, Department of Water Affairs, 2008, pers. comm.). There is some intrusion by the Malmesbury, Cango and Gariep groups in the Tulbagh valley.

The Table Mountain Group has three major folds present in and near the Groot Winterhoek Complex. These folds are orientated north- south. They include, from west to east, the Olifants River Syncline (U-shaped; results in younger formations outcropping, *i.e.*, the Skurweberg and Goudini formations) in the area where the Groot Kliphuis River runs, and the Koue Bokkeveld Anticline (A-shaped; results in older formations outcropping at surface, *i.e.,* the Peninsula, Graafwater and Piekenierskloof formations) near Perdevlei. Lastly there is the Agter-Witzenberg Syncline (younger Skurweberg and Rietvlei formations outcropping, with the synclinal basin deepening towards the Agter-Witzenberg, leading to the outcropping of the even younger Bokkeveld Group) where the Olifants River runs adjacent to the complex. Subsequently, the Peninsula formation forms the major fracture Peninsula Aquifer, while the Skurweberg and Rietvlei formations form the Nardouw Aquifer. It is likely that

both these aquifers provide significant base flow, mostly from the discharge from permanent springs and the numerous seepage areas to the rivers that originate within the Groot Winterhoek Complex. In addition, these springs and seeps also feed the groundwater dependent ecosystems (like other wetlands) within their vicinity (Dylan Blake, Department of Water Affairs, 2008, pers. comm.).

The Peninsula and Nardouw aquifers fall into the major aquifer type classification, which are considered high yielding systems of good quality water (0-70 mS/m; Parsons and Conrad, 1998; DWAF 2012c). These aquifers are also considered to be the most vulnerable to pollutants (with some exceptions; DWAF 2012a) and are considered to be the most susceptible to contamination (DWAF, 2012b). The high rainfall within the Groot Winterhoek Complex result in a moderate to high groundwater recharge in these areas (Nel *et al.* 2011a). This, together with the pressures imposed by drought events, could result in the use of groundwater to augment water supply for urban and agricultural areas and utilization thus becoming an increasing threat in the future. Increased abstraction of groundwater will likely result in some ecological impacts for the freshwater (rivers and wetlands) and terrestrial ecosystems in the catchment. While this has been researched in the Boland Mountain catchment (Colvin *et al.* 2009), focused information is lacking for the Groot Winterhoek catchments.

#### 2.3.2.2 Rivers

The Groot Winterhoek Complex is located mainly within the eastern section of the Berg River system, while a small section of the catchment of the upper Olifants River is included on the south and north eastern side of the complex. In terms of the Berg River system, the headwaters of the Klein Berg River originate to the south of the complex but most of the river is located off reserve. The Klein Berg River joins the Berg River to the southwest of the town of Saron. To the north and east of the complex lies the Groot Kliphuis and Klein Kliphuis Rivers (Figure 2.12) that become the 24 Rivers downstream of the confluence. To the south the headwater of the Leeu River originates within the complex. Downstream of the complex and Mountain Catchment Area boundary the Leeu River runs into the 24 Rivers that has a confluence with the mainstream Berg River further downstream. Numerous watercourses drain these easts facing mountain slopes to the lowlands. Some of these to the north of the 24 Rivers catchment forms the headwaters of the Assegaaibosspruit River, which joins the Jakkalskloof, Botmaskloof and Krom Rivers respectively, before entering the Berg River as the Matjies River upstream of Misverstand Dam.

**Figure 2.12:** The Klein Kliphuis River. Photo: Jeanne Gouws.

For the tributaries associated with the Olifants River system, the headwaters of both the Dwars and Ratel Rivers originate on the northern side of the complex. The headwater of the Olifants River itself originates on private land in the Agter-Witzenberg valley where it passes through the Koue Bokkeveld Mountain Catchment Area located along the eastern side of the Groot Winterhoek Complex. Several of these rivers have been identified as priorities for the conservation of different aspects and inhabitants of the freshwater ecosystem through the National Freshwater Ecosystem Priority Areas (NFEPA) projects (Nel *et al.* 2011a & b) and the Western Cape Biodiversity Spatial Plan (Pool-Stanvliet *et al.* 2017). The importance of these river catchments is summarised in Table 2.7.

**Table 2.7:** The Freshwater Ecosystem Priority Area status and estimated health condition of the rivers within the Groot Winterhoek Complex, from north to south in each major catchment. Health scores are defined as follows; natural (A), good-natural (AB), good (B), fair (C), degraded (D).

| River | Condition * | Freshwater Ecosystem Priority Area status | River Reach / Type |
|---|---|---|---|
| **Olifants Catchment** | | | |
| Ratel | A ** | FEPA fish sanctuary | Mountain stream |
| Dwars | A ** | FEPA fish sanctuary | Mountain stream |
| **Berg Catchment** | | | |
| Assegaaibosspruit | A ** | No FEPA status | Mountain stream (headwaters) |
| Unnamed tributary of 24 Rivers | A ** | No FEPA status | Mountain stream (headwaters) |

| River | Condition * | Freshwater Ecosystem Priority Area status | River Reach / Type |
|---|---|---|---|
| Klein Kliphuis | AB ** | Fish Rehab FEPA | Mountain stream |
| Groot Kliphuis | AB ** | FEPA fish sanctuary<br>Fish Rehab FEPA | Mountain stream |
| Leeu | AB ** | Fish support area<br>Fish Rehab FEPA<br>Phase 2 FEPA | Mountain stream |
| Klein Berg | AB ** | No FEPA status | Headwaters |

*Condition estimated through a combination of real data, desktop study and specialist input.
**Condition unknown, but expected value provided.

The major threats to the river ecosystems within the Groot Winterhoek Complex include invasive alien plant species within the riparian zones and in wetlands, as well as the presence of invasive alien fish species (section 5.5). The removal of invasive alien plants should be prioritised to improve the health of the riparian zones and the instream environments as well as allow for the release of additional water. Moreover, the establishment of indigenous vegetation after alien clearing should be encouraged to benefit instream aquatic biota such as aquatic macro-invertebrates (Samways *et al.* 2010). The reduction in river flow from over-abstraction of surface water and groundwater, is also a threat, especially within the zone of influence surrounding the complex. The over-abstraction of water is often linked to over allocation of water from the relevant authorities, or in the case of groundwater over-abstraction, to unregulated water use. Many rivers are completely diverted by weirs just outside the complex boundary with little or sometimes no flow reaching the downstream reaches.

#### 2.3.2.3 Wetlands

Relatively few wetlands occur within the boundaries of the Groot Winterhoek Complex (Nel *et al.* 2011a, b). Recent wetland related work on the complex includes ground-truthing for an internal wetlands inventory and for the West Coast Working for Wetlands Programme project (*e.g.,* SANBI, 2015). These ground-truthing events were not exhaustive though, and to date some wetlands remain unmapped. Most of the wetlands mapped thus far are seep wetlands according to the wetland classifications provided in Ollis *et al.* (2013) (Figure 2.13). This means that the complex has a mosaic of wetland and terrestrial areas within its boundaries. Many of these wetlands are associated with perennial and non-perennial watercourses and are likely fed by hillslope interflow and shallow groundwater. However, it is likely that at least some of these wetlands are fed by deeper groundwater from the underlying fractured aquifers, making them groundwater dependent ecosystems. Most of the wetlands fall into the Northwest Sandstone Fynbos regional wetland vegetation type and the seeps that are considered least threatened and moderately protected (Gouws *et al.* 2012).

**Figure 2.13:** A seep within the Groot Winterhoek Complex. Photo: Marius Wheeler.

The wetlands in general are expected to be in a good health condition (A or AB, *i.e.*, natural to near natural), however, some of these wetlands have been negatively impacted (C or D, moderately modified to degraded) due to the historical placement of access roads and hiking trails within the complex. This is mainly due to the high erosion potential of the sandy soil substrate. Wetlands are one of the most highly threatened freshwater ecosystems globally and nationally, especially those located in lowland areas (Gouws *et al.* 2012; Gouws and Gordon, 2017). However, they continue to be the least studied and monitored freshwater ecosystem in the country. A greater understanding of the health of wetlands and other freshwater ecosystems within the Groot Winterhoek Complex is needed, especially within the context of managing these ecosystems as part of a National Strategic Water Source Area (WWF, 2013 a and b).

## 2.4 Biodiversity Context: Taxa

The Cape Faunal Centre (*sensu* Stuckenberg, 1962) coincides roughly with the Cape Floral Region and contains a distinctive fauna with some invertebrates showing little change over millions of years. These relictual faunas date back to the time of Gondwana. Faunal biodiversity and endemism are high, with several endemic and/or threatened vertebrate and invertebrate species conserved in the Groot Winterhoek Complex.

### 2.4.1 Invertebrates

#### 2.4.1.1 Terrestrial invertebrates

Invertebrates are a vital component of terrestrial ecosystems and constitute more than 80% of all animal diversity, yet they are grossly under-represented in studies of African biodiversity. Site biodiversity estimates that do not consider invertebrates not only omit the greatest components of what they are attempting to measure, but also ignore groups that are very significant contributors to terrestrial ecosystem processes.

The core of the CFR represents a distinct zoogeographic zone, the Cape Faunal Centre (Stuckenberg 1962), characterised by the phylogenetic antiquity of much of its invertebrate fauna. The component species of this centre represent what is probably the richest known assemblage of post-Gondwana relict species and is a pronounced hotspot for faunal endemism within southern Africa, where high levels of endemism are characterised for virtually all taxa examined.

In addition to the vital role's invertebrates play in ecosystems (McGeoch 2002, Samways *et al.* 2010, 2012), such as primary production, nutrient recycling, predation, herbivory, competition, the Cape flora is dependent on specialised pollination guilds and insect-driven ecological processes such as myrmecochory (seed dispersal by ants) (Le Maitre & Midgley 1992). In South Africa, myrmecochorous plants are mainly restricted to the Fynbos Biome and approximately 20% of the strictly fynbos plant species are dependent on myrmecochory for their survival (Johnson 1992). A total of 29 families and 78 genera of fynbos plants have been identified as containing species that are ant-dispersed (Table 1 in Bond & Slingsby 1983).

The presence of a diversity of *Colophon* beetle species in the CFR is indicative of the capacity of this region to provide refuge to biodiversity during periods of climate change. This ancient, flightless group of beetles is endemic to the CFR and geographically restricted to the high mountains of the Western Cape. The high-altitude peaks of the Groot Winterhoek Complex provide habitat for at least one *Colophon* beetle species, namely the Vulnerable *Colophon cameroni*. This species has a wide distribution ranging from the Waaihoek and Hex River Mountains northwards to Groot Winterhoek Peak (Switala *et al.* 2014). These flightless stag-beetles are relictual fauna with Gondwana linkages since their closest relatives are today found in Brazil and Australia (Endrödy-Younga 1988). These species are under threat due to illegal harvesting by collectors and from climate change impacts.

The butterflies of South Africa were recently assessed according to the latest International Union for Conservation of Nature (IUCN) criteria as part of the South African Butterfly Conservation Assessment project (Mecenero *et al.* 2013). There are 38 species of Lepidoptera that are endemic to the Western Cape. No species of conservation concern occurs within the Groot Winterhoek Complex. Mecenero and others (2013) argued that, in the South African context, it is not just the threatened taxa that are of importance, but also those taxa that are intrinsically rare or localised but not currently threatened. Conservationists should be made aware of these taxa so that future threats can be identified timeously, and the species monitored for change. They assigned conservation statuses to butterfly species that were classified as Least Concern during Red Listing but has local rarity (Mecenero *et al.* 2013). These species were either classified as Extremely Rare (known from only one site) or Rare. Rare

species were further classified as Rare – Restricted Range (those with a range less than 500 km²), Rare – Habitat Specialist (species restricted to a specific micro-habitat) or Rare – Low Density (species with small subpopulations or single individuals scattered over a wide area). Table 2.8 gives the classification of the five Western Cape species that are likely to occur within the Groot Winterhoek Complex that are classified as Least Concern with local rarity.

**Table 2.8:** Conservation status of butterfly species that are likely to occur within the Groot Winterhoek Complex and its zone of influence that were classified as Least Concern during Red Listing but are locally rare (Mecenero *et al.* 2013).

| Species | Common Name | Distribution |
|---|---|---|
| **Rare – Restricted Range (range less than 500 km²)** | | |
| **Lycaenidae** | | |
| *Chrysoritis adonis* | Adonis opal | Northern slopes of the Gydo Mountains and adjacent ranges near Ceres. Winterhoek Sandstone Fynbos. |
| *Lepidochrysops quickelbergei* | Quickelberge's blue | On the north-facing slopes of the Groot Winterhoek Mountains to Gydoberg and Waboomberg north of Ceres on Winterhoek Sandstone Fynbos. |
| *Trimenia argyroplaga cardouwae* | Large silver-spotted copper | In the mountains near Porterville, including the Groot Winterhoek Mountains, in Winterhoek Sandstone Fynbos. |
| **Rare – Habitat Specialists and Low Density** | | |
| **Lycaenidae** | | |
| *Lepidochrysops bacchus* | Wineland blue | Occurs in fynbos and Albany Thicket localities that receive between 500 mm and 750 mm rainfall per annum. |

Further Red List assessments have been conducted since 2013 and several of the species listed in Table 2.8 were assigned higher National Red Listings in 2016 (Red List of South African Species, http://speciesstatus.sanbi.org/taxa/lineage/4/). *Chrysoritis adonis adonis* has not been seen during the normal flight period since 2004 despite regular surveys. The current habitat of this species has shown no signs of degradation, but farming has expanded and may have had an influence on the population through drift of insecticides used for crop spraying. The taxon thus qualifies globally under the IUCN criteria as Critically Endangered. *Lepidochrysops quickelbergei* was classified as Least Concern in 2013, but Rare with a restricted range (Table 2.8). This species has since only been found at a single site in the Gydo Mountains. However, there are no perceived threats to the population and it thus qualifies globally under the IUCN criteria as Least Concern but was nationally re-classified in 2016 as Extremely Rare (see classification by Mecenero *et al.* 2013 above).

Another ecologically important invertebrate group is the Arachnida. The South African National Survey of Arachnida (SANSA) was initiated in 1997 (Dippenaar-Schoeman *et al.* 2015) and is an umbrella project that is implemented at a national level in

collaboration with researchers and institutions countrywide dedicated to document and unify information on arachnids in South Africa. SANSA is providing essential information needed to address issues concerning the conservation and sustainable use of the arachnid fauna (Dippenaar-Schoeman *et al.* 2013; Dippenaar-Schoeman *et al.* 2015). Presently 71 spider families, 471 genera and 2 240 species are known from South Africa, representing approximately 4.8% of the world fauna. A total of 966 species represented by 365 genera and 68 families have been recorded in the Western Cape (Dippenaar-Schoeman *et al.* 2015) of which 361 species are endemic to the Western Cape (37.4%), with 119 species only known from their type localities. Unfortunately, there is no spider species list available for the Groot Winterhoek Complex, but given the information generated by SANSA, it is likely that there might be endemic spider species in the complex.

Main threats to invertebrate populations include habitat destruction/alteration and invasive alien plants. This critically important group can be protected by managing ecosystems according to the required fire regimes and by removal of invasive alien plants, especially along river courses.

#### 2.4.1.2 Freshwater macro-invertebrates

The South African odonate species have been assessed according to the latest IUCN criteria (Samways & Simaika 2016). A freshwater health index (the Dragonfly Biotic Index) has also been developed which places great emphasis on these irreplaceable endemics and is particularly useful for assessing the level of threat to the local dragonfly fauna as well as its recovery when these threats are lifted (Samways & Simaika 2016). By far the biggest threat to Western Cape dragonflies is invasive alien trees. Removal of these trees has resulted in substantial recovery of these irreplaceable dragonfly species, as well as that of other endemic invertebrates, especially in low-elevation mountain rivers.

Recent work on some of the Western Cape dragonflies and damselflies has indicated that they represent ancient lineages. Species in the genus *Syncordulia* (Corduliidae or Emeralds) for example, diverged some 60 million years ago. These species, along with several others, currently survive in small populations and are more resilient than expected, recovering quickly when invasive alien trees are removed. Invasive alien trees shade out the sunny habitat that the dragonflies require for their life activities.

There are three dragonfly species of conservation concern in the Groot Winterhoek Complex, namely the Gilded presba (*Syncordulia legator*) listed as Vulnerable, Rock malachite (*Ecchlorolestes peringueyi*) listed as Near Threatened and the Cape thorntail (*Ceratogomphus triceraticus*); Near Threatened. The Gilded presba is a very rare and localized Western Cape endemic that is found in swift rocky montane rivers lines with bushy fynbos between 350 and 800 m elevation (Samways & Simaika 2016). The Rock malachite is highly localized in the mountains of the Western Cape and inhabits clear montane streams and rivers with clear pools with lichen-covered boulders that they use as camouflage (Samways & Simaika 2016). The Cape thorntail is a highly localized and rare Western Cape endemic that occurs at elevations up to approximately 800m (Samways & Simaika 2016). It occurs along wide and shallow bush-lined and rocky streams and rivers (Samways & Simaika 2016).

There is no comprehensive invertebrate species list available for the Groot Winterhoek Complex. Such lists are essential as inventories of what occurs in the complex, especially in terms of Red Data and endemic species, and as baseline information for long-term monitoring. Some protection might be provided to certain arthropod groups in protected areas given the fact that there are correlations between insect species richness and biomes in the Western Cape (*e.g.,* Procheş & Cowling 2006, 2007; Procheş *et al.* 2009). Therefore, the argument can be made that the attention and protection that the area receives in terms of its floral diversity might provide some protection for its insect diversity (Samways *et al.* 2012).

The invertebrate species list of the Groot Winterhoek Complex is updated through *ad hoc* baseline data collection. Additional information on the insects of the Cape Floral Region can be obtained from the Iziko Museums of South Africa (www.iziko.org.za).

### 2.4.2 Amphibians

The Groot Winterhoek Complex has 12 frog species on record. One species, the northern moss frog, (*Arthroleptella subvoce*) (Figure 2.14a) is listed as Critically Endangered. The complex also hosts two endemic frog species, namely Fitzsimons' ghost frog (*Heleophryne depressa)* (Figure 2.14b), which still needs formal taxonomic elevation as distinct from the Cape ghost frog *(H. purcelli)*, and an undescribed species of mountain toadlet (*Capensibufo sp*.). This toadlet has previously been confused with the Tradouw mountain toadlet (*Capensibufo tradouwi*) *(*Tolley *et al.* 2010; Cressey *et al. 2014;* Channing *et al.* 2017*).* The complex hosts two main types of amphibian habitat, namely highland seeps and streams. The seep areas are important habitats for *Arthroleptella* and *Capensibufo* and the upper reaches of the streams (generally above the level where fish occur except for *Galaxias* sp.) are important for the ghost frogs which are a good indicator of water quality.

There is a long-term frog monitoring site just south of Veepos near the northern entrance to the Groot Winterhoek Complex (Figure 2.15). The project records the presence and numerical density estimates for all the frog species that may be present at the fixed monitoring site. These data should be able to indicate whether there are any trends in the presences or population numbers with the aim of achieving persistence of all species and on average stable population numbers. In the short-term we would like to achieve an increasing population of *Arthroleptella subvoce*. This monitoring project started in 2008 and was specifically chosen as this site represents the most northerly population of any moss frog within the genus *Arthroleptella*. Moss frogs are dependent on permanent moisture, are temperature sensitive (to high temperatures) and thus are good indicators of climatic change and ecosystem health. The particular moss frog present, the northern moss Frog (*Arthroleptella subvoce*), is listed as Critically Endangered and is so also a species of conservation concern for the complex in its own right. Surveillance surveys to check on continued presence at the other two known sites in the complex and any new unknown sites will be required. Fitzsimon's Ghost frogs require clean, running water year-round and their continued presence should be an indicator of good management of the upper catchments.

Monitoring at the Veepos long-term monitoring site has indicated that the primary driver of frog populations is fire and that short fire return intervals reduce and suppress northern moss frog populations. The conservation of frogs in the Groot Winterhoek Complex is primarily reliant on ensuring an appropriate fire-return interval. To a more

limited extent it requires effective management of invasive alien woody plant species, primarily *Hakea* and *Pinus spp.*

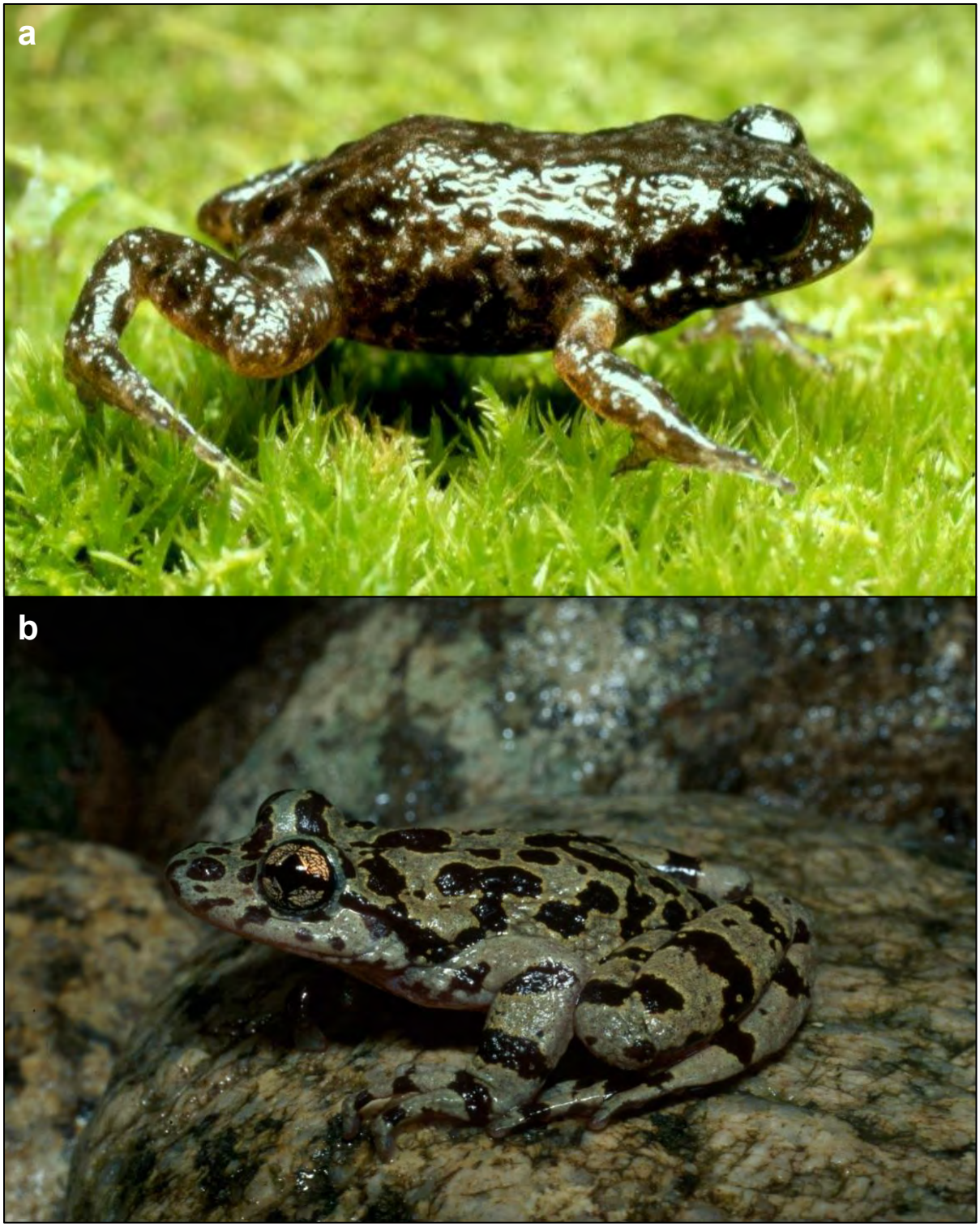


**Figure 2.14:** Two frog species found within the Groot Winterhoek Complex. a) The Critically Endangered northern moss frog (*Arthroleptella subvoce*); b) The endemic Fitzsimons' ghost frog (*Heleophryne depressa*). Photos: Andrew Turner.

**Figure 2.15:** The Veepos long-term monitoring site for moss frog populations. Photo: Andrew Turner.

### 2.4.3 Fish

The Western Cape Province is located within the Cape Fold Ecoregion, one of the six aquatic ecoregions of southern Africa (Abell *et al.* 2008). This region is characterised by high levels of endemism in its freshwater fish fauna and cryptic diversity within many species. Recent research has elucidated the presence of many distinct lineages within known species (*e.g.,* Swartz *et al.* 2009; Chakona *et al.* 2013). The latest figure for freshwater fish of the Cape Fold Ecoregion is 45 taxa, which include known species as well as undescribed lineages (Ellender *et al.* 2017, Chakona *et al.* 2019).

The Groot Winterhoek Complex is located mainly within the eastern section of the Berg River system, while a small section of the catchment of the upper Olifants River included on the north-eastern side of the complex. Based on formally described species, the Berg River system is home to four freshwater fishes of which one, the Berg-Breede River whitefish (*Cheilobarbus capensis)* (previously *Barbus andrewi*), now being extinct from this river system. The Berg River redfin (*Pseudobarbus burgi)* currently listed as Endangered (Jordaan *et al.* 2018), Cape galaxias (*Galaxias zebratus)* and Cape kurper (*Sandelia capensis)* make up the remainder of the

indigenous fish fauna (Figure 2.16). The latter two species are currently listed as Data Deficient due to taxonomic uncertainty (Swartz *et al.* 2007, Chakona 2018). Fish records within the Groot Winterhoek Complex include Cape kurper in the Groot Kliphuis River as well as in the lower section of the Klein Kliphuis River. There are also records for Cape kurper outside the complex boundary in the Leeu River and their distribution extends into the reserve. A small population of the Endangered Berg River redfin is also present in the upper reaches of the Leeu River within the complex.

Recent (2011) records exist for Cape galaxias in the headwaters of the Leeu River and based on the work of Chakona and others (2013), this population represents a novel lineage, *Galaxias sp*. “zebratus mollis”. Based on current distribution knowledge, this lineage is restricted to the Leeu River in the Berg River system as well as the Onrus River system (Chakona *et al.* 2013). Cape galaxias were also recorded in a nearby unnamed tributary flowing west off the Saronsberg Mountains, but their genetic origin is unknown at present. Off-reserve records for *G. zebratus* also exist for the headwaters of the Klein Berg River to the south of the complex.

The novel *Galaxias sp*. “zebratus mollis” as well as the Berg River redfin populations in the Leeu River are of high conservation value and ensuring their persistence is a priority. Galaxias populations occurring nearby should be screened to determine their genetic origins. The largest threat to the indigenous fish species within the Groot Winterhoek Complex is posed by invasive alien fish species (section 5.5). Ensuring the long-term survival of these and other indigenous fish populations requires preventing new alien fish invasions and ensuring that existing invasive fish populations on the complex are contained. Furthermore, active landowner engagement is required in the zone of influence to ensure that habitat directly downstream of the complex and Mountain Catchment Area boundary is not adversely affected by poor land use practices. The complex also offers an opportunity for fish rehabilitation work to be conducted within the lower reaches of the 24 Rivers and the Kliphuis River system. Objective 1.8 (section 10) identifies conservation actions needed in this regard.

The Olifants-Doring River system is more species rich with 10 described fish species and one additional known lineage, but very little of this system is included within the Groot Winterhoek Complex. It is only the headwaters of the Dwars and Ratel Rivers that fall within the complex boundary and the headwaters of the upper Olifants River that parallel to the eastern side of the complex. For both the Dwars and Ratel Rivers, the upper distribution limit for indigenous fish is located downstream of the complex boundary (Van der Walt *et al.* 2016). While the headwaters of the Olifants River are outside the Groot Winterhoek Complex, this area is of high conservation value as it is home to substantial breeding populations of the Clanwilliam yellowfish (*Labeobarbus seeberi)* and the Clanwilliam sawfin (*Cheilobarbus capensis)*, both endemic to the Olifants-Doring River system. Alien fish invasions from upstream pose the biggest risk to these fish and should be mitigated by creating awareness of the risk and impacts associated with alien fish among landowners in the zone of influence.


**Figure 2.16:** Fish species occurring within the Groot Winterhoek Complex. a) Berg-Breede River whitefish now extinct (Photo: Leonard Flemming); b) Cape kurper (*Sandelia capensis*) (Photo: Unknown); c) Cape galaxias (*Galaxias zebratus*) (Photo: Andrew Turner) and d) Berg River redfin (*Pseudobarbus burgi*) (Photo: Riaan van der Walt).

### 2.4.4 Reptiles

The Groot Winterhoek Complex has 32 reptile species recorded. This is not the full complement of expected species for the complex and a formal survey will be useful. Of the recorded species, none are currently listed as threatened by the IUCN (IUCN Red List 2019). One species is endemic to the complex and adjacent mountains, namely Oelofsen's girdled lizard (*Cordylus oelofseni*) (Figure 2.17) as the other populations elsewhere, *e.g.,* Hottentots Holland Nature Reserve, are likely to be distinct at the species level (Daniels *et al.* 2004).

**Figure 2.17:** Oelofsen's girdled lizard (*Cordylus oelofseni*). Photo: Andrew Turner.

The conservation of reptiles in the Groot Winterhoek Complex is primarily reliant on ensuring an appropriate fire-return interval. To a more limited extent it requires effective management of few invasive alien woody plant species, primarily *Eucalyptus sp.* These management actions should be sufficiently measured and monitored.

### 2.4.5 Avifauna

The Groot Winterhoek Complex is dominated by mountain fynbos and most of the bird species recorded on the complex are typical for this vegetation type. There are however some substantial rivers flowing through wooded gorges providing habitat for several wetland and forest/woodland species of birds albeit in very low numbers,

increasing the number of bird species within the complex. A total of 134 species of birds (SABAP2 2019) have been recorded on the complex, of which seven are listed as regionally and/or globally threatened. The complex is situated in high-density areas for both Black Harrier (*Circus maurus*), listed as Endangered, (Figure 2.18) and Verreaux's Eagle (*Aquila verreauxii*), listed as Vulnerable, (Taylor *et.al.* 2015). The importance of the complex for these two species is evident from the relatively high reporting rates (SABAP2 2019) calculated for these two species within the complex. The other species for which high reporting rate were recorded was the Cape Rockjumper (*Chaetops frenatus)*. While Taylor and others (2015) did not delineate high density areas for this species, comparing reporting rates across the distribution area for this species (SABAP 2019) it is clear that the Groot Winterhoek Complex is an important refuge for the Cape Rockjumper. As the impact of climate change increases due to rising temperatures, high montane reserves like the Groot Winterhoek Complex are going to play an ever more important role in the survival of the Cape Rock-jumper, a species shown to be susceptible to high temperatures (Lee and Barnard 2015).

**Figure 2.18:** A Black Harrier (*Circus maurus*) a ground breeding raptor on a nest. Photo: Rob Simmons.

### 2.4.6 Mammals

As part of the developing protected area corridor between the Cederberg Wilderness Area to the north and the Boland Mountain Complex to the south (UNESCO 2004), the Groot Winterhoek Complex facilitates ecological processes such as migration and dispersal of key mammal species. The complex's mountain fynbos, ravine forests and montane wetlands support a diverse mammal community. At least 36 mammal species (one Vulnerable and four Near Threatened) have been recorded in the complex (CapeNature 2020). Three of these are near endemic to the Western Cape and four species are ecotypical (*i.e.*, comprise discrete populations below the level of subspecies that can be recognized on genetic, phenotypic or zoogeographic grounds).

A keystone species on Groot Winterhoek Complex and greater catchment is the leopard (*Panthera pardus)*, which regulates terrestrial ecosystems through its role as an apex predator. This species is classified as Vulnerable in South Africa, mainly due to unsustainable levels of persecution and illegal hunting. Other threats are habitat fragmentation and loss (Swanepoel *et al.* 2016). These are not direct threats in the complex, where there is a healthy, breeding leopard population (Jaco van Deventer, Biodiversity Conservation Specialist, CapeNature, 2020, pers. comm.). However, leopard genetic variability depends on gene flow (and thus dispersal) between populations over large areas (Swanepoel *et al.* 2016). Groot Winterhoek Complex's leopard population will thus be affected by off-reserve activities such as snaring, illegal hunting and land transformation. The complex also has a high diversity of small- to medium-sized carnivores which experience similar threats to leopard, *e.g.,* caracal (*Caracal caracal)* (an important mesopredator), African wildcat (*Felis silvestris lybica)* and honey badger (*Mellivora capensis)*.

There are relatively few game species in the Groot Winterhoek Complex but all of these – Cape grysbok (*Raphicerus melanotis)* (near-endemic to the Western Cape), klipspringer (*Oreotragus oreotragus)*, common duiker (*Sylvicapra grimmia*), and grey rhebok (*Pelea capreolus*) – are ecotypical and thus of conservation concern. Some, such as common duiker and klipspringer, are important contributors to leopard diet in the Western Cape (Swanepoel *et al.* 2016). Game numbers in the complex are recorded annually in the game on reserves register. Monitoring grey rhebok is especially important. Firstly, this species is a good indicator of ecosystem health in sandstone fynbos (Cadman 2016). Secondly, it is Near Threatened because of habitat loss and fragmentation, especially by agriculture. Invasive alien plants, with a related increase in wildfires, are also a threat (Wilson *et al.* 2016). Thirdly, grey rhebok conservation is dependent on corridors between areas of suitable habitat. In 2004, three grey rhebok and 16 klipspringers were translocated from Groot Winterhoek Complex to the Table Mountain National Park.

The complex falls within the historical distribution range of Cape mountain zebra (*Equus zebra zebra)* (Birss *et al.* 2015). However, the habitat suitability for these animals is low due to low grass abundance and a shortage of palatable grass species (Olivier 2019). Other game species which might have occurred historically in the complex but for which there are no known records are red hartebeest (*Alcelaphus buselaphus caama)*, eland (*Tragelaphus oryx oryx)* and springbok (*Antidorcas marsupialis)* (Birss *et al.* 2015). Interestingly, eland is depicted in rock art on the complex (Jaco van Deventer, Biodiversity Conservation Specialist, CapeNature, 2020,

pers. comm.). At present, there is no intention to actively introduce any of these game species to the complex.

Other common and widespread but ecologically important species recorded in Groot Winterhoek Complex include Cape porcupine (*Hystrix africaeaustralis)* (ecosystem engineers), rock hyrax (*Procavia capensis)* (food source for raptors such as Verreaux's Eagle and baboon (*Papio ursinus)* (important seed disperser). Porcupine and baboon population trends can be useful indicators of habitat condition in shale fynbos (Cadman 2016).

The watercourses of the complex provide habitat for Cape clawless otter (*Aonyx capensis)* (Near Threatened, Okes *et al.* 2016) and vlei rat (*Otomys irroratus)*. Both species will be impacted by loss or deterioration of aquatic habitat downstream of the complex and thus the complex becomes more important as a refuge for mammal species as the lowland areas are impacted.

Small mammals on Groot Winterhoek Complex perform important ecosystem services. They form the prey base for many other animals, including birds and reptiles. Some also play a role in plant pollination. For example, Xeric striped mouse (*Rhabdomys pumilio)* and pygmy mouse (*Mus minutoides)*, both recorded in the complex, are known to visit certain *Protea* species (Zoeller *et al.* 2016). Two small mammal species, the range-restricted fynbos golden mole (*Amblysomus corriae)* and the rare spectacled dormouse (*Graphiurus ocularis)*, are Near Threatened. The main threats to both species are habitat loss, alteration and degradation (Bronner and Mynhardt 2016; Wilson *et al.* 2016). Climate change is likely to exacerbate these threats, and monitoring and field surveys will provide better information on which to base future conservation assessments (Bronner and Mynhardt 2016; Wilson *et al.* 2016). Cape golden mole (*Chrysochloris asiatica)* and Cape mole-rat (*Georychus capensis)* are two other small mammal species of conservation concern in the complex. Although they are not threatened, both are near endemic to the Western Cape Province.

Groot Winterhoek Complex supports one species of fruit bat and five species of insectivorous bats. Caves on the complex provide roosts for hundreds of bats (Jaco van Deventer, Biodiversity Conservation Specialist, CapeNature, 2020, pers. comm.). Insectivorous bats play an important role in insect control, including control of agriculturally significant pests (McEwan *et al.* 2020). Although none of the bat species on Groot Winterhoek Complex are considered threatened, these populations could be impacted by the wind farm near Gouda to the southwest of the complex. In particular, turbine strikes, and barotrauma pose a high risk to Natal long-fingered bats (*Miniopterus natalensis)* and Cape serotine bats (*Neoromicia capensis)* (McEwan *et al.* 2020). Monitoring of bats is a specialized field and cannot be done by CapeNature, but external conservation-related research on the bats of the complex should be facilitated as far as possible.

Due to the inaccessibility of much of the Groot Winterhoek Complex to humans, most of the threats to mammals are based off-reserve rather than within. Historically, parts of the complex were under plantation or used for livestock grazing, but all feral cattle and goats have been removed and the veld is mostly in excellent condition (Jaco van Deventer, Biodiversity Conservation Specialist, CapeNature, 2020, pers. comm.).

There are currently no extralimital game species in the complex (Marius Wheeler, Landscape Conservation Intelligence Manager, CapeNature, 2021, pers. comm.).

The main on-reserve management actions for the complex are to continue with monitoring of game and surveillance of other mammal species, to facilitate conservation-related research, and to do follow-up alien plant control. Off-reserve actions include implementation of regular enforcement actions to mitigate against illegal hunting, and provision of a conservation extension service to neighbouring landowners, addressing issues such as river care, biodiversity agriculture and non-lethal control of damage-causing animals. Protected area expansion and corridor development through stewardship and/or land purchase will contribute to the conservation of wide-ranging flagship species such as leopard, as well as conservation of a host of less charismatic but equally important ones.

## 2.5 Heritage Context

Section 5 of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) outlines general principles for heritage resources management while section 9 outlines responsibilities of the state and supported bodies.

### 2.5.1 Heritage resources

The Western Cape mountains were inhabited by San (hunter-gatherer) descendants as long as 100 000 years before present (Deacon and Deacon 1999; Stephanie-Anne Barnardt, Heritage Officer, Heritage Western Cape, 2021, pers. comm.). Various examples of rock art, believed to have been produced between 6 000 and 300 years before present, can be found in the Groot Winterhoek Complex, serving as evidence of San habitation of the area (Figure 2.19). The National Heritage Resources Act, 1999 (Act No. 25 of 1999) protects all rock art and artefacts.

**Figure 2.19:** Examples of rock art found within the Groot Winterhoek Complex. Rock paintings illustrate the religious and social life of the San Photos: Groot Winterhoek staff.

In 1993, Management Guidelines for rock art sites in two Wilderness Areas in the Western Cape was compiled for the Cederberg and Groot Winterhoek Complex. The project was funded by the Department of Environmental Affairs from April 1991 to March 1993, and lead by Dr Janette Deacon from the University of Stellenbosch.

The major aims of the project were:

- To search the Groot Winterhoek Wilderness Area for sites with rock paintings, to record the state of paintings and to draw up a statement of their significance;

- To design a management plan and guidelines for appropriate management practices in the wilderness areas.

The San produced the fine-line rock art of which there are numerous examples in the complex. Currently there are fifteen known recorded rock art sites but it is expected that there are many more. It is suspected that the San burned the veld to stimulate growth of various edible iridaceous plant species which they utilized as a food source. Fire was also used to burn the veld to attract game which made hunting easier. The San lived in small family groups of 10-20 individuals and moved around often to where their food sources were readily available (Parkington and Dlamini 2015).

Approximately 2 000 years ago, the Khoekhoen (pastoralist) descendants arrived south from present day Botswana and brought sheep and cattle with them (Stephanie-Anne Barnardt, Heritage Officer, Heritage Western Cape, 2021, pers. comm.). By the 17th century they were established in the area and their population numbers far exceeded those of the remaining San (Maingard 1931). The Khoekhoen produced dairy products, collected food from the veld and hunted game. It is unlikely that they would have needed to use the mountain pastures except in extremely dry years. As is the case with other pastoralists, the Khoekhoen regularly burnt the veld to improve the grazing. However, low numbers and infrequent use of the area of the current complex, probably meant that their veld burning had little or no effect on the composition of the vegetation.

Not long after Jan van Riebeeck established the outpost at the Cape in 1652, colonial hunters were ranging as far afield as the Land van Waveren (Tulbagh Valley) and the Piketberg area. According to Andrag (1977), the first Europeans explored the area in 1661 under the leadership of Dutch explorer Jan Danckaert. As game became scarcer, some colonial hunters turned to stock farming and their hunting concession areas were later converted to pasturing concession early in the 1700's. These were later converted to "loan farms" on condition that the farmers constructed houses and fortified kraals. Permanent title to these properties was only registered after the second British annexation. The process of colonial domination continued once the British defeated the Dutch in 1806 and the Cape became part of the British Empire. In 1809 it was reported that neither San hunter-gatherers nor Khoekhoen pastoralists were living independently in the Groot Winterhoek area.

The following historical account was compiled by Mr Jaco van Deventer during his tenure as conservation manager for the Groot Winterhoek Complex from 1989 until 2000. The information was obtained through various physical interviews with many of the original owners and family members that lived on the various outposts that were historically located within the Groot Winterhoek Complex. Interviews were conducted in Porterville, Saron, Ceres, Prince Alfred Hamlet and Agter Witzenberg (Jaco van Deventer, Biodiversity Conservation Specialist, CapeNature, 2020, pers. comm.).

"Up to the late 19th century this region was Crown Land and between 1875 and 1893 the Crown granted farms to the local "Basters" and white colonial farmers. The first "Quitrent" (French) (Afrikaans = Erfpag stelstel) farms registered in what is today known as the Groot Winterhoek Complex follows:

- De Tronk Kellerman 1875
- Louwslegplek Wiid 1876
- Paarden Vallij Malan 1889
- Kliphuisvlakte Van Scalkwyk and Malan 1890
- Driebosch Van der Merwe 1893
- Vischgat Van Huffel 1893

These farmers used their mountain properties solely for summer pasture, bringing their livestock down to their lowland properties during the colder winter months. There were no permanent structures on the mountain properties at the time. Nomadic black farmers from Sotho or Tswana decent, known as “Makatese” or Mantatee’s, were appointed to guard the livestock of the farmers because of their extensive knowledge of farming with livestock (Stephanie-Anne Barnardt, Heritage Officer, Heritage Western Cape, 2021, pers. comm.). They lived in temporary shelters and brought the sheep and goats into a kraal each night as a precaution against predators. Cattle were allowed to range free.

In 1909 Mr Retief bought De Tronk and sometime after this date, permitted a small group of Mantatee’s to settle on his property at the place known as “Ou Pos”. They built a few houses and cultivated a small area of crops such as beans, peaches and tobacco. They also kept some livestock. Mantatee descendants were probably the first people to live year-round in the De Tronk area which is in the southern part of the present-day complex. This was a turning point for land use of this mountainous area. There are at least 14 Mantatee grave sites located in the complex (Figure 2.20).


**Figure 2.20:** Graves at Langvlei believed to be those of Mantatee’s who died between 1919-1920 because of flu. Photo: Groot Winterhoek staff.

During 1913 Mr Sarel van Huffel of Vischgat bought a portion of Perdevlei. One of his sons moved to this property, built a stone house, planted fruit trees and cultivated a small area of land (Figure 2.21). He also kept sheep, goats and some cattle.

**Figure 2.21:** One of Mr Sarel van Huffel's sons with his family sitting in front of the stone house he built at Perdevlei.

In 1936, Mr W Engelbrecht bought the property Louwslegplek, where he had been living for some years. He built a good house, planted a small orchard, approximately half a hectare of oak trees and cultivated land at a site on the Groot Kliphuis Rivier which he named Weltevrede. During 1941 Mr Engelbrecht bought Kliphuisvlakte and a portion of Perdevlei where two of his sons then settled. They named the site where the homesteads were Groot Kliphuis. A third son was set up on a portion of Louwslegplek, today known as Langvlei. The graves of some of the Engelbrecht family members can be seen at the oak trees behind the Weltevrede house ruins.

There are also approximately nine graves across the river at Driebochfontein, one has a tombstone with the name Frekie Jacobus Erasmus dated 1913. Driebochfontein used to be a school building constructed of stone where the children from the nearby outposts were educated by a teacher living in at Weltevrede and paid by the parents. The latter building has unfortunately been demolished.

After the Versveld pass was built up the mountain outside Piketberg during the Anglo Boer War, pressure was put on the government to build a pass outside Porterville leading up the mountain too, and in 1936 machinery was ordered from England and the present day Dasklip Pass was built. This road eventually traversed the Groot Winterhoek plateau and through to the homesteads of Weltevrede, Driebochfontein and the livestock camp at Agterdam. The road was eventually completed in 1941. The veterinarian, the late Dr John Dorrington of the farm Heidedal, played a pivoting role

in lobbying for the construction of the Dasklip Pass. The Porterville plateau road was extended from Zuurvlakte to Groot Kliphuis in 1951 and to Perdevlei in 1952.

Apart from livestock that was farmed on the mountain, large orchards of fruit trees were planted and played a vital role in justifying the building of Dasklip Pass to transport products to and from the mountain. Produce included beans, tobacco, dried fruit and later, “bush tea” and “buchu”. The produce was transported out using sledges pulled by donkeys via rough tracks suitable only for foot traffic. One of these paths from Perdevlei runs via Weltevrede over the ridge and down via the farm now known as Fraai Uitsig. The erosion dongas are still visible today where the donkey carts were used. As the road became easier to use motor vehicles were used and donkey carts became something of the past.

In 1950 Mr Roelof Wigboldus bought his brother’s share of De Tronk. Building materials and equipment was transported to his farm with donkeys and carts from Houdconstand farm and Saron’s side. He later constructed the road from Weltevrede to his farm in 1951. He planted both citrus and deciduous fruit trees and several kinds of nut, including hazel, almond, pecans and walnuts. He later cultivated several hectares of “bush tea”, “buchu” and some grazing pastures. The orchards and cultivated lands were fertilized with bat guano that he mined and collected from the caves around the Die Hel area.

In the 1950s large scale harvesting of Buchu (*Agathosma betulina*) started to support the growing export trade thereof. The complex was frequently burnt to increase the production. During the late 1960s to early 1970s various farmers also collected fynbos flowers and other veld products within the complex to supplement their income.

In 1961 the interdepartmental committee of the government consisting of officials from the department of Agriculture, Forestry and Water Affairs acted on instruction from the commission of inquiry into South Africa’s water resources and recommended that the properties in the upper catchment area of the 24 Rivers should be bought to conserve the water resources. During 1978 the last property, Perdevlei, was vacated and only five active farmers remained on the mountain. During the 1980s the Department of Water Affairs & Forestry was restructured, and the management responsibility of those areas not planted for forestry purposes, reverted to the Provincial Department of Nature and Environmental Conservation. It was during 1985 that the Groot Winterhoek Wilderness was also proclaimed.”

## 2.6 Socio-Economic Context

In terms of the Municipal Systems Act, 2000 (Act No. 32 of 2000), municipalities are required to use integrated development planning to plot future development in their mandated management areas. The relevant municipal Integrated Development Plan (IDP) sets the strategic and budget priorities for development and aims to co-ordinate the work of local and other spheres of government. The IDP should also address how the environment will be managed and protected and is supplemented by a Spatial Development Framework (SDF).

IDPs and SDFs are tools for integrating social, economic, and environmental issues. As biodiversity is a fundamental component of sustainable development, IDPs and SDFs offer an opportunity to ensure that biodiversity priorities are incorporated into

municipal planning processes through consultation. In turn, the identification of biodiversity-related projects for the IDP can support local economic development and poverty alleviation. Municipalities within which the Groot Winterhoek Complex occurs are illustrated in Appendix 1, Map 1.

The primary land use adjacent to the Groot Winterhoek Complex is agriculture, mainly small stock farming (sheep and goats), winery and a very small proportion of grain farming and flower farming. A mix of commercial and communal land is in use around the complex. The communities adjacent to the complex include Porterville, Saron, Gouda, Tulbagh and Op die Berg. The towns surrounding the complex are mostly dependent on agricultural and wine farming related business. Businesses are mainly service providers to the mainly agricultural communities. Table 2.9 provides a breakdown of the socio-demographics for the Bergrivier, Drakenstein and Witzenberg local municipalities.

**Table 2.9:** Socio-economic information for the local municipalities relevant to the Groot Winterhoek Complex.

| Local Municipality | Number of Residents | Number of Households | Unemployment Rate (%) | Number of Indigent Households * |
|---|---|---|---|---|
| Bergrivier (2018) | 71 518 | 19 072 | 5.3 % | 1 992 |
| Drakenstein (2018) | 300 991 | 71 686 | 14.1% | 16 534 |
| Witzenberg (2019) | 142 466 | 35 976 | 5.8% | 3 000 |

*Economic active people.

Drakenstein Local Municipality is a Category B municipality and is situated in the Cape Winelands District of the Western Cape. It is a strong economic centre of the region, with a strong agricultural, tourism, light manufacturing industry and business services base and has recorded positive economic growth over the period 2001 to 2009. The unemployment rate in 2017 is much lower at 14.1% than the average for the Western Cape Province (18.2%) but noticeably higher than that of the Cape Winelands District. The rise in indigent households within Drakenstein Local Municipality has been quite dramatic in recent times. This sudden increase can potentially be linked to job losses within the agricultural sector and the influx of citizens that move from outlying smaller towns to the Drakenstein area in search of employment opportunities (Drakenstein Municipality 2018).

There is currently a total of 19 072 urban households in the Bergrivier local municipal area of which 1 992 are registered as indigent households. The agriculture, forestry and fishing sector contributed more than half of all the jobs within the municipality in 2017 (51.8%), followed by the wholesale and retail trade, catering and accommodation sector (12.6%) and the community, social and personal services sector (8.6%). Combined, these three sectors contributed 21 532 (73.1%) of the 29 361 jobs in 2016 (Bergrivier Municipality 2018).

With a population of 142 466 in 2019, Witzenberg Local Municipality is the second lowest populated local municipal area in the Cape Winelands District. This total is expected to growth to 153 987 by 2023, equating to an average annual growth rate of

2.0%. In 2018, the Witzenberg local municipal area had a total of 3 000 indigent households. (Witzenberg Municipality 2019).

Unemployment and poverty are a serious concern in the local municipalities surrounding the Groot Winterhoek Complex and therefore CapeNature strives to contribute to local job creation to help mitigate unemployment and poverty in the region. Provincial treasury funding allows for permanent staff appointments. Additional staff are also appointed through other funding mechanism such as the national Expanded Public Works Programme (EPWP) and the Environmental Protection and Infrastructure Programme. These programmes strive to employ a high number of un-skilled and semi-skilled youth (55%), women (55%) and disabled persons (2%). The above initiative aims to contribute to local economic and social development within the region, particularly communities surrounding the complex. In return, the complex receives work opportunities for various operational tasks such as alien plant clearing, infrastructure maintenance, ecological monitoring and administration services; enhancing both service delivery to the public and ecosystem services. During the employment of local people, un-skilled workers are also up skilled through specific training sessions to make them more competitive in the job market.

# 3 POLICY FRAMEWORK

CapeNature is subject to the framework of the Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996), national legislation including the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003), National World Heritage Convention Act, 1999 (Act No. 49 of 1999), and all associated regulations and norms and standards for the management of protected areas in South Africa and all other relevant requirements as set out in the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).

## 3.1 Purpose of Protected Area Management

The declaration of protected areas is part of a strategy to manage and conserve South Africa's biodiversity. Accordingly, the object of the management plan is to ensure the protection, conservation and management of the natural and cultural historic heritage in a manner that is consistent with the objectives of the NEM: PAA, and for the purpose for which protected areas were declared.

## 3.2 Guiding Principles

The following guiding principles underpin the management plan for the Groot Winterhoek Complex:

- Articulate desired results in terms of conservation outcomes, not actions;
- Articulate how management responses will lead to desired results;
- Monitor progress towards achieving desired results;
- Consider monitoring programme design at the onset of planning;
- Consider expected outcomes of management at the outset of planning;
- Invest in management response appropriate to the risk;
- Adapt strategies based on lessons learnt understanding that measuring effectiveness alone may not resolve uncertainty; data and analyses are

necessary to guide management towards doing more of what works and less of what does not work;
- Share results to facilitate learning, acknowledging that although success is not a given, learning can be, through honest appraisal of efforts.

The Groot Winterhoek Complex is also subject to the principles and provisions of relevant international treaties and conventions, national and provincial legislation and policy, and any local contractual or co-management agreements.

### 3.3 Strategic Adaptive Management

Strategic Adaptive Management integrates planning, management and monitoring to provide a framework for:

- testing assumptions;
- learning through monitoring and evaluation;
- adapting strategies or assumptions.

Strategic adaptive management bridges management and decision science by systematically evaluating results and using this information in a community of practice (CMP 2020) enabling management to change course when it becomes evident that it is necessary, rather than waiting until the end of a strategy to determine whether an intervention worked (Conservation Coaches Network 2012).

CapeNature has adopted, and applies, the Conservation Standards for the Practice of Conservation adaptive management framework (CMP 2020) as illustrated in Figure 3.1. The Conservation Standards facilitates strategic adaptive management through a systematic evidence based participatory process with stakeholders (CMP 2020). The systematic approach makes explicit the links between goals, focal conservation targets, threats, strategies and actions, enabling management to define and measure success of their actions in the complex over time.

The Conservation Standards framework is comprised of five stages (Figure 3.1):

- Conceptualising the protected area (*i.e.*, defining the purpose of the protected area, establishing scope and vision; selecting focal conservation targets and assessing threats, and analysing the conservation situation (*i.e.,* assessing contributing factors in terms of opportunities and challenges);
- Planning actions and monitoring (*i.e.*, drafting the plan based on theories of change using results chains);
- Implementing actions and monitoring (*i.e.*, drafting work plans, doing the work and monitoring the work);
- Analysing and using results to adapt (*i.e.*, deciding if what was planned is working);
- Capturing results, sharing and learning (*i.e.*, learning and sharing what is learned).

The framework works on the rationale that effective conservation of carefully selected conservation targets will ensure the conservation of all indigenous biodiversity and cultural historic heritage within the complex that in turn contributes to a functional landscape. At the same time, the rationale follows that healthy focal conservation targets deliver ecosystem services essential for human well-being. An assessment of

the current condition of focal conservation targets serves as a baseline against which to measure condition over the next 10 years and guides the formulation goals and conservation strategies with associated objectives, indicators and work plans.

As such, step one of the adaptive management framework illustrated in Figure 3.1 is foundational to effective management of the area.

Focal conservation targets are classified as follows:

- Natural targets can be species, habitats or ecological systems, which collectively represent and encompass the biodiversity of the complex. They can include the physical, natural features from which ecosystem services flow, benefitting humans in a variety of ways;
- Cultural historic targets are described in terms of the tangible features that collectively represent and encompass the cultural historic heritage of the complex. They can also include the physical, cultural and/or historic features from which human well-being values are derived;
- Human well-being values are the intangible or non-material values derived from tangible values, and which collectively represent the array of human well-being needs dependent on natural and cultural features; they can be defined in terms of the benefits delivered to humans by healthy ecosystems, or by intact cultural or historical features.


**Figure 3.1:** Strategic Adaptive Management Framework adapted from The Conservation Standards for the Practice of Conservation (CMP 2020).

## 3.4 Protected Area Management Effectiveness

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?

The monitoring and evaluation framework applied to the Groot Winterhoek Complex (illustrated in Figure 3.2 below) measures compliance and management effectiveness of the complex in terms of the NEM: PAA and associated Norms and Standards for Protected Area Management. Management effectiveness is assessed over time using the Management Effectiveness Tracking Tool – South Africa (METT-SA) which is based on the six elements of good management:

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

Management effectiveness is measured at the strategic level as a percentage, drawing upon the results of fine scale monitoring linked to management actions, objectives, goals and focal conservation targets articulated in this plan (Figure 3.2). Management effectiveness includes the measurement of administrative processes such as capacity and budgets that, when adequate, are likely to result in positive conservation outcomes.

Mechanisms for monitoring and evaluation are built into each aspect of the Strategic Plan (section 10) through the inclusion of verifiable indicators of progress. The protected area monitoring and evaluation programme, supplementary to the management plan, monitors site level implementation of the plan, status of targets and effectiveness of strategies. Results contribute to the Western Cape State of Biodiversity report, produced at five-year intervals.

Furthermore, management reports annually on implementation of the plan through CapeNature's strategic Performance Management System. The Performance Management System ensures that implementation of the management plan is embedded in individual staff performance agreements.

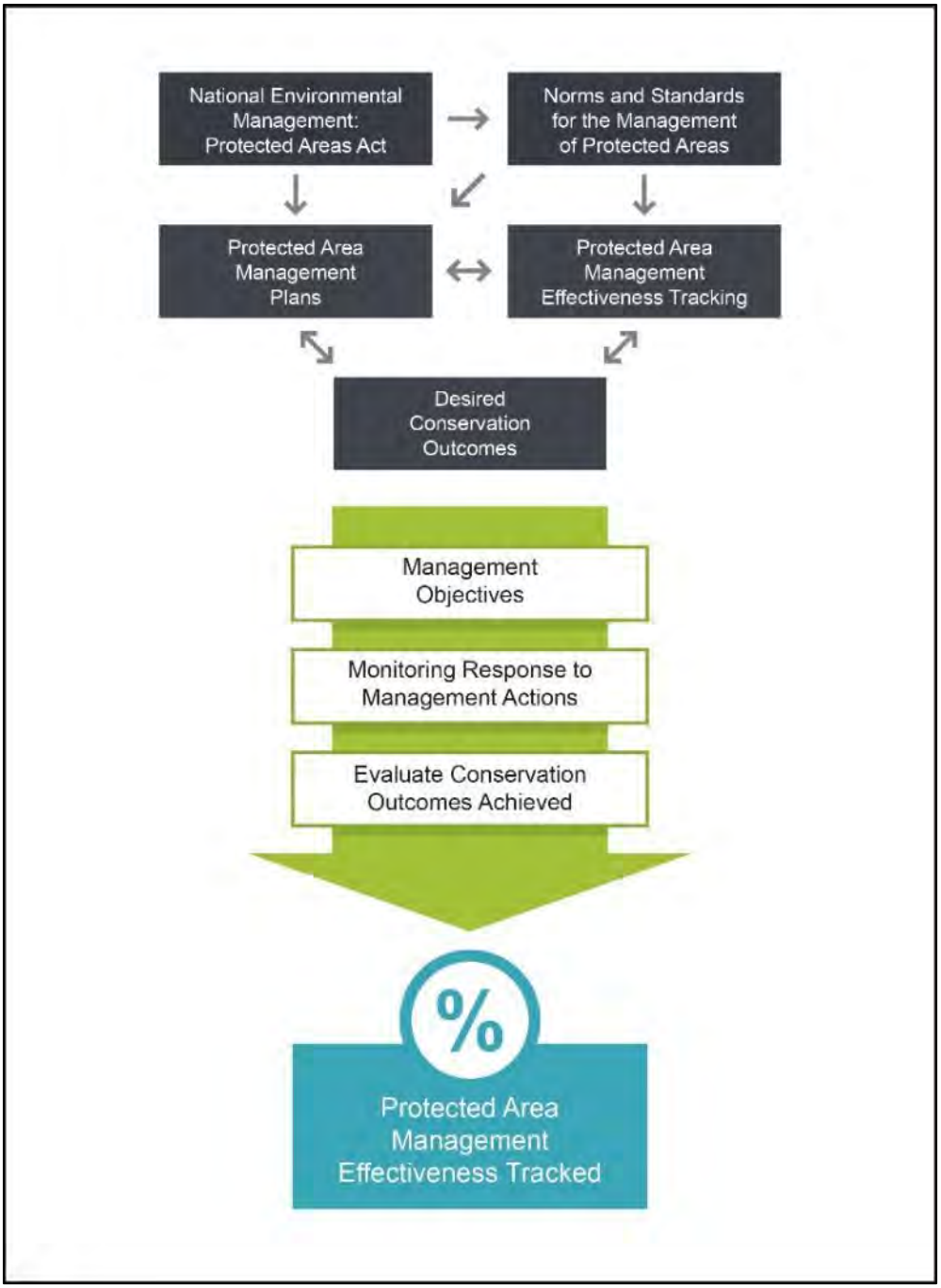


**Figure 3.2:** Protected area monitoring and evaluation framework.

## 3.5 Policy Frameworks

Protected area management is guided by CapeNature policies, procedures and guidelines for use across all its components. Policies, procedures and guidelines applicable to this management plan are referenced here and in section 10.

### 3.5.1 Internal rules

In terms of section 52 of NEM: PAA, as amended, the management authority of a nature reserve may, in accordance with prescribed Norms and Standards, make rules for the proper administration of the area.

In addition to the Regulations for the Proper Administration of Nature Reserves, as gazetted on 12 February 2012 in Government Gazette 35021, and Regulations for the Proper Administration of Special Nature Reserves, National Parks and World Heritage Sites, as gazetted on 28 October 2005 in Government Gazette 28181, the Groot Winterhoek Complex implements the Nature Conservation Ordinance, 1974 (Ordinance No. 19 of 1974) and Provincial Notice 955 of 1975.

### 3.5.2 Financial

CapeNature is a schedule 3C public entity responsible for nature conservation in the Western Cape. CapeNature is the executive arm of the Western Cape Nature Conservation Board, established in terms of the Western Cape Nature Conservation Board Act, 1998 (Act No. 15 of 1998) as amended. The objectives of the Board as per the Act shall be:

- To promote and ensure nature conservation and deal pro-actively with related matters in the Province;
- To render services and provide facilities for research and training that would inform and contribute to nature conservation and related matters in the Province;
- To generate income, within the framework of the applicable policy framework.

Funding for the entity comprises three main revenue streams. The majority of funding, which equates to approximately 80% of funding, is received in terms of a provincial allocation received in terms of Vote 9. Secondary funding, which is approximately the further 20%, is received from external donors and own revenue. Own revenue generation consists mainly of tourism income generated through activities and accommodation available on various nature reserves managed by the entity.

The entity prides itself on its strong internal controls, sound financial management and practicing of good corporate governance. Corporate governance within the entity embodies sound processes and systems and is guided by the Public Finance Management Act, 1999 (Act No. 1 of 1999) and the principles contained in the King 4 Report of Corporate Governance.

### 3.5.3 Safety and security

**Business Continuity Plan:** The CapeNature Business Continuity Plan establishes and provides emergency response procedures and protocols which need to be implemented should an event significantly disrupt the operations of the organisations or an emergency situation is declared by management. The plan identifies critical services, how it will be maintained, how to minimise the impact, increase preparedness and initiate effective responses.

**Integrated Compliance Plan:** The Integrated Compliance Plan for the Groot Winterhoek Complex details how compliance and enforcement will be implemented in the complex in order to:

- Prevent biodiversity loss caused by human activities on the Groot Winterhoek Complex through the implementation of active and passive compliance and enforcement operations;

- Ensure compliance with legislation through the monitoring of activities in the Groot Winterhoek Complex;
- Address and combat illegal activities through the institution of criminal proceedings;
- Reports illegal activities to the delegated authority where activities have a negative impact on the Groot Winterhoek Complex (*e.g.,* listed activities in terms of the National Environmental Management Act.

It is a dynamic reference document that is continually updated and improved, using the data that is gathered in the course of the implementation thereof in order to achieve the management objectives of the Groot Winterhoek Complex.

**Fire Protection Associations:** CapeNature is obliged in terms of the National Veld and Forest Fire Act, 1998 (Act No. 101 of 1998) to be a member of their local fire protection association. Within the Western Cape, five large fire protection associations have been established that cover the whole province. The Groot Winterhoek Complex is a member of the Greater Cederberg- and Winelands Fire Protection Associations. Fire protection associations are the primary partnership tool in veldfire management in South Africa.

**Fire Management Plan:** The fire management plan is essentially a derivative and part of the complex's management plan. The latter details the objectives of the Groot Winterhoek Complex and the fire management plan use this information to detail how fire will be managed to ensure that the ecological objectives of the complex are met. This includes the management of both wild and controlled fires.

**Fire response plan:** The fire response plan forms part of the fire management plan and serves as an operational document for cooperative wildfire management in the Groot Winterhoek Complex. This plan is compiled annually at regional level according to the CapeNature fire policy to ensure that there is complete co-operation at higher level. It includes updated names and telephone numbers of all contact persons, radio frequencies and emergency notifications.

### 3.5.4 Resource use

Resource utilisation is governed by CapeNature's Policy on consumptive use of wild flora from CapeNature-managed protected areas (2019). The policy implementation framework and protocol provide a guideline as to how access to the natural resources should be handled.

According to NEM: PAA, section 50, the management authorities of protected areas, including World Heritage Sites may, subject to the management plan of the protected area or site, allow or enter into a written agreement with or authorise a local community inside or adjacent to the protected area or site, to allow members of the community to use in a sustainable manner biological resources in the protected area or site. Section 50, however also states that an activity allowed in terms of this section may not negatively affect the survival of any species in, or significantly disrupt the integrity of the ecological systems of the protected area or site.

CapeNature undertakes to build the capacity of natural resource users and other relevant stakeholders on the sustainable utilisation of natural resources and its environmental regulatory framework in and outside protected areas.

There are no resource utilization plans in the complex. If such a request is received and granted, resource utilization will be governed by CapeNature's Policy on consumptive use of wild flora from CapeNature-managed protected areas.

### 3.5.5 Biodiversity management

**Integrated Catchment Management Strategy:** Integrated catchment management is regarded as improving and integrating the management of land, water and related natural biological resources in order to achieve the conservation, and sustainable and balanced use of these resources. The CapeNature Integrated Catchment Strategy will focus on three key areas; including catchment, freshwater and coastal management. All of these contribute to socio-economic development and are underpinned by key principles including knowledge, advocacy and awareness and an enabling environment.

The Integrated Catchment Management Strategy is aligned to national and provincial priorities and has five strategic objectives to guide implementation namely:

- To integrate the management of the physical, ecological and man-made components of the environment to ensure sustainability and integrity of the ecosystems and the services that they provide in order to ensure long-term climate change resilience;
- Management of biodiversity assets, ensuring their contribution to the economy, rural development, job creation and social well-being is enhanced;
- To enhance biodiversity implementation through the development of strategic tools and knowledge management systems;
- People are mobilised to adopt practices that sustain the long-term benefits of biodiversity;
- The required enabling environment (including institutional and professional capacity, policy and legal framework, partnerships, strategic and operational alignment and stakeholder support) is established and sustained.

**Invasive Species Monitoring, Control and Eradication plans:** An Invasive Species Monitoring, Control and Eradication plan for the Groot Winterhoek Complex are compiled according to the requirements of the National Environmental Management: Biodiversity Act (NEM: BA), 2004 (Act No. 10 of 2004) Alien and Invasive Species Regulations and Lists (Oct 2014). The plans aim to guide management actions to reduce infestation densities and rates of fauna and flora species through systematic integrated control methods.

**Integrated Compliance Plan:** The Integrated Compliance Plan for the Groot Winterhoek Complex details how compliance and enforcement will be implemented in the complex to achieve the management objectives and to minimise biodiversity loss due to anthropogenic causes.

**Western Cape Protected Area Expansion Strategy:** This strategy aims to expand the Western Cape Protected Area network to encompass a more representative and resilient suite of areas that support biodiversity and ecological infrastructure, especially those threatened species and ecosystems that remain as yet unprotected. The Groot Winterhoek Complex expansion will be achieved in line with the WCPAES.

**Fencing and Enclosure of Game and Predators in the Western Cape Province Policy:** All protected areas with game species are subject to the management guidelines outlined in the policy.

**The Western Cape Game Translocation and Utilization Policy:** All protected areas with game species are subject to the management guidelines outlined in the policy.

**Management of large game:** All large game species in the Groot Winterhoek Complex will be dealt with according to the following principles:

- All game farms bordering the Groot Winterhoek Complex that have extra-limital or historic alien animals, must be enclosed to the standards as stipulated in the CapeNature fencing policy. Protected area personnel must do regular inspections on the reserve side of the fence and escapees must be reported to the owner immediately;
- If the owner is not in possession of a Certificate of Adequate Enclosure, they must be given reasonable time to remove the animals as soon as possible. Game animals escaping from properties without a valid Certificate of Adequate Enclosure are *res nullius* and must be dealt with accordingly. Conservation Managers must stipulate and regulate the actions to remove the animals (*i.e.,* flying with a helicopter to recapture or to chase back);
- In cases where *res nullius* game animals enter the Groot Winterhoek Complex, the Conservation Manager must report it immediately and a decision must be taken to either have the animals removed, culled or that they may remain on the protected area;
- All protected areas with game animals who wish to remove surplus animals, must follow protocol which includes approval at regional level (*i.e.,* ecological meetings) and approval at corporate level;
- Where alien invasive game (*e.g.,* fallow deer) are observed in protected areas, Conservation Managers must take immediate action by removing these animals in a humane manner.

**Damage-causing wild animals:** CapeNature aims to ensure coexistence of humans and indigenous wild animals and considers human-wildlife conflict as situations where artificially induced interactions between humans and wildlife lead to situations requiring mitigation of loss, disturbance or damage. CapeNature requires that human-wildlife conflict be managed, taking into consideration all legal, ethical and welfare implications and that interventions are carried out within an ecologically sound framework (CapeNature position statement on human–wildlife conflict 2015).

CapeNature advocates the five-step approach to holistic wildlife management of damage causing wildlife namely (1) understanding the origin of the problem; (2) maintaining the correct attitude and respect towards the animal; (3) the responsible species must be identified correctly; (4) implement suitable mitigation measures; and (5) implement effective selective control as per the information contained in the "The Landowner's guide: human-wildlife conflict – sensible solutions to living with wildlife". This handbook supplies basic and cost-effective mitigation methods to landowners who report damage caused by wildlife. By implementing the suggested interventions and understanding the ecological role of each species, this will enable the

Conservation Manager to deal with wildlife conflict situations both on and off protected areas.

Furthermore, the national predation management manual prepared by the predation Management Forum is also available to give management guidance on dealing with predation problems on and off protected areas. CapeNature advocates the following broad best practice guidelines:

- All reports of predators found on protected areas and causing stock losses on neighbouring properties must be reported to and investigated by relevant CapeNature staff who will assist the landowner with mitigation management. All actions against predators must be actioned on the property where the losses occurred and not within the protected area. No hunting or pursuing of predators on any protected area is legally allowed;
- All other wildlife found on protected areas and causing losses or damage on neighbouring properties must be reported to and investigated by relevant CapeNature staff who will assist the landowner with mitigation management;
- Domestic animals (*e.g.,* donkeys, goats, cattle, sheep and pigs) that roam onto protected areas from neighbouring properties must be addressed by relevant staff in conjunction with the local municipal authority through the draft National Animal Pounds Bill and/or any local authority bylaws;
- All feral animals (domestic animals that have become wild and without an owner) found within a protected area must be removed in a humane manner immediately;
- No confiscated, nuisance, damage-causing wildlife or rehabilitated wild animals may be released onto a protected area unconditionally.

### 3.5.6 Cultural resource management

CapeNature acknowledges that access to protected areas for traditional, spiritual, cultural and historical purposes has major benefits for people and accepts that protected areas have intrinsic and extrinsic use value for the people of the region. CapeNature therefore recognises the need to manage, conserve and promote natural assets for the benefit of all. CapeNature contributes towards the promotion of culture and heritage through the development and conservation of heritage resources as well as the facilitation of access.

### 3.5.7 Neighbour relations

The National Veld and Forest Fire Act, 1998 (Act No. 101 of 1998) places a duty on landowners to prepare and maintain firebreaks. Chapter 4, section 12 (7) of the Act states that owners of adjoining land may agree to position a common firebreak away from a boundary. Firebreaks that have been repositioned off CapeNature boundaries must be documented in an official firebreak agreement between CapeNature and the relevant landowner. Firebreak agreements bind all parties over a five-year period (unless otherwise stated) and are renewable upon joint agreement from both parties.

Within the structure of CapeNature, firebreak registers are used as a management tool to assist with the prioritisation and maintenance schedule for each firebreak. The firebreak register is updated annually and indicates whether a firebreak has been realigned to aid with maintenance or fire suppression operations.

Where firebreaks are constructed by the reserve away from the reserve boundary it is required to have mutual agreement in place with the adjacent landowner, the signing of many of these agreements is still in process, or to be renewed.

The boundaries of the Groot Winterhoek Complex are mostly unfenced and due to the rugged and mountainous landscape, the firebreaks are constructed away from the complex boundary. There are currently 42 formal firebreaks measuring approximately 124 km in length. These firebreaks are mostly roads and jeep tracks creating a network of firebreaks between the complex and the adjacent properties.

CapeNature and landowners have agreed to the placement of firebreaks along farm roads through the relevant fire protection association and undertake to maintain these firebreaks as per the annual planning schedule. Both landowners become active members and assists with the suppression of wildfires to prevent spread from/to relevant parties' property.

Where firebreaks are constructed away from the complex boundary, an informal mutual agreement will be put in place with the adjacent landowner. Firebreak agreements are governed through the Fire Management Unit plans of the fire protection associations. The Winelands Fire Protection Association is responsible for the Tulbagh-Wolseley Fire Management Unit plan and the Greater Cederberg Fire Protection Association for the Groot Winterhoek Fire Management Unit plan.

### 3.5.8 Research and development

The National Biodiversity Research Development and Evidence Strategy (2015-2025) highlights the increasing demand for knowledge and evidence to support policy and decision making for the protection of biodiversity and the realisation of benefits from our natural resources. In response to this CapeNature developed a biodiversity research and monitoring strategy. The overall goal of this strategy is to provide reliable data and knowledge to inform and facilitate the conservation of the biodiversity and sustained ecosystem functioning in the Western Cape Province.

Structured monitoring programmes need to be put in place and carried out consistently over time to monitor the state of biodiversity and ecosystem functioning. This allows tracking of ecosystem health and allows critical evaluation of management practices by employing an adaptive management cycle. Therefore, there is a focus on applied scientific research that is driven by management requirements. The strategy emphasises research and monitoring that measures biodiversity outcomes so that management can be clearly linked to the biodiversity and ecosystem function targets.

The guiding principles of the strategy are good science (robust and defensible), alignment with management requirements, taking an integrated management and ecosystems approach, employing a full monitoring lifecycle approach to planning and implementing monitoring programmes and considered (evidence-based) prioritisation of research and monitoring actions.

The CapeNature Biodiversity Research and Monitoring Strategy (CapeNature 2016b) facilitates research that guides management actions in the Groot Winterhoek Complex pertaining to the following:

- Priority species (alien invasive, threatened, endemic, keystone and indicator species);
- Damage-causing animals;
- Human-wildlife conflict including social impact;
- Integrated catchment management (fire ecological management, freshwater, alien invasive species);
- Effects of resource use;
- Land-use change in the zone of influence;
- Rehabilitation and restoration, genetic processes supporting conservation;
- Ecosystem services and functioning;
- Climate change (and weather);
- Conservation management effectiveness,
- Cultural, historical and heritage sites;
- Social effects of conservation initiatives (indicators of change, awareness, value of nature as place of learning, healing and self-discovery);
- The socio-economic effects of implementing EPWP like work opportunities and resource economics.

### 3.5.9 Access

CapeNature strives to establish a differentiated and leading brand of products in outdoor nature-based tourism across the Western Cape for all to enjoy. This is achieved by providing opportunities to the public and interacting in an environmentally responsible and sustainable manner specifically to:

- Optimise income generation for biodiversity conservation;
- Optimise shared growth and economic benefits, to contribute to national and provincial tourism strategies and transform the tourism operations within CapeNature;
- Strengthen existing and developing new products with special attention to the provision of broader access for all people of the Western Cape.

Furthermore, CapeNature strives to increase and improve stakeholder awareness, understanding and participation in environmental conservation through:

- Developing the capacity of local people to meaningfully and responsibly participate in the management and enjoyment of protected areas;
- Educating relevant stakeholders and creating awareness around key environmental issues to increase knowledge about the environment, develop a deeper understanding of environmental principals and encourage environmentally conscious values that allow for more informed and environmentally responsible decision making.

As part of its multi-sectoral approach, CapeNature aims to support the Western Cape Education Department’s efforts through presenting curriculum aligned Environmental Education Programmes to schools and will endeavour to collaborate with like-minded partners in pursuit of environmentally sustainable development goals as platforms for involving citizens and groups with the aim of expressing a "call to action". Behaviour

change efforts will be optimised through targeting specific audiences with innovative, transformative, quality assured programmes and interventions.

### 3.5.10 Administrative framework

In terms of CapeNature's administrative operating footprint, the province is divided into two regions, namely region east and region west. Each region is further sub-divided into two landscapes; of which each landscape is divided into three units.

The Groot Winterhoek Complex is one of seven protected area complexes that occurs within the organisation's region west. It falls into landscape west within the Cederberg unit. The complex is supported primarily through head office as well as the landscape office located in Porterville.

The Groot Winterhoek Complex staff component is primarily based in the Groot Winterhoek Complex office on the reserve, and report through the conservation manager (on -reserve) through to the landscape manager. The staffing structure for the complex is shown in Figure 3.3.

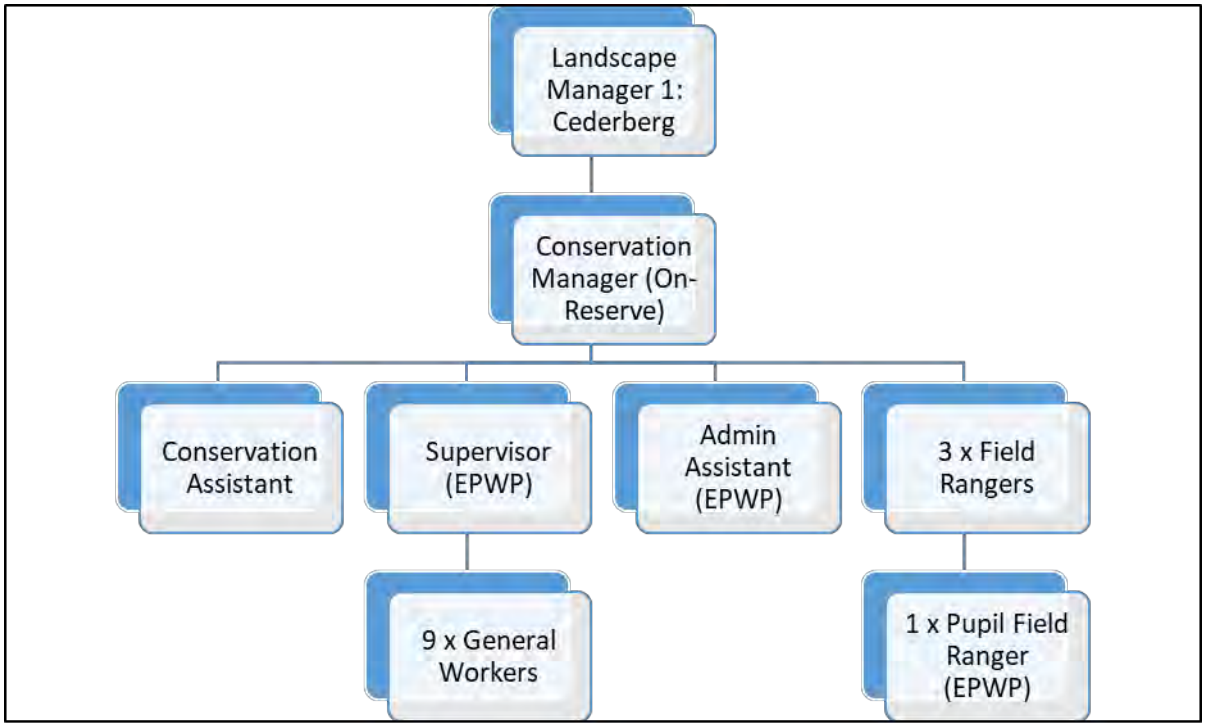


**Figure 3.3:** Approved organogram for the Groot Winterhoek Complex.

## 4 CONSULTATION

This section outlines procedures for public participation during the development of the management plan, including formal processes for public comment on the draft plan, and establishes procedures for public participation during the implementation phase of this plan (Figure 4.1).

Stakeholder engagement takes place throughout the adaptive management cycle and enables public participation essential for sustainability, builds capacity and enhances

responsibility. It promotes communication and the derivation of new information and/or expertise.

At the outset of the planning process for the Groot Winterhoek Complex, a stakeholder analysis identified relevant internal and external stakeholders, and defined the scope and purpose of engagement.

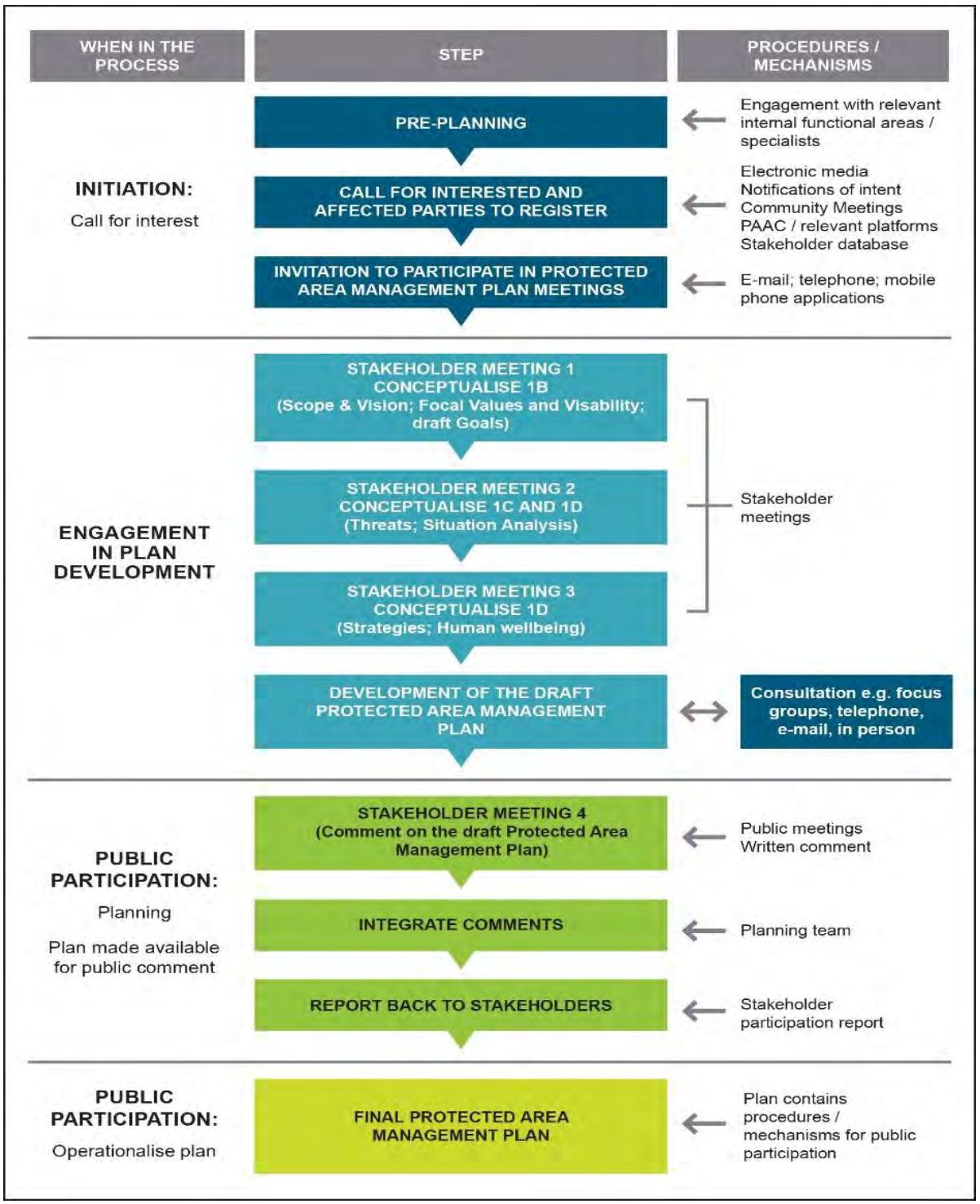


**Figure 4.1:** Process flow for protected area stakeholder engagement.

## 4.1 Stakeholder Engagement

### 4.1.1 Participatory planning

Several approaches to engaging internally and externally with stakeholders were applied, including structured facilitated workshops, meetings, site visits and the provision and circulation of information for input. Different stakeholders were engaged using varied approaches during the stages of the planning process, from gathering and sharing information, to consultation, dialogue, working groups, and partnerships. The degree of engagement was guided by the stakeholder analysis and in response to the need (*i.e.,* transparency of process/expert opinion/buy-in and support, *etc.*).

During 2020 a series of expert-facilitated stakeholder workshops, coordinated and hosted by CapeNature, were held. A range of stakeholders representing individuals or agencies with an interest in, and/or knowledge/expertise of the landscape, and individuals or agencies with the capability to support the implementation of the Groot Winterhoek Complex management plan were involved. Stakeholders included landowners and land managers (private and communal), and relevant land or resource management authorities. Workshops were aimed at developing a strategic framework for the complex to help coordinate efforts in the landscape towards a common vision. The desired outcomes were to capacitate stakeholders in the understanding of the natural and cultural conservation targets in the complex landscape and to identify mechanisms to maintain these targets over time.

The outcomes of the above-mentioned process were precursors to the site-specific management planning process for the Groot Winterhoek Complex and formed the foundation for smaller working groups towards the development of the management plan. The complex management planning process was further facilitated by the core planning team comprised of the Groot Winterhoek on-reserve conservation manager, landscape conservation intelligence manager, landscape ecologist, ecological coordinator, off-reserve conservation manager/officer, stakeholder engagement manager/officer and landscape managers.

#### 4.1.1.1 Key stakeholder groups engaged

- Communities (Porterville, Saron, Halfmanshof).
- Various private landowners and neighbours.
- Government agencies and non-governmental organisations:
    - CapeNature
    - Cape Leopard Trust;
    - WWF-SA
    - Greater Cederberg Fire Protection Association;
    - Winelands Fire Protection Association;
    - Department of Agriculture: Western Cape LandCare;
    - Educo Africa;
    - Jan Danckaert Museum;
    - Heritage Western Cape;
    - Western Cape Education Department;
    - BADISA Porterville;
    - Porterville Rastafarians;
    - Groot Winterhoek Conservancy;

    - Beaverlac Nature Reserve;
    - Waterval Private Nature Reserve;
    - Berghoff;
    - University of Cape Town;
    - South African Council for Geoscience;
    - Agricultural Research Council;
    - Fynbos Fish Trust;
    - Working for Wetlands.
- Local authorities
    - Bergrivier Local Municipality;
    - Drakenstein Local Municipality;
    - West Coast District Municipality;
    - Cape Winelands District Municipality.

Due to COVID-19 lockdown restrictions during the Groot Winterhoek Complex management plan, planning period, stakeholder engagements were primarily digital in nature.

#### 4.1.1.2 Workshops

Stakeholder engagements had the following key themes:

- Planning purpose: introducing stakeholders to planning for adaptive management; planning scope and vision.
- Conceptualisation: capacitating stakeholders in adaptive management planning; selecting focal conservation targets and human well-being values and assessing the condition of these, threats assessment and conservation situation analysis.
- Planning actions: identifying strategies; developing theories of change and developing objectives and indicators.
- Internal stakeholder engagement: scientific review and component review.

#### 4.1.1.3 Working groups and other input opportunities

In instances where specific input was required or stakeholders and/or experts were unable to participate in workshops, smaller teams engaged and/or public meetings were facilitated to:

- Share workshop outputs and progress, and test the rationale of situation analyses, for example meetings with internal stakeholders related to taxon and habitat specific planning;
- Address relevant knowledge gaps and test rationale to address knowledge gaps, *e.g.,* in heritage knowledge and cultural heritage sites;
- Facilitate information sessions and registration of interest with community members.

### 4.1.2 Procedures for public comment

Cedarberg Conservation Services CC, trading as Footprint Environmental Services was appointed in February 2021 to facilitate the Groot Winterhoek public participation process. A process inviting the public and interested and affected parties, to register their interest and comment on the draft management plan was initiated via the media

(notifications were placed in the Witzenberg Harald and Weslander local newspapers), electronic media *e.g.,* CapeNature's website, e-mail and telephone. A total of 85 potential stakeholders were notified by email.

Furthermore, the draft management plan was placed at the public libraries in Porterville, Citrusdal, Op Die Berg and Tulbagh. The document was also available for viewing at the CapeNature Regional office, the Groot Winterhoek Complex office and the CapeNature website. Written comment was invited on the draft management plan for a period of 27 days. The public participation process was initiated on 25 February 2021 and was concluded on 23 March 2021.

Registered interested and affected parties were invited to a public meeting and afforded the opportunity to provide information and express their opinion. Two meetings were held on 11 March 2021 (Porterville KaapAgri) and on the same day via an online webinar. A total of 14 stakeholders registered as interested and affected parties and six external stakeholders participated in either of the two meetings. Based on a comprehensive public participation process report, summarising the outcomes of the public meetings, including written comments and responses received, the Groot Winterhoek Complex management plan was amended where relevant, and feedback provided to registered interested and affected parties. A stakeholder register, maintained by CapeNature lists registered interested and affected parties, comments received, and responses provided by CapeNature. Refer to Appendix 2 (Public Participation Report for the Groot Winterhoek Complex) for detailed information.

### 4.1.3 Procedures for participatory implementation

#### 4.1.3.1 Protected area advisory committee

Participatory management is facilitated through structures such as Protected Area Advisory Committees (PAAC) with the aim of regular interaction with stakeholders and a mechanism to evaluate stakeholder feedback, to promote good neighbour relations and to influence beyond protected area boundaries. The Groot Winterhoek Complex Protected Area Advisory Committee consists of the following organizations:

- West Coast District Municipality;
- Bergrivier Local Municipality;
- Porterville Tourism;
- Jan Danckaert Museum;
- SAPS Porterville;
- Goedgedacht Trust;
- 24 Riviere Bewarings Genootskap;
- Porterville Rastafarians;
- Groot Winterhoek Conservancy;
- Porterville Gemeenskapsadvieskantoor;
- University of Cape Town;
- Cape Leopard Trust.

#### 4.1.3.2 Other mechanisms for stakeholder engagement

Enhancing engagement and participation by relevant stakeholders throughout the complex is a key focus area going forward. Current structures for stakeholder engagement, additional to the PAAC, include:

- The Western Cape Stewardship Reference Group serve as a platform for conservation implementation by partners;
- The Greater Cederberg Fire Protection Association;
- Winelands Fire Protection Association.

# 5 PURPOSE AND VISION

This section makes provision for CapeNature to manage the Groot Winterhoek Complex exclusively for the purpose for which it was declared. It presents the vision, purpose, focal conservation targets, human well-being values and key threats foundational to developing the desired state for the complex.

The desired state, articulated as goals in this management plan, defines the outcome of management and directs management within and beyond protected area boundaries. This serves as a foundation for appropriate ongoing monitoring and evaluation to assess management effectiveness.

## 5.1 Management Intent and Desired State

The Groot Winterhoek Complex, identified as a component of one of three mega-reserves for the Cape Floral Region (Cowling *et al.* 1999), and large enough to ensure the continuation of evolutionary processes.

The Groot Winterhoek Complex forms the central area, joining the Cederberg Complex in the north with the Boland Mountain Complex in the south. It therefore performs a vital function in the continuous protection of the north/south axis of the Cape Fold Belt. Covering some 26 000 ha, the area is supported by the presence of several contiguous reserves (comprising more than 410 000 ha of land) which surround both the Groot Winterhoek and Cederberg Wilderness Areas. This configuration of reserves forms a significant safeguard to both protected areas. Together the two wilderness areas represent the Northwest Phytogeographic Centre of Endemism. The combined size of this protected area ensures considerable security for the essential natural processes, which maintain and drive biodiversity.

The Groot Winterhoek Complex aims to strategically, and adaptively, manage biodiversity towards ensuring the persistence of an intact natural climate change corridor, freshwater ecosystems, and unique cultural and biological diversity of the region through: 1) the prioritised strategic management of threats; 2) improving the condition of terrestrial and freshwater resources through integrated catchment management; 3) ensuring that properties comprising the complex are legally secured and protected area design is augmented by expansion through stewardship or other effective means; and 4) cooperative governance to overcome regulatory division in the management of freshwater resources.

## 5.2 Purpose

A significant area of mountainous terrain was reserved as water catchment, in terms of the Forest Act, 1968 (Act No. 72 of 1968), and between 1961 and 1978, all the privately owned farms within the current Groot Winterhoek Complex were purchased or expropriated (with adequate financial compensation) to ensure the preservation of the 24 Rivers catchment in a satisfactory state. Originally the main objective for the Groot Winterhoek Wilderness was to "deliver a sustainable yield of high-quality water" to the Olifants River to the north and the Berg River to the south.

The Cederberg- and Groot Winterhoek Complex, along with the Boland Mountain Complex, together with their surrounding reserves, form a valuable conservation band along the north-trending axis of the Cape Fold Belt. This imparts a high degree of protection to the levels of biodiversity and endemism that occur in this region of the south-western Cape.

CapeNature manage the Groot Winterhoek Complex in accordance with its organisational vision, and in accordance with the vision, goals and strategies derived in consultation with stakeholders, as set out in this section.

According to section 17 of the NEM: PAA each protected area is declared for one or more of the following purposes:

a) to protect ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes in a system of protected areas;
b) to preserve the ecological integrity of those areas;
c) to conserve biodiversity in those areas;
d) to protect areas representative of all ecosystems, habitats and species naturally occurring in South Africa;
e) to protect South Africa's threatened or rare species;
f) to protect an area which is vulnerable or ecologically sensitive;
g) to assist in ensuring the sustained supply of environmental goods and services;
h) to provide for the sustainable use of natural and biological resources;
i) to create or augment destinations for nature-based tourism;
j) to manage the interrelationship between natural environmental biodiversity, human settlement and economic development;
k) generally, to contribute to human, social, cultural, spiritual and economic development;
l) to rehabilitate and restore degraded ecosystems and promote the recovery of endangered and vulnerable species.

## 5.3 Vision

The vision for the Groot Winterhoek Complex is:

***"A montane World Heritage, with a wilderness character, managed to sustain and promote water security, biodiversity, ecotourism and heritage, to promote ecological resilience through effective catchment management and partnerships".***

## 5.4 Focal Conservation Targets

In consultation with stakeholders, natural and cultural historic focal conservation targets were identified, explicitly defined, and selected for their ability to represent the full suite of biodiversity and cultural historic heritage within the Groot Winterhoek Complex. Focal conservation targets are summarised in Table 5.1. Features considered to be nested within or catered for by the conservation target are noted. Key human well-being values derived from the tangible natural and cultural conservation targets are also noted. Since human well-being values are those components of well-being affected by the status of tangible natural or cultural targets, their "health" or status is not assessed separately but seen as contingent upon the status of the natural and cultural conservation targets selected.

**Table 5.1:** Summary of the Groot Winterhoek Complex focal conservation targets and associated viability as at 2020.

| Conservation Target | Description, Nested Targets, Key Attributes & Associated Human Well-being Values | Current Status |
|---|---|---|
| **Freshwater Ecosystems** | **Description:** Comprising of all-natural seasonal rivers and riparian zones, streams, seeps and groundwater, wetlands and buffers.<br>**Nested targets of note:** Freshwater invertebrates, freshwater fish communities (specifically Berg River redfin (*Pseudobarbus burgi)* (EN), Cape kurper (*Sandelia capensis*), Cape galaxias (*Galaxias zebratus*), wetlands and seeps, rivers, groundwater, characteristic amphibian species specifically northern moss frog (*Arthroleptella subvoce*) (CR) and Fitzsimons' ghost frog (*Heleophryne depressa*).<br>**Key attributes:** Wetland ecosystem health, native vegetation structure and species composition within riparian zone (%), intact wetland buffers, river health (instream macro-invertebrate species composition, freshwater fish species composition, and size of characteristic amphibian communities.<br>**Associated human well-being value(s):** Water Security and Environmental Resilience, Sustainable Natural Resource Use, Environmental Education and Awareness. | **Good** |
| **Terrestrial Ecosystems** | **Description:** Comprising the terrestrial vegetation that consists of six distinct vegetation types, of which one is of conservation concern, and the associated flora and fauna species.<br>**Nested targets of note:** Serotinous Proteaceae, Swartland Alluvium Fynbos (CR), 22 highly restricted plant species, all associated fauna and flora communities specifically Cape Rockjumper (*Chaetops frenatus*), Black Harrier (*Circus maurus*) (EN) and Verreaux's Eagle (*Aquila verreauxii*) (VU).<br>**Key attributes:** Fire regime, indigenous vegetation species composition (%).<br>**Associated human well-being value(s):** Water Security and Environmental Resilience, Sustainable Natural Resource Use, Environmental Education and Awareness. | **Fair** |
| **Pre-colonial Heritage** | **Description:** Comprising tangible heritage features such as rock art.<br>**Nested targets of note:** This includes archaeological and paleontological heritage resources.<br>**Key attributes:** Condition (the conservation state of the rock art). | **Good** |

| Conservation Target | Description, Nested Targets, Key Attributes & Associated Human Well-being Values | Current Status |
|---|---|---|
| | **Associated human well-being value(s):** Sustainable Natural Resource Use, Environmental Education and Awareness. | |
| **Artificial and Historic Structures** | **Description:** Comprising tangible heritage features older than 70 years such as De Tronk buildings and graves.<br>**Nested targets of note:** Graves, buildings.<br>**Key attributes:** Condition (the conservation state of structure).<br>**Associated human well-being value(s):** Sustainable Natural Resource Use, Environmental Education and Awareness. | **Poor** |

As the public entity responsible for biodiversity conservation in the Western Cape Province, CapeNature delivers a suite of core services to the public towards the following outcomes: resilient ecosystems that provide water and other ecosystem services, the promotion of local economic development, job creation and skills development, growing diversified nature-based revenue streams, access to environmental education, advocacy and education, and access to natural and cultural heritage. Human well-being is articulated as an outcome of conservation and is illustrated in Table 5.2. These focus areas are essential to the effective execution of this management plan and achievement of goals.

**Table 5.2:** Human well-being values of the Groot Winterhoek Complex.

| Human Well-being Values | Description and Associated Benefits | Current Status |
|---|---|---|
| **Water Security and Environmental Resilience** | **Description:** Healthy ecosystems protect and enhance the provision of good quality freshwater in significant quantities to a large part of the Western Cape Province.<br>**Key attributes:** Access to clean water in sufficient quantity. | **Good** |
| **Sustainable Natural Resource Use** | **Description:** Utilisation (consumptive and non-consumptive) of natural resources in a sustainable and non-damaging way. Includes access for tourism, hiking, filming, research, and spiritual and cultural use.<br>**Key attributes:** Permitted utilisation of resources and access to the Groot Winterhoek Complex. | **Good** |
| **Environmental Education and Awareness** | **Description:** Provide an effective environmental education, awareness and interpretation programme that supports the values of the Groot Winterhoek Complex and promotes respect and care for the natural environment.<br>**Key attributes:** Intact ecosystems, advocacy, education and awareness opportunities and activities. | **Fair** |

## 5.5 Threats

CapeNature aims to mitigate threats to focal conservation targets, either through direct threat mitigation, or through mitigation or management of a factor contributing to or driving the threat. Threats to focal conservation targets and the relevant contributing factors of key threats need to be described in sufficient detail to support effective planning and management.

Threat's assessment influences the direction and effectiveness of management options. Rating threats according to scope, severity and irreversibility of impact facilitates the allocation of limited resources, simplifies complex scenarios and provides a systematic decision support method to focus efforts (Table 5.3).

**Table 5.3:** Summary of critical threats highlighting the focal conservation targets of the Groot Winterhoek Complex at greatest risk.

| Focal Conservation Targets | Critical Threats | Threat Rating |
|---|---|---|
| **Freshwater Ecosystems** | Invasive alien fish, invasive alien plants, inappropriate fire regime, climate change, inappropriate jeep tracks and hiking trails, agricultural water impacts, illegal resource use. | **High** |
| **Terrestrial Ecosystems** | Inappropriate fire regime, invasive alien plants, inappropriate jeep tracks and hiking trails, climate change, illegal resource use, illegal access. | **High** |
| **Pre-colonial Heritage** | Vandalism, fire damage to heritage features. | **Medium** |
| **Artificial and Historic Structures** | Lack of maintenance of heritage structures. | **High** |

The results of the above threat rating highlighted the following key threats affecting the focal conservation targets of the Groot Winterhoek Complex as outlined in Table 5.4 below:

**Inappropriate fire regime (Medium):** Too frequent, too large and fires burning outside of the appropriate fire season have severe ecological impacts (Holmes *et al.* 2016) and severely degrades ecological infrastructure delivery. Research indicates that globally and within the CFR, many areas have experienced increases in fire frequency and size (Kraaij & van Wilgen 2014). Generally, most fires are human induced either through accidental ignition or are intentionally set.

Over the past 10 years the size of fires in the Groot Winterhoek Complex has increased significantly (section 2.3.1.3), resulting in very large proportions of the complex consisting of young veld. In addition, fires have become more frequent with large areas burning at too short fire-return intervals and this is impacting negatively on the complex's ecosystems. Some aquatic systems, such as wetlands, are also affected by an unhealthy fire regime. These habitats are sensitive to inappropriate fire regimes with both too short and too long fire-return intervals being problematic. Inappropriate fire regimes also negatively impact indicator species, biodiversity, and potentially also on water supply. There is also a general lack of knowledge about the direct and indirect impacts of uncontrollable fires and enforcement is limited.

**Invasive alien plants (Low):** Freshwater and terrestrial ecosystems are threatened by invasive alien flora. *Pinus, Hakea,* oleander (*Nerium oleander*) and Australian *Acacia* species are amongst the most problematic woody invasive species in the complex and the surrounding areas, although several other species, such as grey poplar (*Populus canescens*) and karri (*Eucalyptus diversicolor*) are also problematic in the low-lying drainage areas (section 2.3.1.3). Although most of the complex is fortunately under low alien plant infestation levels, it requires sustained active management intervention to prevent it from impacting on species diversity and

ecological infrastructure delivery – most notably water production (Samways *et al*. (2010). An integrated approach to clearing invasive alien plants is applied for both aquatic and terrestrial ecosystems and the use of biological control is also incorporated where feasible.

**Invasive alien fish (Low):** Invasive alien species affect indigenous fishes through predation, habitat alteration, competition for resources, the introduction of diseases and the disruption of ecological processes (Skelton 1987; De Moor and Bruton 1988; Impson and Henning 2019). The primary impact is predation on smaller species and on juveniles of larger species and this has resulted in the extirpation of most indigenous species from mainstream rivers and tributaries (Weyl *et al.* 2014).

The Groot Winterhoek Complex has records for alien invasive fishes that pose a significant threat to indigenous fish of the Cape Fold Ecoregion. Based on current distribution knowledge, smallmouth bass (*Micropterus dolomieu)* and rainbow trout (*Oncorhynchus mykiss)* have established distributions in the upper 24 Rivers but fortunately do not extend into either the Groot and Klein Kliphuis Rivers due to a large natural barrier (waterfall) located at Die Hel. The lower section of the Leeu River has the same alien fish species distribution, but an artificial barrier (abstraction weir) prevents movement further upstream into the complex.

While rainbow trout are a cold-water species that are highly suited to invading headwater tributaries, smallmouth bass are not limited by temperature and have far greater invasive potential and as a result, their impacts on indigenous fish of the Cape Fold Ecoregion is severe. Van der Walt *et al.* (2016) studied the impacts of black bass (*Micropterus spp*.) invasion on a basin wide scale for the Olifants-Doring system. These authors reported that black bass had invaded >80% of stream habitat in the basin and that small-bodied cyprinid minnows were consistently extirpated from black bass-occupied reaches. While larger cyprinid species co-occurred with black bass, this was only observed for larger individuals, indicating size specific predation on these species.

**Inappropriate jeep tracks and trails (Low for Terrestrial Ecosystems, Medium for Freshwater Ecosystems):** Sections of both the terrestrial and freshwater ecosystems are currently in some state of degradation mainly due to the high erosion potential of the sandy soil substrate in the complex and the often erroneous and/or historical placement of access roads and hiking trails. The historical land use practices (old farmland) have contributed to the current patterns of soil erosion within the complex and the lack of jeep track and trail maintenance over several years has exacerbated the situation. CapeNature has partnered with the national Working for Wetlands programme to help implement erosion measures throughout the complex (SANBI 2015). Rehabilitation efforts are ongoing (Figure 5.1), and section 10 has highlighted various actions to assist the complex to deal with this threat.

**Figure 5.1:** Perdevlei silt traps constructed as part of ongoing erosion rehabilitation efforts. Photo: Groot Winterhoek Field Rangers.

**Climate change (Very High):** Climate change will have significant environmental, social, cultural and economic consequences. Although the effects of climate change are speculative, in general, it is likely to have major negative impacts on the Fynbos and Succulent Karoo Biomes (Pool-Stanvliet *et al.* 2017), and their freshwater ecosystems (Shelton *et al.* 2017). It is expected that rainfall patterns throughout the winter-rainfall regions will be disrupted (Helme 2016; Holmes *et al.* 2016). This could have dire negative consequences for some specialised endemic species found within the Groot Winterhoek Complex, especially high-altitude specialists. This will most likely result in reduced geographic ranges and possible extinction of species (Pool-Stanvliet *et al.* 2017).

The focal conservation targets of the complex link to the landscape being a priority climate change adaptation and mitigation corridor within the Western Cape. It is expected that climate change will contribute to or exacerbate directs threats to the complex's targets on a broad scale. In this context, the complex aims to build habitat resilience through increased reserve connectivity and reducing/mitigating contributing threat factors such as invasive alien plant species and inappropriate fire management.

**Agricultural water impacts (Low):** Agricultural water drainage from neighbouring farms situated along the northern boundary of the Groot Winterhoek Complex may have an impact on the functioning of the wetlands within the complex. Such water may contain chemicals such as pesticides, herbicides and fertilizer. The scope and severity of this threat needs some investigation to determine the extent and risk it poses to the complex. Currently the extent of impact (if it exists) is expected to be localised, low or completely absent. Section 10 has highlighted some monitoring actions needed to assist in this regard. Groundwater extraction within and around the complex is a potential emerging threat that CapeNature is fully aware off and will monitor over time.

**Illegal resource use (Low):** This refers to illegal harvesting of fauna and flora (poaching) of geophytes, orchids, reptiles and beetles, both intentionally and un-intentionally. Many rare and endemic plant and animal species, particularly reptiles, are intentionally sought after by local and international collectors for the horticultural and wildlife trade (Helme 2016). Helme (2016) also lists the unsustainable picking of buchu in particularly the Groot Winterhoek and Olifants River mountains as a concern. Illegal harvesting of buchu along the Voorberg, Agterdam and Rooiwalle areas is a concern. Illegal harvesting of medicinal plants and the poaching of wildlife with the aid of dogs are also taking place within the complex. Harvesting and utilisation of natural resources without authorisation and in an unsustainable manner compromises biodiversity and ecological infrastructure delivery.

**Illegal access (Low):** Illegal access to the Groot Winterhoek Complex takes place on a small scale by locals, primarily for the collection of medicinal plants and various Restionaceae species. Some locals also hike to Die Tronk and Die Hel crossing the Voorberg Mountain and some hikers illegally access Sneeugat and Groot Winterhoek Peak via Tulbagh. Poachers may also access illegally specifically to target species for collection.

**Vandalism (High):** The National Heritage Resources Act, 1999 (Act No. 25 of 1999) clearly state that archaeological sites may not be destroyed, damaged, altered, defaced or in any form be disturbed. Heritage resources in particular rock art and palaeontological resources (fossils) are a non-renewable resource/value and once vandalised or altered it is either destroyed or loses its value. Some of the rock art in the complex are being defaced and vandalised by hikers. Section 10 highlights actions needed to address this threat.

**Fire damage to heritage features (Very High):** Some rock art had been damaged or destroyed because of veld fires, while illegal fires made by hikers at some overnight sites result in fire and smoke damage to sensitive rock art. Fire can cause serious damage to rock art, not only to the paint but also to the rock surface bearing the art. The inclusion of archaeological sites in fire management plans as eco-sensitive areas, and the mitigation of fire effects on rock art either through active fire management and prevention or through awareness at sensitive rock art sites is critical. Section 10 highlights actions needed to address this threat.

**Lack of maintenance of heritage structures (High):** Physical heritage features are often non-replaceable and once destroyed or altered their heritage significance diminishes. The heritage structures and graves at De Tronk and other parts of the complex are not adequately maintained. The complex aims to partner with heritage partners to assist it in developing a dedicated heritage management plan that will allow for a full heritage inventory and assessment of individual heritage features to specify the specific heritage maintenance requirements of these sensitive features (section 10).

**Table 5.4:** Summary rating of key threats for the Groot Winterhoek Complex.

| Threats | Associated Focal Conservation Targets | Summary Threat Rating |
|---|---|---|
| **Climate Change** | Terrestrial ecosystems, Freshwater ecosystems | **Very High** |
| **Fire Damage to Heritage Features** | Pre-colonial heritage | **High** |
| **Inappropriate Fire Regime** | Terrestrial ecosystems, Freshwater ecosystems | **Medium** |
| **Lack of Maintenance of Heritage Structures** | Artificial and historic structures | **Medium** |
| **Vandalism** | Pre-colonial heritage | **Medium** |
| **Invasive Alien Plants** | Terrestrial ecosystems, Freshwater ecosystems | **Low** |
| **Inappropriate Roads and Trails** | Terrestrial ecosystems, Freshwater ecosystems | **Low** |
| **Invasive Alien Fish** | Freshwater ecosystems | **Low** |
| **Agricultural Water Impacts** | Freshwater ecosystems | **Low** |
| **Illegal Resource Use** | Terrestrial ecosystems, Freshwater ecosystems | **Low** |
| **Illegal Access** | Terrestrial ecosystems | **Low** |

## 5.6 Goals

Clear and measurable outcome-based goals, strategies and objectives are fundamental for the assessment of protected area management effectiveness and to the whole process of management itself. Based on the viability and threats assessment, a desired future condition was established for focal conservation targets and human well-being values, including associated core service areas, by setting measurable, time-bound goals directly linked to the targets and values and their key attributes.

### Groot Winterhoek Complex Goals:

To maintain and build healthy and resilient ecological infrastructure, that supports the focal conservation targets and human well-being values of the Groot Winterhoek Complex, management needs to achieve the following:

1. By 2031, the terrestrial ecosystems in the Groot Winterhoek Complex have an ecologically healthy fire regime* and comprises at least 95% indigenous species.
   *<50% of area is young veld (<6 years old), the proportion of area burnt in fires larger than 1000 ha is more than 75% and single fires does not exceed 5000ha, >80% of the area burns during December-April, Fire return interval 13 years.

2. By 2031, the upper and middle river reaches in the Groot Winterhoek Complex support macro invertebrate species communities with an ASPT of 6 - ≥8* and viable indigenous fish communities are present in on-reserve rivers identified for fish conservation**.
   *The scores will vary seasonally. Monitoring should always be done at the same time each year (preferably late spring/early summer); ** Leeu River, 24 Rivers and Kliphuis River System.

3. By 2031, the health of the wetland ecosystems in the Groot Winterhoek Complex will be in at least a near-natural* condition, and riparian zones and wetland buffers will have an indigenous vegetation cover of at least 95%.
   * A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place.

4. By 2031, the state of all pre-colonial heritage sites has been determined and all unnatural disturbances to heritage features within the Groot Winterhoek Complex are managed to maintain or improve (where possible) the current conditions.

5. By 2031, all human disturbance to heritage structures within the Groot Winterhoek Complex is limited, maintained in the current state, or, if feasible, the condition is improved.

Achieving human well-being, derived from healthy responsibly managed ecological infrastructure and heritage, requires that:

6. By 2031 the Groot Winterhoek Complex will, through integrated catchment management, protect and enhance the provision of water quality and quantity contributing to the water resilience for the Berg and Olifants catchment areas.

7. By 2031, access to, and sustainable utilisation of, natural resources within the Groot Winterhoek Complex are in accordance with CapeNature policy and procedures.

8. By 2031, the Groot Winterhoek Complex environmental education and awareness programme will promote ecological targets and human well-being values.

## 5.7 Sensitivity Analysis

Sensitivity analysis based on the complex's biodiversity, heritage and physical environment is a key informant for spatial planning and decision-making in protected areas. Sensitivity analysis aims to:

- Highlight areas containing sensitive biodiversity and heritage features;
- Inform all infrastructure development *e.g.,* location of management and tourism buildings and precincts, roads, trails, firebreaks;
- Facilitate holistic reserve planning and zonation;
- Support conservation management decisions and prioritisation of management actions.

At the regional scale, sensitivity mapping also allows for direct comparison of sites both within and between protected areas to support organisational planning across CapeNature's protected areas network. The process elevates:

- Sites with the highest regional conservation value;
- Areas where human access or disturbance will have a negative impact on biodiversity or heritage, and specific environmental protection is required;
- Areas where physical disturbance or infrastructure development will cause greater environmental impacts, and/or increasing construction and maintenance costs;
- Areas where there is a significant environmental risk to infrastructure;

- Areas that are visually sensitive and need to be protected to preserve the aesthetic quality of the visitor's experience.

Sensitivity analysis provides decision support to ensure that the location, nature and required mitigation for access, utilisation and infrastructure development in the complex are guided by the best possible landscape-level biodiversity and heritage informants. The process is transparent, relying on defensible expert-derived information and scientific data. Sensitivity maps do not replace site-level investigation, although do allow for rapid assessment of known environmental risks, guiding planning to minimise negative impacts.

Sensitivity analysis uses a hierarchical approach. The method uses the premise that if a portion of the landscape is demarcated as highly sensitive in one of the categories considered in analysis then, regardless of the sensitivity in other categories, that portion is elevated as highly sensitive in the overall scoring. The approach thus allocates the highest allocated sensitivity in any of the input categories as the ultimate sensitivity class for that particular portion. As new and improved data become available, these data can be included.

Biodiversity, heritage and physical features are rated on a standard scale of one to five, where one represents 'no' or 'minimal sensitivity' and five indicates 'maximum sensitivity' (Figure 5.2). Additional features such as visual sensitivity, fire risk and transport costs can be included. Higher scores represent areas that should be avoided for conventional access and infrastructure development, or where a specific strategy is applicable relative to sensitivity. A score of five typically represents areas where mitigation for conventional access or infrastructure development would be extensive, costly or impractical enough to be avoided at all costs or features so sensitive that they represent a 'no go' area.

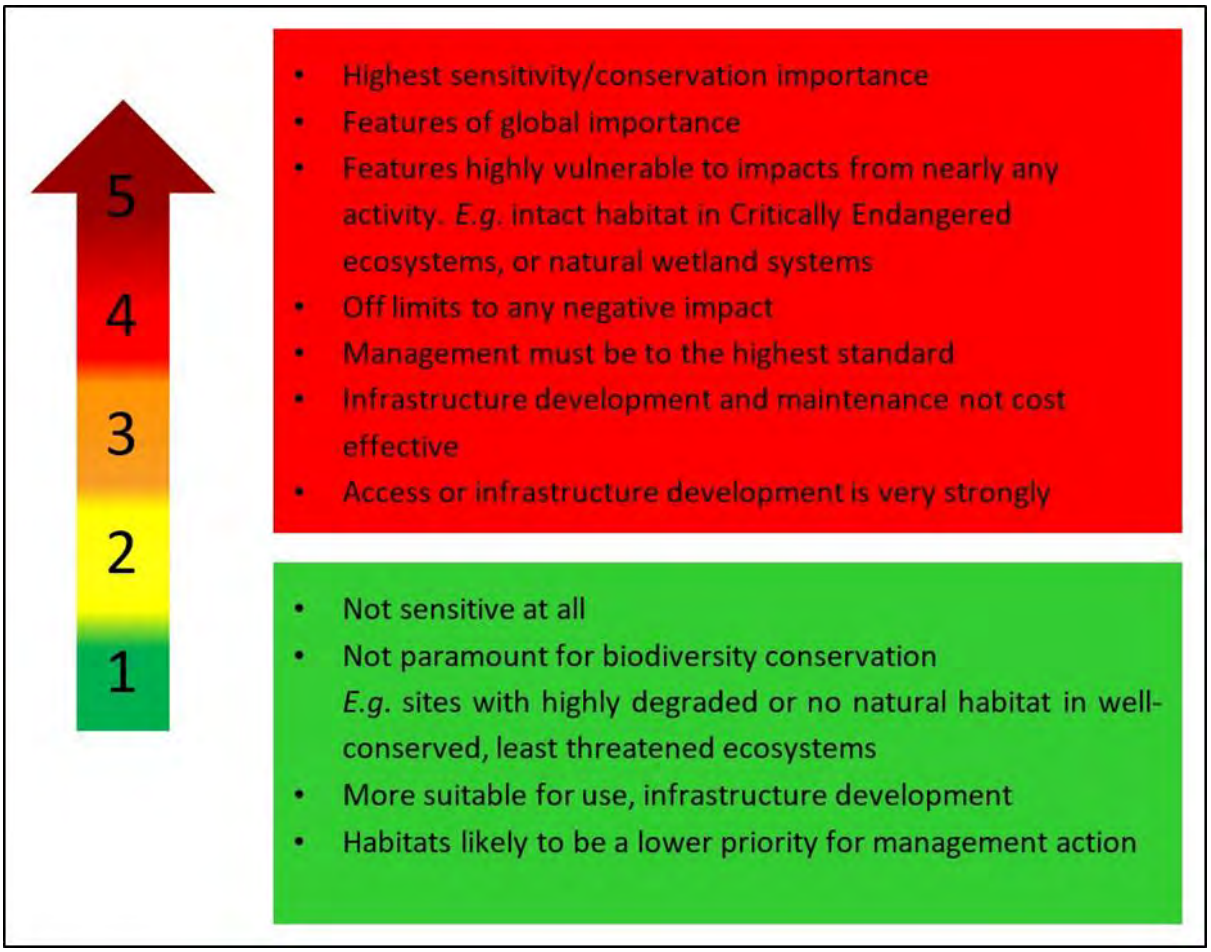


**Figure 5.2:** CapeNature method for sensitivity scoring and synthesis.

Physical, biodiversity and heritage features included in the sensitivity analysis for the Groot Winterhoek Complex is illustrated in Table 5.5.

**Table 5.5:** Physical, biodiversity and heritage factors included in the sensitivity analysis of the Groot Winterhoek Complex.

| | Category | Dataset | Criteria | Sensitivity Score | |
|---|---|---|---|---|---|
| Physical | Slope (degrees) | Slope calculated from 20m resolution digital elevation model | > 30° Effectively off-limits for infrastructure development due to extreme risk of erosion and instability, or extreme engineering mitigation and associated construction costs required. | Highest sensitivity | 5 |
| | | | 20°-30° Strongly avoid for infrastructure development – cut and fill or other difficult and expensive construction method required. Appropriate engineering mitigation essential to prevent erosion and slope instability. Highest initial and on-going cost due to slope stabilization and erosion management required. | High sensitivity | 4 |

| | Category | Dataset | Criteria | Sensitivity Score | |
|---|---|---|---|---|---|
| | | | 10°-20° Avoid for road, trail and firebreak construction if possible. Severe erosion will develop on exposed and unprotected substrates. Pave roads and tracks and ensure adequate drainage and erosion management is implemented. | Moderate sensitivity | 3 |
| | | | 5°-10° Low topographic sensitivity, likely still suitable for built infrastructure. Use of gentle slopes may provide improved views or allow access to higher areas. | Low sensitivity | 2 |
| | | | 0°-5° Preferred areas for any built infrastructure, lowest risk of erosion or instability, lowest construction and on-going maintenance costs. | Lowest sensitivity | 1 |
| | Soil erodibility/ Geology | Soil erodibility, based on slopes derived from 20m digital elevation model (Wheeler & Shaw pers. comm.) | 0°-5° Slope derived from 20m digital elevation model - based on expert knowledge of the reserve these areas are highly erodible and should be avoided. | High sensitivity | 4 |
| | | | 5°-10° Slope derived from 20m digital elevation model - based on expert knowledge of the reserve areas at this slope are moderately erodible. | Moderate sensitivity | 3 |
| Biodiversity | Rivers | National Freshwater Priority Areas major rivers; 1: 50 000 National Geo-Spatial Information Rivers | Within 200m of perennial river. Used the major rivers identified through the National Freshwater Priority Areas project and also the small sections from the 1:50,000 not included as National Freshwater Priority Areas. | Highest sensitivity | 5 |
| | | | Within 100m of non-perennial river. | High sensitivity | 4 |
| | Wetlands and Seeps | Wetlands from Western Cape Biodiversity Spatial Plan; Working for Wetlands; Seepage mapping | Wetland and seeps from various data sources and then merged. | Highest sensitivity | 5 |
| | | | Within 200m of wetlands and seeps. | High sensitivity | 4 |
| | Vegetation status/Red-Listing Ecosystems (previously referred to as Ecosystems threat status) | Red-Listing Ecosystems by Andrew Skowno, done for the National Biodiversity Assessment per veg type, SA Veg | Critically Endangered: None. | Highest sensitivity | 5 |
| | | | Endangered: Swartland Alluvium Fynbos, Breede Shale Fynbos. | High sensitivity | 4 |
| | | | Vulnerable: None. | Moderate sensitivity | 3 |
| | | | Threatened: None. | Low sensitivity | 2 |

| | Category | Dataset | Criteria | Sensitivity Score | |
|---|---|---|---|---|---|
| | | Map 2018 (SANBI 2006 & 2018) | Least Concern: Olifants Sandstone Fynbos, Northern Inland Shale Band Vegetation, Western Altimontane Sandstone Fynbos, Winterhoek Sandstone Fynbos. | Lowest sensitivity | 1 |
| | Protection levels per vegetation type | Protection Levels by Andrew Skowno, done for the National Biodiversity Assessment per veg type, SA Veg Map 2018 (SANBI 2006 & 2018) | Not Protected: None. | High sensitivity | 4 |
| | | | Poorly Protected: Swartland Alluvium Fynbos. | Moderate sensitivity | 3 |
| | | | Moderately Protected: Breede Shale Fynbos. | Low sensitivity | 2 |
| | | | Well Protected: Olifants Sandstone Fynbos, Northern Inland Shale Band Vegetation, Western Altimontane Sandstone Fynbos, Winterhoek Sandstone Fynbos. | Lowest sensitivity | 1 |
| | Vegetation status/ Ecosystems threat status | Ecosystem Threat Status based on CapeNature's 2016 assessments per veg type 2012 (Mucina & Rutherford 2006) | Critically Endangered: Swartland Alluvium Fynbos. | Highest sensitivity | 5 |
| | | | Endangered: None. | High sensitivity | 4 |
| | | | Vulnerable: None. | Moderate sensitivity | 3 |
| | | | Threatened: None. | Low sensitivity | 2 |
| | | | Least threatened: Breede Shale Fynbos, Olifants Sandstone Fynbos, Northern Inland Shale Band Vegetation, Western Altimontane Sandstone Fynbos, Winterhoek Sandstone Fynbos. | Lowest sensitivity | 1 |
| | Rare and endangered plant species | Rare and endangered plant species extracted from CapeNature's State of Biodiversity database; All threatened Species (SANBI 2015); Berg Water Management Area (Impson and Henning 2019) | All plant species rated as Critically Endangered, Critically Rare, Declining, Endangered, Near Threatened, Rare or Vulnerable. Point localities buffered by 5m.<br><br>Special habitat – Rivers identified as highly important for threatened indigenous fish species. Rivers buffered by 100m. | Highest sensitivity | 5 |
| **Heritage** | Archaeological and cultural sites | Cultural and Heritage Sites (CapeNature infrastructure and heritage registers) | Heritage sites as extracted from the complex's infrastructure and heritage register. Files are in point shape file format and buffered by 100m. | Highest sensitivity | 5 |

The Groot Winterhoek Complex has a sensitivity score of moderate to highest sensitivity, with approximately 36% classified as having the highest sensitivity and 51% as having high sensitivity (Table 5.6). The key drivers of sensitivity in the complex are slope, the erodibility of soils, rivers and wetlands. Approximately 52% was classified as having high to highest sensitivity due to slope. Rivers (34%) and wetlands and seeps (34%) contributed to high sensitivity.

The vegetation of the Groot Winterhoek Complex was not a key driver of sensitivity with the sensitivity based on the protection levels and ecosystem threat status per vegetation type scoring low. In addition, special habitat only contributed a small percentage (3%) to the highest sensitivity. Sensitivity for the complex is illustrated in Table 5.6 and Appendix 1, Map 8.

**Table 5.6:** Summary of sensitivity scores for the Groot Winterhoek Complex.

| Sensitivity Score (lowest - highest) | Sensitivity Scope | | Main Sensitivity Features | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Area (ha) | Area (%) | Slope (%) | Soil Erodibility (%) | Rivers (%) | Wetlands and Seeps (%) | Red-Listed Ecosystems (%) | Protection Levels per Vegetation Type (%) | Ecosystem Threat Status per Vegetation Type (%) | Species of Special Concern (%) | Special Habitats (%) | Heritage (%) |
| **1** | - | - | 10.5 | - | - | - | 97.0 | 97.0 | 100 | - | - | - |
| **2** | - | - | 12.3 | - | - | - | - | 3.0 | - | - | - | - |
| **3** | 3 680.3 | 13.4 | 25.2 | 12.3 | - | - | - | 0.0 | - | - | - | - |
| **4** | 14 034.6 | 51.0 | 26.4 | 10.5 | 33.9 | 33.6 | 3.0 | - | - | - | - | - |
| **5** | 9 805.9 | 35.6 | 25.6 | - | 9.4 | 3.0 | - | - | 0.0 | 0.01 | 3.2 | 0.1 |

# 6 ZONING PLAN

This section outlines the zoning plan for the Groot Winterhoek Complex. The complex forms part of a planning matrix and locating the complex in terms of the municipal integrated development plan is aimed at minimising conflicting development in either the protected area or the neighbouring municipal area.

The primary objective of the zoning plan is to establish a coherent spatial framework within and around the Groot Winterhoek Complex to guide and co-ordinate conservation, tourism and visitor experience, access and utilisation, and stakeholder and neighbour relations.

Zoning is intended to minimise user conflict by separating potentially conflicting activities such as wildlife viewing, recreational activities and tourism accommodation,

whilst ensuring that activities and utilisation continues in appropriate areas and do not conflict with the goals and objectives of the Groot Winterhoek Complex.

## 6.1 The Groot Winterhoek Complex in the Context of Municipal Integrated Development Planning

The Groot Winterhoek Complex is located primarily within the Bergrivier Local Municipality which is one of the municipalities making up the West Coast District Municipality. A small portion of the complex lies within the boundaries of Witzenberg and Drakenstein local municipalities, which make up part of the Cape Winelands District Municipality.

SDFs are compiled to illustrate current and desired future land uses spatially across the municipality and link in to the IDP in terms of the spatial allocation of the municipal budget. IDPs are compiled annually and for five-year periods by all municipalities in South Africa to establish prioritization and allocation of budget expenditure in terms of development priorities.

As such, there are five SDFs and five IDPs which need to be taken into consideration for the Groot Winterhoek Complex, in terms of alignment between statutory initiatives at the three tiers of government and management of the complex and identification of risks and interventions required. The IDPs and SDFs should be taken into consideration in determining the zone of influence and establishing potential threats and opportunities in these areas. There is also the opportunity to identify projects and interventions that need to be included in the IDPs and SDFs where appropriate and within the legislated stakeholder engagement processes (Table 6.1).

### 6.1.1 West Coast District Municipality SDF and IDP

The West Coast District Municipality (WCDM) SDF has used the 2017 Western Cape Biodiversity Spatial Plan (WCBSP) as a key informant and directly aligned the Spatial Planning Categories to the appropriate WCBSP category. The management objectives and guidelines of each of the WCBSP categories are explained. The WCDM SDF discusses the need to have conservation areas and the spatial implications thereof. These spatial implications relate to the need for restricted and carefully considered land use and development, managed and controlled public access, Environmental Management Plans, buffer areas around nature reserves (which also require management), continued efforts to maintain the natural state of habitats and ecosystems and establish linkages between interrelated conservation areas (West Coast District Municipality 2019). All these spatial implications are of direct relevance to the Groot Winterhoek Complex management plan.

The WCDM SDF also refers to the importance of protecting hydrology and freshwater ecosystems, particularly considering regular droughts experienced. Water provision has been highlighted as a key challenge. The implications of climate change on water, biodiversity, infrastructure, agriculture and health are discussed. The SDF acknowledges the need to protect ecological corridors which will allow for movement of species as part of the response to climate change. This is of high relevance to protecting the Groot Winterhoek Complex and contribute meaningfully to protected area expansion.

Certain challenges have been identified regarding conservation and biodiversity. These include degrading of sensitive ecosystems of high conservation importance, loss of ecological connectivity, conflict between conservation, agriculture and development needs and loss of ecological infrastructure which compromises the ability to provide ecosystem services.

Goal 3 of the WCDM SDF is to enhance and protect the key biodiversity and agricultural assets in the district and plan to minimise the human footprint on nature while also mitigating the potential impact of climate change on the residents of the district. This goal aligns directly with one of the WCDM IDP strategic objectives which is to promote sustainable utilisation of the district's natural resource base to extract economic development opportunities without compromising conservation objectives and biodiversity.

According to the SDF, the WCDM undertakes several environmental management programmes and activities including environmental education and awareness, integrated coastal and estuarine management, inland water management, addressing environmental complaints, alien clearing, biodiversity conservation, Coast Care and acting as a commenting authority for development applications.

Strategies and plans included as part of the WCDM IDP include *inter alia* a Regional Climate Change Strategy, an Integrated Environmental Strategy and support for the Greater Cederberg Biodiversity Corridor initiative. The IDP also refers to the WCBSP. An alien management and monitoring plan was developed in 2019.

***Bergrivier Local Municipality SDF and IDP:***

The Bergrivier Local Municipality SDF has used the 2017 WCBSP as a key informant and directly aligned the Spatial Planning Categories to the appropriate WCBSP category. The SDF states the need for the Bergrivier Local Municipality to safeguard the region's natural assets, ensure on-going ecological functionality and promote sustainable land uses. Conservation related initiatives which have been identified as opportunities in the SDF include expansion of the "conservation estate" outside of formal protected areas, including CapeNature stewardship sites and targeting key representative habitats and landscape connectivity.

Key actions for conservation management have been identified in the SDF. These include rehabilitating and maintaining ecological infrastructure, securing Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs), managing land uses compatible with CBAs and ESAs, applying development setbacks in coastal, estuarine and riverine areas, rehabilitating degraded areas and maintaining ecological corridors (Bergrivier Local Municipality 2018).

The need to improve catchment and riparian management and clear alien plants which are high consumers of water has been identified as a priority, especially considering the regional strategic value of water resources. The SDF acknowledges that stricter management of natural resource utilisation is required in order that sustainability thresholds, such as the ecological reserve of surface- and groundwater resources, are not threatened through the modification of wetlands and/or flow regimes.

The Bergrivier Local Municipality aims to address climate change pressures and adapt and diversify in response to changing market conditions, extreme climatic conditions

and increasing food security concerns. One of the ways in which Bergrivier Local Municipality aims to support this is by reducing climate vulnerability and improving landscape resilience by developing a "green" economy. The Bergrivier Local Municipality supports opportunities for payment for water supply and habitat restoration.

The Bergrivier Local Municipality SDF has several strategic focus areas. Of relevance to the Groot Winterhoek Complex is the "Building Resilience" focus area which is recognising that biodiversity, ecological infrastructure and ecosystem services underpin the Bergrivier Local Municipality's economy, the SDF pursues mitigation and rehabilitation strategies in relation to stressed and degraded habitats and promotes job creation in the green economy. One of the municipalities' 2040 vision strategies is strengthening resilience through recognising the importance of protecting ecological infrastructure.

One of the strategic objectives in the Bergrivier Local Municipality IDP is to conserve and manage the natural environment and mitigate the impacts of climate change. The IDP acknowledges that there are several critical aspects facing the municipality regarding conservation of its biodiversity. These include *inter alia* the conservation and management of freshwater aquatic biodiversity (noting that there is a correlation between the health of freshwater aquatic ecosystems and the quantity and quality of water they provide) and the impact of waste and pollution on biodiversity (Bergrivier Local Municipality 2017). A Climate Change Adaption Plan was developed for the municipality in partnership with the Climate Change Sub Directorate of the Western Cape Department of Environmental Affairs and Development Planning as part of their Municipal Support Programme.

### 6.1.2 Cape Winelands District Municipality SDF and IDP

The Cape Winelands District Municipality SDF (2019) has used the 2017 WCBSP as one of its key informants. The SDF acknowledges formal protected areas, stewardship sites, CBAs and ESAs as being important for the protection of biodiversity and ecosystem services. Wilderness areas, statutory conservation areas and CBAs are listed as falling under the Core Spatial Planning Category where no urban development is permitted.

In terms of impacts on biodiversity the Cape Winelands District Municipality SDF has identified changes in fire regime, invasive alien species, over-extraction of water sources and loss of ecosystem services as being of major concern. Some of the key strategies that have been identified in the SDF under the Biodiversity and Ecosystems Focus Area, which are relevant to the Groot Winterhoek Complex, include preventing loss and degradation of CBAs and ESAs and to incorporate CBAs into protected area networks; preventing loss of wetlands and increasing the protection of freshwater ecosystems; removal of invasive alien species; and to improve and maintain ecological corridors to facilitate the migration of flora and fauna.

The Cape Winelands District Municipality SDF indicates that financial resources have been set aside for EPWP invasive alien vegetation management, river rehabilitation and the service delivery agreement with the Cape Winelands Biosphere Reserve for which the Land Use and Spatial Planning section of the municipality is responsible.

The Cape Winelands District Municipality IDP includes the Sustainable Development Goals as a basis for its strategy. Objective 9 of the IDP is “To improve and protect the districts natural environment”. The environmental concerns identified include over-utilisation of water, water quality, soil erosion and loss of biodiversity and natural beauty (Cape Winelands District Municipality 2017).

The IDP acknowledges that conserving biodiversity and ecosystem functioning through assigning the correct Spatial Planning Category is important. The Cape Winelands District Municipality’s selection of strategies and action was guided by concerns regarding degradation of freshwater ecosystems, absence of any protected status for these ecosystems, intense development pressure on many vegetation types, poor water quality and absence of adequate buffers to protect core areas, larger conservation areas and intact CBAs.

In terms of projects and programmes across the municipality, the health and air quality programme focus on environmental education and urban greening. The IDP also has a strong focus on water security which is of high relevance to the Groot Winterhoek Complex which falls within a catchment identified as a national strategic water source area.

***Drakenstein Local Municipality SDF and IDP:***

The Drakenstein Local Municipality has used the WCBSP categories such as CBAs and ESAs to inform their development planning. The SDF has several strategy themes, one of which is to protect threatened or scarce assets, which includes biodiversity, securing connectivity between natural habitats within and between threatened ecosystems, as well as heritage and scenic and agricultural assets.

Spatial proposals included within the SDF of relevance to the Groot Winterhoek Complex include protection of CBAs and wetlands and management of floodplains, ecosystem management, catchment management, pollution control and riparian zone management programmes and prevention of agricultural encroachment into floodplains and riparian areas (Drakenstein Local Municipality 2020).

The Drakenstein Local Municipality IDP acknowledges that the ecosystem services provided by the natural environment offer some of the most significant buffering opportunities for communities and infrastructure against the negative impacts of climate change (Drakenstein Local Municipality 2019). This is achieved through essential ecosystem services like food production, water supply, erosion control, nutrient cycling, pollination, raw materials, recreational and spiritual activities *etc.*

Key issues that have been identified regarding protection of the natural environment include *ad hoc* transformation of the natural landscape resulting in loss of biodiversity, including threatened species and ecosystems, land degradation and increased soil and water contamination as a result of urban sprawl and the persistence of alien vegetation which allows veld fires to occur more frequently and intensely, destroying soil structure and seed banks.

Climate change has been identified as a significant threat to biodiversity, not just with regard to shifting and loss of species but also loss of ecosystem services, flooding, drought and heat stress. The IDP also recognises that over-abstraction and modification of natural watercourses is altering flow regimes which also impacts on

species migration and breeding, aquatic habitats, food resources and wetland ecological functioning.

***Witzenberg Local Municipality SDF and IDP:***

The Witzenberg Local Municipality SDF has also used the 2017 WCBSP as one of its key informants. The SDF has included formal nature reserves, Mountain Catchment Areas, Private Nature Reserves and CBA category 1 under the Core 1 Spatial Planning Category and detailed development guidelines have been provided, including a list of undesirable activities. Furthermore, the SDF also includes a Core 2 category under which ESAs have been included (Witzenberg Local Municipality 2019b).

From a spatial planning and land use management perspective, the following issues have been identified in relation to the biophysical context: Biodiversity and habitat loss are occurring due to agriculture; the southern and western parts of the municipal area are prone to wildfires (and hence are classified as high risk areas); droughts and other climate-change related disasters are anticipated to occur with increased frequency; the eastern part of the municipality is predicted to become less productive due to limited water availability and heat-related issues. The SDF states that the match between land capacity and the potential of the land has already been met within the municipality and therefore, the balance between conservation and agriculture is essential to maintain ecosystem functioning and farming productivity of the region.

The Witzenberg Local Municipality SDF has a “Nature Focus Area” which aims to maintain and expand the continuity of core biodiversity areas, river systems and other landscape elements to establish connected “green networks” across the municipal area and region. Implications of this are that they need to prohibit incompatible activities in CBAs and ESAs and set urban development back from wetlands and floodplains. The SDF also acknowledges the need to prioritise management of alien invasive species in water catchments and river corridors, which is of high relevance to the catchments to the east of the Groot Winterhoek Complex. The municipality plans to implement proactive fire and invasive species management on municipal properties; provide active support for stewardship programmes and Land-care programmes; the establishment of conservancies and special management areas to incentivise these programmes and nature reserve declarations on private land.

The Witzenberg Local Municipality IDP refers to managing two nature reserves and several CBAs (Witzenberg Local Municipality 2019a). It acknowledges that municipal land is vastly infested by aliens. The municipality has appointed consultants to draw up the Witzenberg Municipal Invasive Alien Species Monitoring and Control Plan. This plan will be valid for five years from date of approval after which it will be reviewed to reflect management objectives.

The IDP states that availability of water is the most critical factor within the municipal area; crucial to the well-being of humans and playing a fundamental role in the continuing existence and health of ecosystems. Water is also vital for cultivation, processing and manufacturing activities, which drives the economy of the Witzenberg Local Municipality. This recognition of the value of water resources is of high relevance to the Groot Winterhoek Complex.

**Table 6.1:** Aspects of the municipal integrated development plans applicable to the Groot Winterhoek Complex.

| Municipality | Aspect to be Addressed | Proposed Intervention |
|---|---|---|
| West Coast District Municipality | Alien clearing and protection of ecological corridors. | • Integrate with CapeNature operations.<br>• Align with Western Cape Protected Area Expansion Strategy. |
| Bergrivier Local Municipality | Alien clearing and protection of ecological corridors. | • Integrate with CapeNature operations.<br>• Align with Western Cape Protected Area Expansion Strategy. |
| Cape Winelands District Municipality | Various fire management interventions and structures. | • Integrate with CapeNature operations. |
| Cape Winelands District Municipality | Various alien clearing initiatives. | • Integrate with CapeNature operations. |
| Drakenstein Local Municipality | Alien clearing. | • Identifying priority areas for clearing. |
| Witzenberg Local Municipality | Alien clearing. | • Identifying priority areas for clearing. |
| Witzenberg Local Municipality | Various fire management interventions and structures. | • Integrate with CapeNature operations. |

## 6.2 Protected Area Zonation

The primary function of the Groot Winterhoek Complex is to conserve biodiversity. However, other functions such as ensuring access and providing benefits to neighbouring communities and local economies may conflict with this primary function.

The zonation plan is thus a standard framework and set of formal guidelines to balance conservation, access and utilisation within the complex, and is informed by sensitivity analysis. Zonation:

- Is foundational to planning and development within the complex;
- Provides a framework for development of the complex;
- Recognises the purpose for which the complex is established;
- Ensures ecosystem resilience by limiting human intrusion in the landscape;
- Mitigates user conflict and minimises the impact of utilisation on natural and cultural heritage through access and activity management;
- Accommodates a range of activities ensuring that nature-based recreation and experiences for solitude do not conflict with social and environmental requirements or needs;
- Confines development within the complex to areas deemed appropriate to tolerate transformation without detracting from sense of place.

CapeNature's zonation categories, illustrated in Table 6.2, 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 6.2:** Guide to CapeNature conservation management zones.

| Zonation Category | Explanation |
|---|---|
| Wilderness / Wilderness (declared) | Areas with pristine landscape, 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 landscape. 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 reserve). |
| Species / Habitat / Cultural Protection | Areas for protection of species or habitats of special conservation concern. |
| Cultural<br>Species / Habitat<br>Visual<br>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:
    - The principle that all else being equal, an existing transformed site is preferable to a green fields site from a biodiversity perspective;
    - Increase in maintenance cost if the development is not near existing infrastructure;
    - The socio-economic benefit of existing tourism nodes and access routes;
    - 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.

A summary of the zonation scheme applicable to the Groot Winterhoek Complex is outlined in Table 6.3 and illustrated in Appendix 1, Map 9.

**Table 6.3:** Summary of CapeNature zonation categories applicable to the Groot Winterhoek Complex.

| Zonation Category | Explanation |
|---|---|
| Wilderness | The declared wilderness area of the complex is zoned as wilderness, except for the southern part where the south-facing slopes overlook the Tulbagh valley. |
| Primitive | The southern part of the complex where the south-facing slopes overlook the Tulbagh valley is zoned as primitive. The two separate parts of the complex named Groot Winterhoek Nature Reserve (north and south) are zoned as primitive, except for the areas zoned for nature access and development-management. |
| Nature Access | The entrance road from the north up to the parking area is zoned as nature access. This road has high usage from public visiting the complex. The road was buffered by 2.5 m only, due to the high sensitivity of the surrounding environment. |
| Development – Management | This zone includes the areas around the parking area, reservoir, old farm dam, office with staff house (Veepos), and the staff village (consisting of 15 dwellings). Similarly, the roads leading from the parking area to the office and staff village and up to the reservoir are mainly used by staff. The road was buffered by 2.5 m only, due to the high sensitivity of the surrounding environment. |

## 6.3 Protected Area Zone of Influence

CapeNature seeks to maximise positive influences and/or minimise direct and indirect negative pressures on conservation targets, with the aim of ensuring the persistence of species and biodiversity in general. Activities managed include those that might have direct impacts on targets, and those that have only indirect effects, often at considerable distance from the location where the activity takes place.

The zone of influence is a mechanism that recognises and activates the abovementioned principle. Three key informants (Figure 6.1) used to delineate the zone include:

- Viability of focal conservation targets;
- Threat's assessment;
- Protected area sensitivity and zonation.

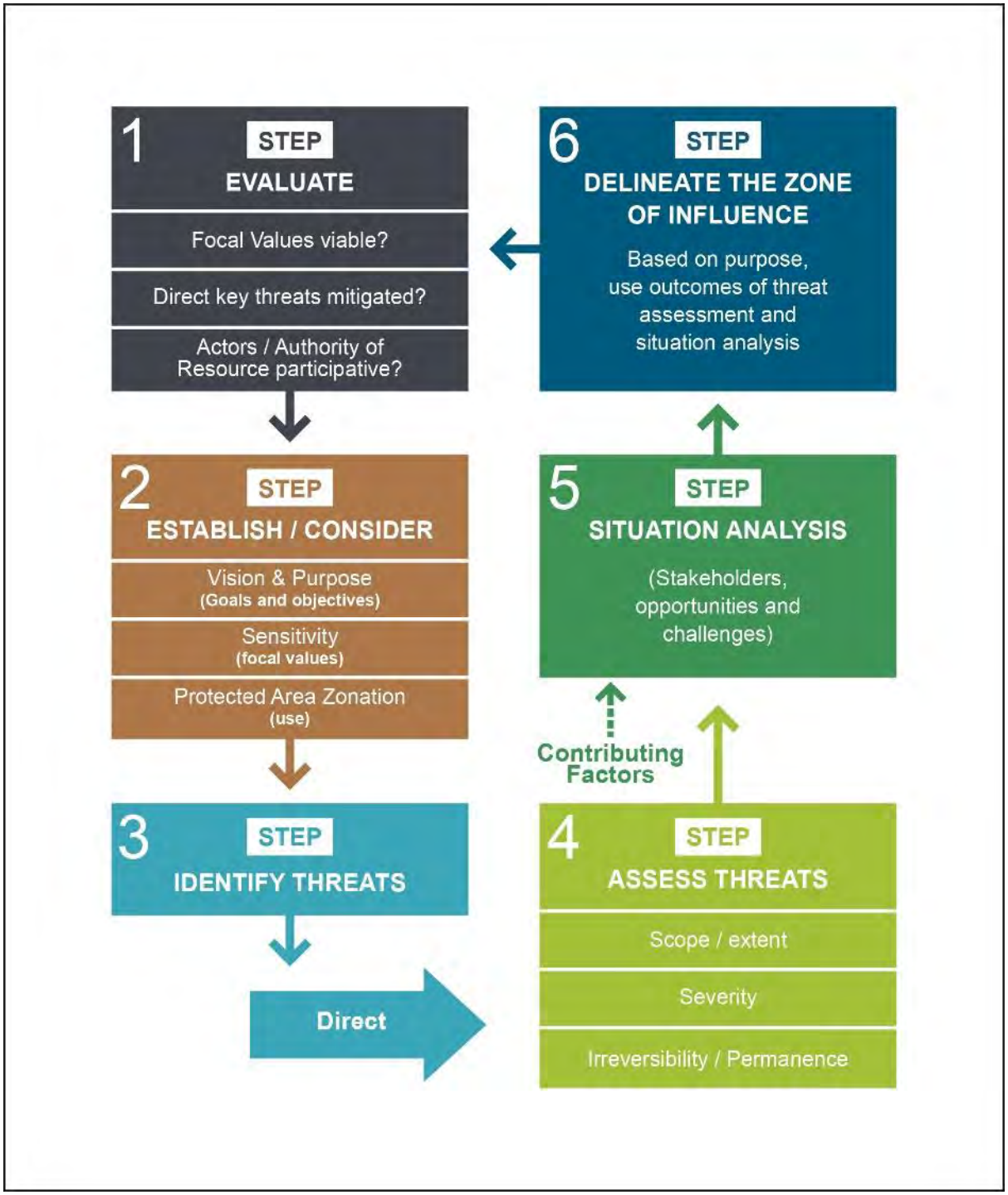


**Figure 6.1:** Process flow for the delineation of the zone of influence.

The zone of influence is a non-legislated area spatially depicted around the Groot Winterhoek Complex. The zone ultimately aims to facilitate strategic stakeholder engagement by linking key stakeholders to prioritised influences to promote an ecologically functional landscape that supports goals and objectives of the complex, and enhances the benefits derived from the complex. The process of delineation helps to identify:

1) Actions to directly restore a value or mitigate a threat;

2) Actions designed for people to continue positive behaviours or halt direct threats;
3) Actions to address enabling conditions.

The zone of influence is thus:

- A tool to guide resource allocation and investment outside of the complex;
- A tool to marry stakeholder engagement/authorities of resource to activities;
- A spatial prioritisation of where to support compatible land and water use, and positive behaviours;
- A spatial prioritisation of where to collaborate and with whom;
- A mechanism to prioritise support to landowners or managers of priority landscapes;
- All-encompassing mechanism that includes all or part of a buffer zone as prescribed in terms of legislative frameworks and conventions.

The spatial features used in the zone of influence calculation are rated on a standard scale of one to four: Low (1), Medium (2), High (3), and Very high (4). These ratings are assigned to each input feature within the zone of influence. Higher scores represent areas where many features overlap, elevating the necessity to engage stakeholders and positively influence neighbour relations and/or activities.

Table 6.4 lists the features, criteria and ratings applied to delineate the zone of influence of the Groot Winterhoek Complex. Appendix 1, Map 10 illustrates the zone of influence for the complex.

**Table 6.4:** Criteria used for defining the zone of influence of the Groot Winterhoek Complex.

| Feature | Criteria | Rating | Zone Area (ha) | Zone Area (%) |
|---|---|---|---|---|
| New agriculture | Areas identified where additional agricultural activities are possible on farms adjacent to the complex boundary. These areas include areas for possible plantation development. The potential threat posed by additional farming activities and/or plantations includes an increase in water abstraction and possible pesticide pollution.<br>For the Tulbagh basin, areas are identified as under threat of potential agriculture in the future due to climate change and agricultural regulations. The areas that can be targeted in the future are areas at a greater slope (up to 20%). | Medium (2) | 3 417.40 | 3.30 |
| Mining | Indicated areas of past mining activities or areas where application for mining prospecting were received, irrespective whether it was approved or not. Various applications were received for gravel and sand mining and borrow pits. | Low (1) | 1 218.90 | 1.20 |

| Feature | Criteria | Rating | Zone Area (ha) | Zone Area (%) |
|---|---|---|---|---|
| Fire hazards (high fire frequency) | The flammability of the vegetation determines the fire hazard The SA veg map was used to calculate the flammability of all-natural vegetation patches surrounding the complex. | High (3) | 66 684 | 65.20 |
| Use of rivers and water management | Rivers identified for some level of conservation intervention due to the presence of threatened fish species as a preventative measure (timeous intervention should invasion occur) and invasive alien strategies (both plants and fish). Also included rivers where weirs occur for water abstraction and/or serve as invasive alien fish barriers. These rivers included 24 Rivers, Leeu and Klein Berg. These rivers were buffered by 100m. | High (3) | 454.30 | 0.40 |
| Over abstraction of water (surface and groundwater) | Agricultural fields falling within 10 km of the complex were used as a surrogate for surface water abstraction from the water recharge area. | Low (1) | 9 675.60 | 9.50 |
| Illegal resource use | Illegal resource use, emanating from adjacent towns and villages. Additional areas adjacent to the complex were provided by conservation staff where there are known incidences of plant harvesting, illegal snares, and persecution of wildlife. | High (3) | 12 114.20 | 11.90 |
| Invasive alien plants | Stands of alien plants or plantations within a radius of the complex is a source of re-infestation. Only one privately owned plantation was digitized within the buffer area. The National Invasive Alien Plant Survey, compiled by Kotze *et al.* (2010), was used to supplement data. | High (3) | 4 066.30 | 4 |
| Renewable energy | Solar farms and wind turbines, extent based on land use applications. | Low (1) | 4 429.90 | 4.30 |
| **Positive Influencing Aspects** | | | | |
| Mountain Catchment Areas | All adjacent Mountain Catchment Areas were included into the zone of influence. | Low (1) | 51 185.10 | 50.10 |
| Local Authority Nature Reserves | All adjacent local authority nature reserves were included into the zone of influence. | Low (1) | 76.20 | 0.10 |
| Stewardship sites | Includes the stewardship sites and private nature reserves that have direct land- and/or water management responsibilities and that contribute to the complex's conservation targets or values and | Low (1) | 4 750.90 | 4.60 |

| Feature | Criteria | Rating | Zone Area (ha) | Zone Area (%) |
|---|---|---|---|---|
| | appropriate protected area design (connectivity and extent). | | | |
| Areas identified in the Western Cape Protected Area Expansion Strategy | Include areas identified for conservation action in the Conservation Action Priority Map. Extracted all the adjacent properties and those connected to them (forming a clump). | Low (1) | 10 251.70 | 10.00 |

The zone of influence for the Groot Winterhoek Complex has a total extent of 102 219.3 hectares (Appendix 1, Map 10).

Fire hazard was identified as the features that have the highest influence on the overall zone of influence score (Table 6.4). Fire risk affected approximately 65% of the zone of influence (see also Appendix 1, Map 5, and section 2.3.1).

Illegal resource use and water abstraction were rated as features having a high influence on the zone of influence. Illegal resource use, which include various unregulated human activities such as overgrazing by livestock, illegal harvesting of fauna and flora, urban expansion (affecting water source usage), informal human settlement encroachment, and dumping. Illegal resource harvesting affects approximately 12% of the zone of influence.

Surface water abstraction affected approximately 9.5% of the zone of influence. Currently, there is no measure of ground water abstraction and the assumption is made that most irrigation of agricultural fields is done using surface water abstraction. Water abstraction has a low impact on the zone of influence primarily because the complex is located within the top of the catchment.

Stands of invasive alien plants that border the Groot Winterhoek Complex are a source of re-infestation and will affect clearing effort within the complex. However, only 4% of the zone of influence has stands of invasive alien plants and the influence is thus relatively low.

Installation of renewable energy, both wind and solar, adjacent to the Groot Winterhoek Complex will have a low impact on the complex, affecting less than 5% of the zone of influence. Applications to extend the current Gouda wind turbine farm are in process. These wind turbine farms mainly pose threats to raptors and other large bird species.

Approximately 50% of the zone of influence is positively impacted by surrounding Mountain Catchment Areas. Three Mountain Catchment Areas (Koue Bokkeveld, Matroosberg and Winterhoek) occur in the protected area network of the Groot Winterhoek Complex. Stewardship sites and those areas identified in the Protected Area Expansion Plan positively impact on approximately 15% of the zone of influence. These areas are important buffering mechanisms to the Groot Winterhoek Complex.

# 7 ACCESS AND FACILITIES

This section describes infrastructure and procedures necessary for management of the Groot Winterhoek Complex, inclusive of operations and visitors. It provides information on access facilities, operational facilities, control measures as well as commercial and community use.

## 7.1 Public Access and Management

Access points must be easily accessible to relevant user groups but controlled by protected area staff. Access points include controlled and uncontrolled entrances to the complex for various activities. Controlled access is through established, manned entrance gates while uncontrolled access is regulated with displayed signage only.

The main access to the Groot Winterhoek Complex is by road; 33 km from Porterville via the Cardouw turn-off 3 km north of Porterville. Signage is provided along the route. Visitors may enter through an unmanned gate near Zuurvlakte. This gate can be locked to restrict access to the complex if needed but is generally left open to facilitate visitor movement. Upon arrival at the parking area visitors can provide their permit details in the hiking register and start their day or overnight hike. Access permits can also be obtained at the complex office during office hours. Staff are always on-site, and this is a controlled access point.

Most of the complex is unfenced and there are several uncontrolled access points along the boundary. The complex boundary is primarily marked with white marked rock beacons. Most of the boundary borders onto private property which provides some level of restricted access. Access to the complex without a permit is not permitted.

Hikers walking the Die Hel kloofing trail can exit the complex at De Hoek Estate. This is only an exit point and there is a “No Entry” sign placed at the 24 Rivers weir to alert the public that access is restricted. Another uncontrolled access point is through Rooiland (Alto Conservation Area) in Tulbagh via the old Sneeugat hiking trail. This trail is closed and in the process of rehabilitation and hikers should only use it as an emergency exit point. No entry is permitted to the complex via Rooiland. No formal access points are located along the eastern boundary of the complex. The jeep track towards Perdevlei is locked and only used for management purposes.

Access points to the Groot Winterhoek Complex are listed in Table 7.1 and illustrated in Appendix 1, Map 11.

**Table 7.1:** Managed public access points to the Groot Winterhoek Complex.

| Locality | Name | Type of Access | Activity |
|---|---|---|---|
| Groot Winterhoek Complex | Main entrance gate. | Controlled access. | Management and tourism (hiking, day walks, overnight walks). |
| Groot Winterhoek Complex | Laatson | Uncontrolled access. No public entry. | Management and search and rescue. |
| Groot Winterhoek Complex | De Hoek Estate (Die Hel kloofing trail). | Uncontrolled access. No public entry - only exit. | Management and tourism (hiking & kloofing), search and rescue. |

| | | | |
|---|---|---|---|
| Groot Winterhoek Complex | Rooiland (Sneeugat trail). | Uncontrolled access. No public entry - only exit in emergencies. | Management and search and rescue. |
| Groot Winterhoek Complex | Perdevlei jeep track | Controlled access. | Management and search and rescue. |

## 7.2 Airfields and Flight Corridors

Section 47 of the NEM: PAA stipulates prescriptions for the use of aircraft in a World Heritage Site. A legal no fly-zone restriction of 2 500 feet (762 m) exists above all special Nature Reserves, National Parks and World Heritage Sites.

An informal helipad is located at the main office. This landing area is only used for emergency purposes such as mountain search and rescue and firefighting operations. If emergencies occur in other areas of the complex that necessitate the use of helicopters, emergency landing areas will be allocated where and when landing is safe.

No flights without authorisation from the management authority (CapeNature), except emergency and management flights, are allowed over the Groot Winterhoek Complex World Heritage Site.

## 7.3 Administrative and Other Facilities

The Groot Winterhoek Complex is managed from the office located at Veepos, which is situated approximately 33 km outside the town of Porterville. The complex is supported by other centres including the landscape office in Porterville and head office in Cape Town.

Infrastructure and associated building maintenance requirements are captured and managed in both the Groot Winterhoek Complex infrastructure register and the CapeNature User Asset Management Plan. The User Asset Management Plan is updated and submitted to Provincial Treasury and the Western Cape Department of Transport and Public Works on an annual basis. CapeNature also implements and funds scheduled maintenance and emergency repairs to infrastructure via dedicated funding.

The concept development plan, associated zonation scheme and strategic framework guides proposed development of new infrastructure over the planning period, see section 9. Focus areas include infrastructure evaluation, environmental scoping and land use advice to define environmentally responsible development options. Major infrastructure is illustrated in Appendix 1, Map 12.

### 7.3.1 Roads and jeep tracks

The entrance road into the Groot Winterhoek Complex is tarred. The section of road from the office to the staff village is a two-track paved road. All other jeep tracks within the complex are gravel and only accessible by 4x4 management vehicles. All jeep tracks have been subject to erosion damage and are only used in exceptional circumstances. Erosion risk is a major concern and section 10 (objective 1.7 and 5.3) identifies conservation actions needed in this regard. Due to the high risk of soil erosion the grading of jeep tracks is not allowed under any circumstances.

All roads and tracks need regular maintenance as they are prone to erosion, being washed away, and/or overgrown by adjacent vegetation. Rehabilitation and maintenance of jeep tracks are a factor of operational need, finance availability and ecological sensitivity. The Perdevlei, Agterdam and do Tronk jeep tracks have all been earmarked for rehabilitation and closure over a period. Maintenance schedules are updated and implemented on an annual basis through the Integrated Work Plan for the complex.

### 7.3.2 Hiking trails

There are numerous options for hiking in the Groot Winterhoek Complex with four overnight huts located within the De Tronk precinct. Approximately 84 km trails are available for overnight hikers and/or day visitors; ranging in distance and difficulty. A maximum of 12 people per day are permitted per trail. Large parts of the complex are remote and rugged and cannot be reached via a dedicated trail. These areas offer opportunities for a true wilderness hiking experience for the seasoned hiker. Due to safety reasons, hiking groups must be no less than three people.

Hiking trails include the Parking area to De Tronk (14 km); Parking area to Protea Pool (1,5 km); Parking area to Groot Kliphuis (16 km); De Tronk to Die Hel (5 km); Groot Kliphuis to Perdevlei (7 km); Groot Kliphuis to Perdevlei (6 km); Perdevlei to De Tronk (12 km) and Die Hel to De Hoek Estate (9,5 km). The latter is strictly a kloofing route and can only be done in a southerly direction by seasoned hikers. Two basic emergency shelters are located at Perdevlei and De Tronk.

All hiking trails need regular maintenance to clear overgrowing vegetation, replace broken poles, maintain and create water flow contour berms and fill erosion dongas. Maintenance schedules are updated and implemented on an annual basis through the Integrated Work Plan for the complex.

### 7.3.3 Buildings

Buildings of the Groot Winterhoek Complex are designed and utilised for operations and staff accommodation and maintained by CapeNature and the Western Cape Department of Transport and Public Works. The Concept Development Plan, associated zonation scheme and strategic framework identified existing development footprints and focus areas for management.

Buildings include the management offices, stores and a manager’s house located at Veepos. The staff village consists of 15 wooden houses utilised for official accommodation by CapeNature staff and Educo Africa. Four hiking huts (Disa/Ribbok/Klipspringer and Suikerbekkie) are located in the De Tronk precinct. The hiking huts offer basic amenities such as beds and matrasses, eco-loo facilities and tanked rainwater. Routine maintenance and repairs to buildings are identified and attended to by CapeNature using a dedicated infrastructure repair budget.

### 7.3.4 Fences

The entire boundary of the Groot Winterhoek Complex is unfenced due to the rugged and mountainous landscape. The construction and maintenance of a physical fence is unpractical in the context of the terrain and the risk of regular fires. The complex boundary is primarily demarcated by stacked rock beacons that are painted white. This

serves as a more practical boundary demarcation method. Maintenance is carried out on a five-year cycle; section 10 (objective 3.2).

### 7.3.5 High sites

CapeNature regularly monitors all high laying areas for illegal structures. Currently no registered high sites occur within the Groot Winterhoek Complex. The proliferation of intensively developed high sites for cellular and radio telecommunications, particularly in World Heritage Sites, are discouraged.

The Groot Winterhoek Complex does maintain a small mobile communications repeater close to the staff village. This enables communications for operational activities within the mountainous terrain of the complex.

### 7.3.6 Signage

The primary purpose of signage is to demarcate protected areas, stipulate conditions for access and provide contact details for the management authority. Signage is located along the road leading to the Groot Winterhoek Complex from Dasklip Pass and at the entrance gate towards the office. Signboards are also placed at the start and intersection of all hiking trails and hiking huts. Hiking trails are also informally marked with rock kerns. A Groot Winterhoek Complex brochure is also available for visitors.

All signage must conform to the CapeNature brand as per the signage manual and designed and approved by the communication section of CapeNature. Signage pollution needs to be avoided and the use of information kiosks and/or centres are encouraged. Indemnity notices are essential at all visitor entry points. Signage is maintained and replaced if it becomes weathered or is vandalised.

Section 10 (objective 3.2 and 5.2) identifies conservation actions required to promote and enhance the values of the complex through appropriate signage, particularly the heritage aspects.

### 7.3.7 Utilities

#### 7.3.7.1 Water supply

The primary water supply to the Groot Winterhoek Complex is derived from a borehole with an electric pump system. Water is pumped into a reservoir from where it is gravity fed to the office and staff village. An overhead water supply point is available at the office for firefighting or bulk water supply purposes.

Water supply to three of the hiking huts is through rainwater fed tanks. Ribbok hut receives water via a piped system from a nearby stream but it is not functioning optimally and is need of an upgrade. Section 10 (objective 5.3) identifies maintenance action needed. During summer months when rain is limited, hikers can collect water from the Groot and Klein Kliphuis Rivers. A map showing water points is placed inside each hiking hut.

#### 7.3.7.2 Electricity supply

Eskom supplies electricity to the Groot Winterhoek Complex offices and staff village. The use of solar energy needs to be encouraged at all buildings in the complex where hot water is utilised. As operational centres are upgraded, facilities are equipped with solar power systems.

#### 7.3.7.3 Waste management

There is no waste disposal site within the Groot Winterhoek Complex. All waste is collected by staff on a regular basis and transported to the municipal waste collection site in Porterville. “Leave No Trace” waste management principles apply to all staff, researchers and visitors to the reserve.

A septic tank with soakaway system is in use at the complex office and Veepos house. At the staff village a bio digester is installed that is not functioning optimally and needs an upgrade. Three of the hiking huts have eco-loos installed. Ribbok hut has a flush toilet that is not functioning optimally (due to unreliable water supply) and that is need of an upgrade to an eco-loo system. Section 10 (objective 5.3) identifies maintenance action needed.

### 7.3.8 Visitor facilities

A memorandum of understanding with Educo Africa makes provision for the use of the complex for youth environmental education purposes. Educo Africa currently run a base camp and environmental sustainability learning centre for approximately 400 youth participants a year.

There is a need to promote the heritage aspects of the complex to a greater extent and section 10 (strategy 5) identifies some actions needed to promote and expand visitor numbers.

## 7.4 Commercial Activities

No commercial activities exist on the Groot Winterhoek Complex and no agreements or concessions are in place.

## 7.5 Community Use

No community use activities or agreements currently exist for the use of any resources within the Groot Winterhoek Complex.

## 7.6 Servitudes

There are no registered servitudes on or through the Groot Winterhoek Complex.

# 8 EXPANSION STRATEGY

The expansion of protected areas in South Africa is informed by the National Protected Area Expansion Strategy (DEA 2016). This strategy provides a broad national framework for protected area expansion in South Africa by identifying large areas which should be targeted for formal declaration and introduces a suite of mechanisms which could aid in achieving this.

In response to the National Protected Area Expansion Strategy, CapeNature has produced a Western Cape Protected Area Expansion Strategy (WCPAES) and Implementation Plan 2015-2020 (CapeNature 2015). This CapeNature strategy addresses the formal declaration of priority natural terrestrial, freshwater and estuarine habitats in the Western Cape Province as protected areas to secure biodiversity and ecosystem services for future generations. Priority areas have been identified through systematic conservation planning that culminated in the Western Cape Biodiversity Spatial Plan and include sites that contain CBAs (Pence 2017). The Conservation Action Priority Map is a spatial representation of the WCPAES. The Groot Winterhoek Complex's expansion will be done in line with the WCPAES.

Stewardship refers to the wise use, management and protection of that which has been entrusted to you or is rightfully yours. Within the context of conservation, stewardship means protecting important ecosystems, effectively managing invasive alien species and fires, and grazing or harvesting without damaging the veld. The four stewardship options available to landowners are Conservation Areas, Biodiversity Agreements, Protected Environments and Nature Reserves.

Previous expansion of the Groot Winterhoek Complex was achieved primarily through implementation of the CapeNature Stewardship Programme signing agreements with private landowners. This includes declared private nature reserves bordering the complex that are being updated to be compliant with the NEM: PAA. Bordering the eastern boundary, the Groot Winterhoek Protected Environment forms an important biodiversity buffer. Informal conservation of other areas north of the complex include the Groot Winterhoek Conservancy.

The Groot Winterhoek Complex forms the southern core of the Greater Cederberg Biodiversity Corridor; linking the Groot Winterhoek Complex with the Cederberg Complex. The focus of this corridor initiative is on expansion of critical habitat for freshwater species and for climate change adaptation and movement. The expansion map for the Groot Winterhoek Complex is available in Appendix 1, Map 13.

# 9 CONCEPT DEVELOPMENT PLAN

The concept development plan sets out the long-term plan for the development of the Groot Winterhoek Complex in keeping with the purpose of the complex and with due consideration for protected area expansion and the zoning plan.

Tourism products and related infrastructure developments in CapeNature 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.

## 9.1 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 (Figure 9.1).

CapeNature may elect to operate tourism products and services internally, or via other mechanisms described in the Public Finance Management Act, 1999 (Act No.1 of 1999) such as concessions or public private partnerships.

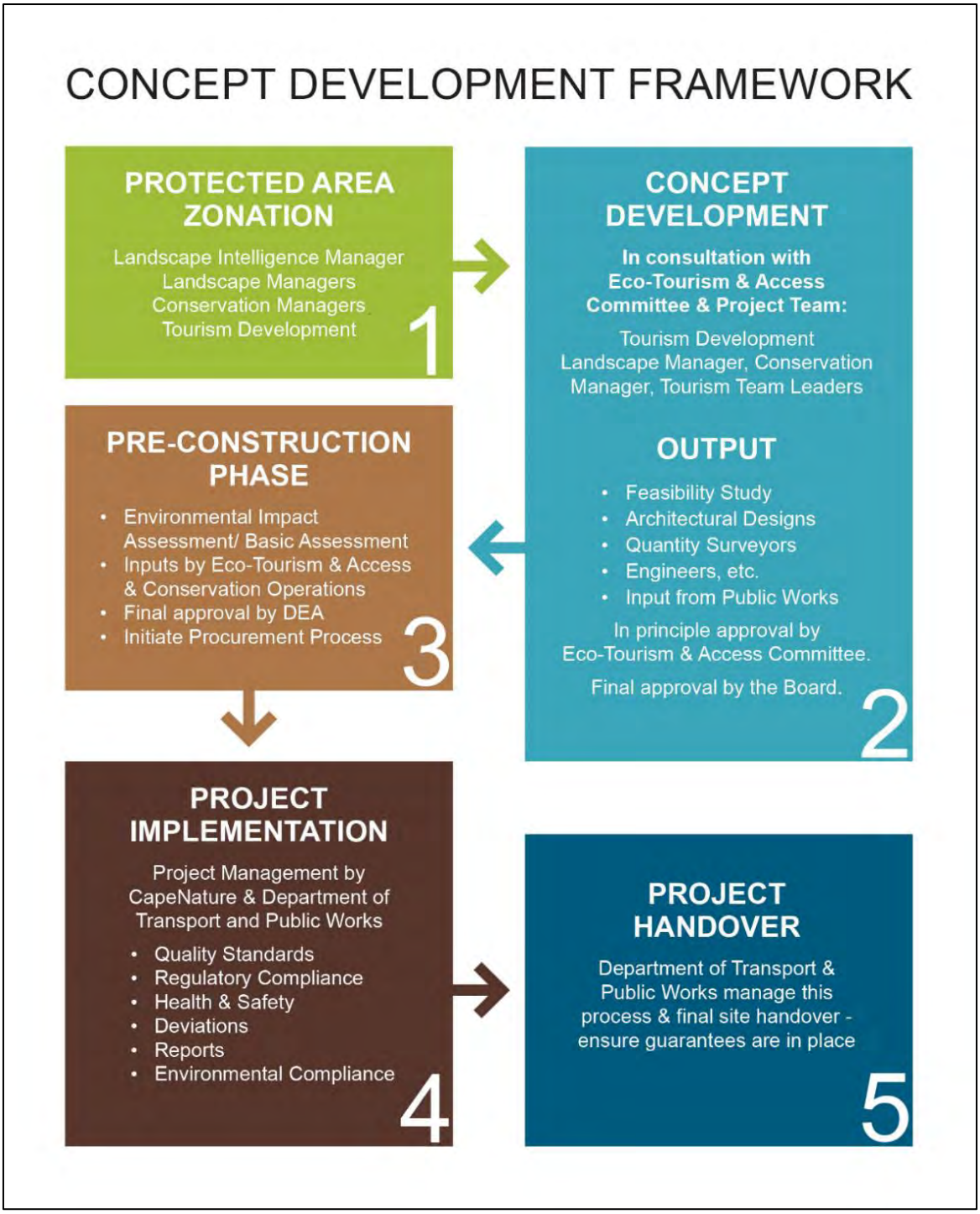


**Figure 9.1:** Concept development framework implemented by CapeNature.

## 9.2 Methodology

Tourism products and infrastructure within CapeNature protected areas are designed to be sensitive to their locations and are intended as prime examples of responsible and sustainable commercial developments. These include off-grid bulk water and energy services; passive design efficiencies; enhanced resource utilisation and resource-saving features. Tourism developments aim to comply with prevailing

zonation schemes and sensitivity analysis unless approval to the contrary has successfully been sought.

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

## 9.3 Infrastructure Management and Development

Taking sensitivity drivers into consideration, large parts of the Groot Winterhoek Complex have been zoned as being highly sensitive (section 5.7; Appendix 1, Map 8). In this context any future infrastructure considerations (tourism or operational) will be placed accordingly, subject to relevant approvals.

No new infrastructure developments are planned for the time span of this management plan. If new development plans are proposed, either internally or through an external developer, it may trigger a need for amendment of this management plan.

Existing infrastructure which mainly include jeep tracks, hiking trails, operational and visitor facilities, water installations and reticulation as well as electricity infrastructure will/may be maintained and/or upgraded during the time span of this management plan, as required. This infrastructure maintenance list is not exhaustive.

### 9.3.1 Environmental authorisations

Environmental authorisation has been granted in terms of the Environmental Impact Assessment Regulations; DEA reference number 14/12/16/3/3/1/1852. The authorisation allows the national Working for Wetlands Programme to undertake wetland rehabilitation activities in several localities within the Groot Winterhoek Complex.

# 10 STRATEGIC PLAN

This section presents the strategic plan for the Groot Winterhoek Complex. The strategic plan was derived from an assessment of the conservation situation, inclusive of the biological environment and the social, economic, cultural and institutional systems that influence focal conservation targets and human well-being values. Strategic intervention points formed the basis for developing strategies; using results chains to test theories of change and establish short to medium term objectives. From these, detailed actions with timeframes were developed to guide implementation, monitoring and evaluation.

Strategies are aimed at:

- Focal conservation target restoration/stress reduction;
- Behavioural change/threat reduction;
- Establishing/promoting enabling conditions.

A summary of selected strategies and objectives for the Groot Winterhoek Complex is provided in Table 10.1. Table 10.2 details the actions and associated timeframes for each separate strategy.

CapeNature will lead the implementation of the management plan, although achieving the vision requires coordinated effort. Stakeholder groups and organisations identified in the strategic plan are key role players in successful delivery of this management plan.

**Table 10.1:** Summary of strategies and objectives identified for the Groot Winterhoek Complex.

| Threat Abated | Strategy Type | Strategy | Objectives |
|---|---|---|---|
| Inappropriate fire regime, invasive alien plants, inappropriate jeep tracks and hiking trails, agricultural water impacts, climate change. | Enabling Conditions/ Focal Value Restoration/ Threat Reduction. | **Strategy 1:** Ensure adequate fire, water and invasive alien species management within and around the Groot Winterhoek Complex to promote a healthy fire regime, biodiversity and strategic water production. | **Objective 1.1:** By 2023, conduct focussed fire awareness within the Groot Winterhoek Complex and its zone of influence. |
| | | | **Objective 1.2:** By 2021, fire monitoring data supports annual planning and management. |
| | | | **Objective 1.3:** By 2021, adaptive annual fire response planning and management in conjunction with landscape stakeholders takes place annually. |
| | | | **Objective 1.4:** By 2021, the Groot Winterhoek Complex has an updated invasive alien species control plan. |
| | | | **Objective 1.5:** By 2021, invasive alien species monitoring supports annual planning and management. |
| | | | **Objective 1.6:** By 2024, invasive alien species management is addressed in the Groot Winterhoek Complex zone of influence. |
| | | | **Objective 1.7:** By 2022, the Groot Winterhoek Complex will have a trail rehabilitation plan. |
| | | | **Objective 1.8:** By 2025, the Groot Winterhoek Complex will have a fish rehabilitation plan. |
| Illegal resource use, illegal access, vandalism, agricultural water impacts, fire damage to heritage features. | Enabling Conditions/ Stress Reduction/ Threat Reduction/ Behavioural change. | **Strategy 2:** Ensure legal and sustainable use and access to the natural and heritage features of the Groot Winterhoek Complex to reduce anthropogenic impacts. | **Objective 2.1:** By 2021, the Groot Winterhoek Complex will have a revised integrated compliance plan. |
| | | | **Objective 2.2:** By 2023, the Groot Winterhoek Complex will have strong and active partnerships with all stakeholders in the zone of influence. |
| | | | **Objective 2.3:** By 2024, natural resource users in and around the Groot Winterhoek Complex will be familiar with the CapeNature Natural Resource Utilisation Policy and permit requirements. |
| | | | **Objective 2.4:** By 2022, assess the scope and impact of possible agricultural pollution on the Groot Kliphuis River. |

| Threat Abated | Strategy Type | Strategy | Objectives |
|---|---|---|---|
| Inappropriate fire regime, invasive alien plants, climate change, Illegal resource use, illegal access, vandalism, agricultural water impacts, fire damage to heritage features, lack of maintenance of heritage structures. | Behavioural change/ Threat Reduction/ Enabling Conditions. | **Strategy 3:** Promote and expand awareness of the Groot Winterhoek Complex's ecological and heritage targets and their contribution towards ecological infrastructure and human well-being. | **Objective 3.1:** By 2022, the Groot Winterhoek Complex will have a revised environmental education and awareness programme. |
| | | | **Objective 3.2:** By 2024, signage has been erected in-line with the revised Groot Winterhoek Complex environmental education and awareness programme. |
| | | | **Objective 3.3:** By 2023, the CapeNature website will promote the Groot Winterhoek Complex targets with an emphasis on its World Heritage Site status and heritage targets. |
| | | | **Objective 3.4:** By 2021, the Groot Winterhoek Complex will promote research and knowledge development. |
| Vandalism, fire damage to heritage features, lack of maintenance of heritage structures. | Enabling Conditions/ Stress Reduction/ Threat Reduction/Focal Value Restoration. | **Strategy 4:** Enhance the management and protection of the Groot Winterhoek Complex's heritage features through effective partnerships. | **Objective 4.1:** By 2031, the Groot Winterhoek Complex will have a heritage management plan. |
| | | | **Objective 4.2:** By 2023, the Groot Winterhoek Complex management team will have appropriate heritage management and monitoring skills. |
| | | | **Objective 4.3:** By 2023, the Groot Winterhoek Complex will conduct focussed awareness interventions to combat vandalism of rock art. |
| Inappropriate fire regime, inappropriate jeep tracks and hiking trails, illegal access, vandalism, fire damage to heritage features. | Enabling Conditions/ Behavioural change/ Threat Reduction. | **Strategy 5:** Promote responsible access to the he Groot Winterhoek World Heritage Site as a unique ecotourism destination and contribute to local economic development and social upliftment. | **Objective 5.1:** By 2023, the Groot Winterhoek Complex zone of influence has been incorporated into municipal planning products. |
| | | | **Objective 5.2:** By 2026, the Groot Winterhoek Complex promotes responsible heritage tourism. |
| | | | **Objective 5.3:** By 2021, the Groot Winterhoek Complex promotes environmentally sensitive and financially sustainable access. |
| | | | **Objective 5.4:** By 2023, the Groot Winterhoek Complex has assessed potential tourism products for implementation. |

**Table 10.2:** Strategic Plan for the Groot Winterhoek Complex.

| **INTEGRATED CATCHMENT MANAGEMENT** | | | | | |
|---|---|---|---|---|---|
| **STRATEGY 1:** | Ensure adequate fire, water and invasive alien species management within and around the Groot Winterhoek Complex to promote a healthy fire regime, biodiversity and strategic water production. | | | | |
| **GOALS:** | By 2031, the terrestrial ecosystems in the Groot Winterhoek Complex have an ecologically healthy fire regime* and comprises at least 95% indigenous species.<br>By 2031, the upper and middle river reaches in the Groot Winterhoek Complex support macro invertebrate species communities with an ASPT of 6 - ≥8* and viable indigenous fish communities are present in on-reserve rivers identified for fish conservation**.<br>By 2031, the health of the wetland ecosystems in the Groot Winterhoek Complex will be in at least a near-natural* condition, and riparian zones and wetland buffers will have an indigenous vegetation cover of at least 95%.<br>By 2031 the Groot Winterhoek Complex will, through integrated catchment management, protect and enhance the provision of water quality and quantity contributing to the water resilience for the Berg and Olifants catchment areas. | | | | |
| **THREATS:** | Inappropriate fire regime, invasive alien plants, inappropriate jeep tracks and hiking trails, agricultural water impacts, climate change. | | | | |
| **Objectives** | **Actions** | **Responsibility** | **Timeframe** | **Measurable Indicators / Outputs** | **References / Existing Procedures** |
| **Fire Management** | | | | | |
| **Objective 1.1:**<br>By 2023, conduct focussed fire awareness within the Groot Winterhoek Complex and its zone of influence. | • Implement the environmental education and awareness activities annually, guided by both the Groot Winterhoek Complex environmental education and awareness programme as well as the Groot Winterhoek Integrated Compliance Plan.<br>• Identify specific target groups within the hotspots/high threat areas and zone of influence (*e.g.,* communities, landowners, partners, schools *etc.*).<br>• *This objective correlates with 3.1.* | **Lead:** Conservation Manager On-Reserve.<br>**Enablers:** Stakeholder Engagement Officer, Protected Area Staff. | Year 3 and beyond. | Number of stakeholder environmental education and awareness activities. | Environmental education and awareness programme.<br><br>Groot Winterhoek Integrated Compliance Plan. |
| **Objective 1.2:**<br>By 2021, fire monitoring data supports annual planning and management. | • Conduct annual fire monitoring, permanent protea monitoring, post fire monitoring and hotspot mapping.<br>• Analyse fire frequency, fire return intervals, fire size, and season during the Groot | **Lead:** Conservation Manager On-Reserve.<br>**Enablers:** Landscape Conservation Intelligence Staff, Protected Area Staff. | Year 1 and beyond. | Permanent protea and post fire summaries. | Fire Policy.<br><br>Eco-matrix.<br><br>Integrated Work Plan. |

| Objectives | Actions | Responsibility | Timeframe | Measurable Indicators / Outputs | References / Existing Procedures |
|---|---|---|---|---|---|
| | Winterhoek Complex management plan revision.<br>• Fire data supports annual Integrated Work Planning. | | | Fire monitoring interventions listed in Eco-matrix.<br><br>Fire management interventions listed in Integrated Work Plan. | |
| **Objective 1.3:** By 2021, adaptive annual fire response planning and management in conjunction with landscape stakeholders takes place annually. | • Conduct annual pre-season fire audits.<br>• Conduct annual planning with landscape partners (neighbours, district municipality, Greater Cederberg Fire Protection Association and Winelands Fire Protection Association).<br>• Implement active fire management during the fire season in conjunction with landscape partners.<br>• Implement fire management policy and procedures and veldfire response plan based on the analysis recommendations for the Groot Winterhoek Complex. | **Lead:** Conservation Manager On-Reserve. **Enablers:** Landscape Manager, Integrated Catchment Specialist, Protected Area Staff. | Year 1 and beyond. | Pre and post fire audit results.<br><br>Minutes of meetings with landscape stakeholders. | Fire Policy.<br><br>Landowner fire agreements.<br><br>Existing Memorandum of Understanding with partners.<br><br>National Veld and Forest Fire Act, 1988 (Act No. 101 of 1988). |
| **Invasive Alien Species Management** | | | | | |
| **Objective 1.4:** By 2021, the Groot Winterhoek Complex has an updated invasive alien species control plan. | • Identify internal and external stakeholders to contribute to the revision process.<br>• Revise and have the Invasive Alien Species control plan approved by year one. | **Lead:** Conservation Manager On-Reserve. **Enablers:** Landscape Conservation Intelligence Staff, Integrated Catchment Specialist, Ecologist Fauna: West, Ecologist Flora: West, Restoration Ecologist. | Year 1. | Approved Invasive Alien Species control plan. | Invasive Alien Species control plan.<br><br>Invasive Alien Species Regulations. |
| **Objective 1.5:** By 2021, invasive alien species monitoring supports annual | • Conduct annual monitoring of invasive alien plants in and around the Groot Winterhoek Complex. | **Lead:** Conservation Manager On-Reserve. **Enablers:** Protected Area Staff, Landscape | Year 1 and beyond. | Alien fauna and flora monitoring interventions listed in Eco-matrix. | Invasive Alien Species control plan.<br><br>Eco-matrix. |

| Objectives | Actions | Responsibility | Timeframe | Measurable Indicators / Outputs | References / Existing Procedures |
|---|---|---|---|---|---|
| planning and management. | • Conduct mapping of alien plants in all high-altitude locations during the first three years.<br>• Conduct annual surveillance for alien fish in the Leeu River.<br>• Compile alien plant management prioritisation maps annually. | Conservation Intelligence Staff, Integrated Catchment Specialist, Ecologist Fauna: West, GIS Specialist. | | Invasive Alien Plants register.<br><br>Annual alien flora prioritisation maps.<br><br>State of Biodiversity database. | |
| | • Implement invasive alien flora management interventions annually through the Integrated Work Planning cycle.<br>• Implement invasive alien flora management interventions annually guided by the alien plant management prioritisation maps as well as the Groot Winterhoek Complex Invasive Alien Species control plan. | **Lead:** Conservation Manager On-Reserve. **Enablers:** Landscape Manager, Protected Area Staff. | Year 1 and beyond. | Hectares cleared. | Integrated Work Plan.<br><br>Invasive Alien Species control plan. |
| | • Obtain funding and arrange a specific intervention to clear all invasive alien plants in high altitude locations within the first five years. | **Lead:** Conservation Manager On-Reserve. **Enablers:** Integrated Catchment Specialist. | Years 1-5. | Hectares cleared. | Integrated Work Plan.<br><br>Invasive Alien Species control plan. |
| **Objective 1.6:** By 2024, invasive alien species management is addressed in the Groot Winterhoek Complex zone of influence. | • Prioritise all neighbouring properties for invasive alien species clearing and/or compliance action.<br>• Obtain commitment from landscape partners and neighbours to address such challenges. | **Lead:** Conservation Manager On-Reserve. **Enablers:** Landscape Conservation Intelligence Staff, Integrated Catchment Specialist, Protected Area Staff. | Year 4. | Hectares cleared.<br><br>Number of compliance directives issued. | Invasive Alien Species Regulations. |
| **Restoration** | | | | | |
| **Objective 1.7:** By 2022, the Groot Winterhoek Complex will have a trail rehabilitation plan. | • Identify internal and external stakeholders to contribute to the development process.<br>• Identify hiking trails/and jeep tracks for closure, rehabilitation and maintenance. | **Lead:** Conservation Manager On-Reserve. **Enablers:** Landscape Conservation Intelligence Staff, | Year 2. | Approved trail rehabilitation plan. | Working for Wetlands rehabilitation guidelines.<br><br>The use of soft options for dryland erosion |

| Objectives | Actions | Responsibility | Timeframe | Measurable Indicators / Outputs | References / Existing Procedures |
|---|---|---|---|---|---|
| | • Identify scope, methods and frequency for rehabilitation interventions.<br>• Produce a trail rehabilitation plan.<br>• *This objective correlates with 5.3.* | Integrated Catchment Specialist, Restoration Ecologist. | | | rehabilitation work on conservancy land – Department of Forestry, Fisheries and the Environment. |
| | • Annual implementation of trail rehabilitation interventions – through the Integrated Work Planning cycle.<br>• Build and expand existing partnership with National Working for Wetlands Programme to obtain funding and technical expertise for trail rehabilitation interventions. | **Lead:** Conservation Manager On-Reserve.<br>**Enablers:** Integrated Catchment Specialist, Protected Area Staff. | Year 2 and beyond. | Meters of trails maintained or rehabilitated.<br><br>Allocation of Natural Resource Management funding received. | Integrated Work Plan.<br><br>Groot Winterhoek trail rehabilitation plan. |
| **Objective 1.8:**<br>By 2025, the Groot Winterhoek Complex will have a fish rehabilitation plan. | • Identify internal and external stakeholders to contribute to the development process.<br>• Evaluate the priority and feasibility of implementing a fish rehabilitation project for the Kliphuis and 24 Rivers within the Groot Winterhoek Complex within the following context:<br>• The removal of alien fish and the introduction of indigenous species below the “Die Hel” waterfall.<br>• The introduction of additional indigenous fish species above the “Die Hel” waterfall.<br>• Produce a fish rehabilitation feasibility report. | **Lead:** Conservation Manager On-Reserve.<br>**Enablers:** Freshwater Ecologist, Fauna Ecologist: West, Landscape Conservation Intelligence Staff, Integrated Catchment Specialist. | Year 1-5. | Approved fish rehabilitation plan. | Rivers of Importance in the Berg Water Management Area and Associated Management Issues – Impson and Henning 2019. |
| | • Implement fish rehabilitation interventions – through appropriate funding streams when required. | **Lead:** Conservation Manager On-Reserve.<br>**Enablers:** Integrated Catchment Specialist, Protected Area Staff. | Years 6-10. | Meters of river rehabilitated. | Groot Winterhoek fish rehabilitation plan. |

| INTEGRATED COMPLIANCE AND ENFORCEMENT | | | | | |
|---|---|---|---|---|---|
| **STRATEGY 2:** | Ensure legal and sustainable use and access to the natural and heritage features of the Groot Winterhoek Complex to reduce anthropogenic impacts. | | | | |
| **GOALS:** | By 2031, the terrestrial ecosystems in the Groot Winterhoek Complex have an ecologically healthy fire regime* and comprises at least 95% indigenous species.<br>By 2031, the state of all pre-colonial heritage sites has been determined and all unnatural disturbances to heritage features within the Groot Winterhoek Complex are managed to maintain or improve (where possible) the current conditions.<br>By 2031, all human disturbance to heritage structures within the Groot Winterhoek Complex is limited, maintained in the current state, or, if feasible, the condition is improved.<br>By 2031, access to, and sustainable utilisation of, natural resources within the Groot Winterhoek Complex are in accordance with CapeNature policy and procedures.<br>By 2031, the Groot Winterhoek Complex environmental education and awareness programme will promote ecological targets and human well-being values. | | | | |
| **THREATS:** | Illegal resource use, illegal access, vandalism, agricultural water impacts, fire damage to heritage features. | | | | |
| **Objectives** | **Actions** | **Responsibility** | **Timeframe** | **Measurable Indicators / Outputs** | **References / Existing Procedures** |
| **Objective 2.1:** By 2021, the Groot Winterhoek Complex will have a revised integrated compliance plan. | • Identify internal and external stakeholders to contribute to the revision process.<br>• Revise the Groot Winterhoek Integrated Compliance Plan in-line with the latest management plan information by year one.<br>• Ensure the Integrated Compliance Plan addresses the threat to heritage vandalism adequately. | **Lead:** Conservation Manager On-Reserve. **Enablers:** Conservation Manager Off-Reserve, Landscape Manager, Compliance and Enforcement Specialist. | Year 1. | Approved Integrated and Compliance Plan. | Integrated Compliance Plan. |
| | • Annually implement the Groot Winterhoek Integrated Compliance Plan.<br>• Identify specific target groups within the hotspots/high threat areas of the Groot Winterhoek Complex and zone of influence (*e.g.,* communities, landowners, partners, schools *etc.*). for either compliance or compliance awareness action. | **Lead:** Conservation Manager On-Reserve. **Enablers:** Conservation Manager Off-Reserve, Landscape Manager, Compliance and Enforcement Specialist. | Year 2 and beyond. | Number of compliance activities and cases/fines.<br><br>Number of Environmental Management Inspectors trained and appointed. | Criminal Procedure Act, 1977 (Act No. 51 of 1977).<br><br>Integrated Work Plan.<br><br>Integrated Compliance Plan |

| Objectives | Actions | Responsibility | Timeframe | Measurable Indicators / Outputs | References / Existing Procedures |
|---|---|---|---|---|---|
| | • Provide relevant compliance training to protected area staff applicable to their function and mandate.<br>• Ensure all new appointed staff receive appropriate training within their first year. | | | Number of Peace Officers trained and appointed. | Compliance and Enforcement Training Strategy / Audit |
| **Objective 2.2:** By 2023, the Groot Winterhoek Complex will have strong and active partnerships with all stakeholders in the zone of influence. | • Setup and improve and maintain collaboration with relevant partners law enforcement partners (SAPS/Farm Watch Groups/Neighbours) in all four zones around the Groot Winterhoek Complex – north/south/west and east).<br>• Setup and ensure a strong functioning Protected Area Advisory Committee that meets regularly. | **Lead:** Conservation Manager On-Reserve. **Enablers:** Conservation Manager Off-Reserve, Landscape Manager, Compliance and Enforcement Specialist. | Year 3 and beyond. | Number of functional interactions via digital channels.<br><br>Minutes of Protected Area Advisory Committee. | Integrated Compliance Plan. |
| **Objective 2.3:** By 2024, natural resource users in and around the Groot Winterhoek Complex will be familiar with the CapeNature Natural Resource Utilisation Policy and permit requirements. | • Produce a summary brochure or information page with the relevant information and guidance for both Natural Resource User Groups and landowners.<br>• Conduct workshops with Natural Resource User Groups and neighbours in identified hotspots.<br>• Implement the approved Natural Resource Utilisation Policy and Permitting System. | **Lead:** Conservation Manager On-Reserve. **Enablers:** Stakeholder Engagement Officer, Conservation Manager Off-Reserve, Protected Area Staff. | Year 4. | Summary brochure produced.<br><br>One workshop conducted in each hotspot.<br><br>Number of resource use permits issued. | Natural Resource Utilisation Policy.<br><br>Permit System.<br><br>Integrated Compliance Plan. |
| **Objective 2.4:** By 2022, assess the scope and impact of possible agricultural pollution on the Groot Kliphuis River. | • Assess initial river condition via SASS scoring and water quality testing over a two-year period.<br>• Assess results and determine best course of mitigation action if needed.<br>• In conjunction with relevant departments, implement mitigation and monitoring actions if/when needed. | **Lead:** Conservation Manager On-Reserve. **Enablers:** Freshwater Ecologist, Conservation Manager Off-Reserve, Protected Area Staff. | Year 2 and beyond. | Monitoring data and results.<br><br>Minutes of engagements with relevant departments involved with mitigation (if needed). | SASS monitoring protocol. |

| ENVIRONMENTAL EDUCATION AND AWARENESS | |
|---|---|
| **STRATEGY 3:** | Promote and expand awareness of the Groot Winterhoek Complex's ecological and heritage targets and their contribution towards ecological infrastructure and human well-being. |
| **GOALS:** | By 2031, the terrestrial ecosystems in the Groot Winterhoek Complex have an ecologically healthy fire regime* and comprises at least 95% indigenous species.<br>By 2031, the upper and middle river reaches in the Groot Winterhoek Complex support macro invertebrate species communities with an ASPT of 6 - ≥8* and viable indigenous fish communities are present in on-reserve rivers identified for fish conservation**.<br>By 2031, the health of the wetland ecosystems in the Groot Winterhoek Complex will be in at least a near-natural* condition, and riparian zones and wetland buffers will have an indigenous vegetation cover of at least 95%.<br>By 2031 the Groot Winterhoek Complex will, through integrated catchment management, protect and enhance the provision of water quality and quantity contributing to the water resilience for the Berg and Olifants catchment areas.<br>By 2031, the state of all pre-colonial heritage sites has been determined and all unnatural disturbances to heritage features within the Groot Winterhoek Complex are managed to maintain or improve (where possible) the current conditions.<br>By 2031, all human disturbance to heritage structures within the Groot Winterhoek Complex is limited, maintained in the current state, or, if feasible, the condition is improved.<br>By 2031, access to, and sustainable utilisation of, natural resources within the Groot Winterhoek Complex are in accordance with CapeNature policy and procedures.<br>By 2031, the Groot Winterhoek Complex environmental education and awareness programme will promote ecological targets and human well-being values. |
| **THREATS:** | Inappropriate fire regime, invasive alien plants, climate change, Illegal resource use, illegal access, vandalism, agricultural water impacts, fire damage to heritage features, lack of maintenance of heritage structures. |

| Objectives | Actions | Responsibility | Timeframe | Measurable Indicators / Outputs | References / Existing Procedures |
|---|---|---|---|---|---|
| **Objective 3.1:**<br>By 2022, the Groot Winterhoek Complex will have a revised environmental education and awareness programme. | • Identify internal and external stakeholders to contribute to the revision process.<br>• Revise and have the plan approved by year two.<br>• Include themes for fire awareness, invasive alien species, indigenous fish, heritage, and compliance. | **Lead:** Stakeholder Engagement Officer.<br>**Enablers:** Protected Area Staff. | Year 2. | Approved environmental education and awareness programme. | Environmental education and awareness programme.<br><br>Biodiversity Crime Awareness Pamphlet |
| | • Implement the environmental education and awareness activities annually, guided by both the Groot Winterhoek Complex environmental | **Lead:** Stakeholder Engagement Officer. | Year 3 and beyond. | Number of stakeholder environmental | Integrated Work Plan. |

| Objectives | Actions | Responsibility | Timeframe | Measurable Indicators / Outputs | References / Existing Procedures |
|---|---|---|---|---|---|
| | education and awareness programme as well as the Groot Winterhoek Integrated Compliance Plan.<br>• Identify specific target groups within the hotspots/high threat areas and zone of influence (*e.g.,* communities, landowners, partners, schools *etc.*). | **Enablers:** Protected Area Staff. | | education and awareness activities. | Integrated Compliance Plan. |
| **Objective 3.2:** By 2024, signage has been erected in-line with the revised Groot Winterhoek Complex environmental education and awareness programme. | • In conjunction with Marketing and Communication Department, develop and produce relevant signboards.<br>• Identify key signage requirements (fire/heritage/Berg River redfin) awareness and the promotion of the Groot Winterhoek World Heritage Site as a wilderness tourism destination.<br>• Have signage printed and erected.<br>• Move the De Hoek Estate no entry signboard to the weir or a more appropriate locality.<br>• Erect a no entry signboard at Rooiland (Sneeugat trail).<br>• Mark and maintain the Groot Winterhoek Complex boundary rock beacons on a five-year cycle. | **Lead:** Conservation Manager On-Reserve.<br>**Enablers:** Stakeholder Engagement Officer, Marketing and Communication Department, Protected Area Staff. | Year 4. | Signage erected and captured into infrastructure register. | Internal signage guidelines.<br><br>Environmental education and awareness programme. |
| **Objective 3.3:** By 2023, the CapeNature website will promote the Groot Winterhoek Complex targets with an emphasis on its World Heritage Site status and heritage targets. | • Incorporate the Groot Winterhoek Complex targets with an emphasis on heritage within the CapeNature website – site page. | **Lead:** Conservation Manager On-Reserve.<br>**Enablers:** Marketing and Communication Department. | Year 3. | Updated CapeNature website site page. | Protected Area Management Plan. |
| **Objective 3.4:** By 2021, the Groot Winterhoek Complex will promote research and knowledge development. | • Create an enabling environment to accommodate students, researchers, and volunteers to contribute to projects on the Groot Winterhoek Complex. | **Lead:** Conservation Manager On-Reserve.<br>**Enablers:** Landscape Conservation | Year 1 and beyond. | Number of Groot Winterhoek Complex Researchers (Recorded in Research Register). | Research Permit. |

| Objectives | Actions | Responsibility | Timeframe | Measurable Indicators / Outputs | References / Existing Procedures |
|---|---|---|---|---|---|
| | | Intelligence Staff, Protected Area Staff. | | | |
| | • Revise and finalise the Memorandum of Understanding with Educo Africa in support of youth development. | **Lead:** Conservation Manager On-Reserve **Enablers:** Stakeholder Engagement Officer, Protected Area Staff. | Year 1. | Signed Memorandum of Understanding. | Protected Area Management Plan.<br><br>Existing Memorandum of Understanding. |

| HERITAGE MANAGEMENT | | | | | |
|---|---|---|---|---|---|
| **STRATEGY 4:** | Enhance the management and protection of the Groot Winterhoek Complex's heritage features through effective partnerships. | | | | |
| **GOALS:** | By 2031, the state of all pre-colonial heritage sites has been determined and all unnatural disturbances to heritage features within the Groot Winterhoek Complex are managed to maintain or improve (where possible) the current conditions.<br>By 2031, all human disturbance to heritage structures within the Groot Winterhoek Complex is limited, maintained in the current state, or, if feasible, the condition is improved.<br>By 2031, access to, and sustainable utilisation of, natural resources within the Groot Winterhoek Complex are in accordance with CapeNature policy and procedures. | | | | |
| **THREATS:** | Vandalism, fire damage to heritage features, lack of maintenance of heritage structures. | | | | |
| **Objectives** | **Actions** | **Responsibility** | **Timeframe** | **Measurable Indicators / Outputs** | **References / Existing Procedures** |
| **Objective 4.1:** By 2031, the Groot Winterhoek Complex will have a heritage management plan. | • Identify stakeholders and partners to assist with baseline heritage surveys.<br>• Conduct a formal baseline heritage survey through the Groot Winterhoek Complex.<br>• Ensure all new heritage resources are captured in the Groot Winterhoek Complex heritage register. | **Lead:** Conservation Manager On-Reserve. **Enablers:** Stakeholder Engagement Officer, Protected Area Staff. | Year 1-5. | Groot Winterhoek Complex heritage register. | Draft CapeNature Heritage Inventory Monitoring Protocol. |
| | • In partnership with Heritage Western Cape, draft an updated heritage management plan for the Groot Winterhoek Complex.<br>• Annually implement the recommendations made by the heritage management plan. | **Lead:** Conservation Manager On-Reserve. **Enablers:** Stakeholder Engagement Officer, Protected Area Staff. | Year 6-10. | Approved heritage management plan.<br><br>Heritage management interventions listed in Integrated Work Plan.<br><br>Heritage monitoring interventions listed in Eco-matrix. | CapeNature and Heritage Western Cape Memorandum of Understanding. |
| **Objective 4.2:** By 2023, the Groot Winterhoek Complex management team will have | • Investigate and conduct heritage awareness, management and monitoring training for all Groot Winterhoek Complex management staff | **Lead:** Conservation Manager On-Reserve. **Enablers:** Stakeholder Engagement Officer. | Year 3 and beyond. | Number of heritage training events conducted. | CapeNature and Heritage Western Cape Memorandum of Understanding. |

| Objectives | Actions | Responsibility | Timeframe | Measurable Indicators / Outputs | References / Existing Procedures |
|---|---|---|---|---|---|
| appropriate heritage management and monitoring skills. | in conjunction with Heritage Western Cape or an independent heritage specialist.<br>• Ensure all new appointed staff receive appropriate training within their first year. | | | | |
| **Objective 4.3:** By 2023, the Groot Winterhoek Complex will conduct focussed awareness interventions to combat vandalism of rock art. | • Implement the environmental education and awareness activities annually, guided by both the Groot Winterhoek Complex environmental education and awareness programme as well as the Groot Winterhoek Integrated Compliance Plan.<br>• Identify specific target groups within the hotspots/high threat areas and zone of influence (*e.g.,* communities, landowners, partners, schools *etc.*).<br>• *This objective correlates with 3.1.* | **Lead:** Conservation Manager On-Reserve.<br>**Enablers:** Stakeholder Engagement Officer, Protected Area Staff. | Year 3 and beyond. | Number of stakeholder environmental education and awareness activities. | Environmental education and awareness programme<br><br>Groot Winterhoek Integrated Compliance Plan. |

| ACCESS AND LOCAL ECONOMIC DEVELOPEMNT | | | | | |
|---|---|---|---|---|---|
| **STRATEGY 5:** | Promote responsible access to the he Groot Winterhoek World Heritage Site as a unique ecotourism destination and contribute to local economic development and social upliftment. | | | | |
| **GOALS:** | By 2031 the Groot Winterhoek Complex will, through integrated catchment management, protect and enhance the provision of water quality and quantity contributing to the water resilience for the Berg and Olifants catchment areas.<br>By 2031, access to, and sustainable utilisation of, natural resources within the Groot Winterhoek Complex are in accordance with CapeNature policy and procedures.<br>By 2031, the Groot Winterhoek Complex environmental education and awareness programme will promote ecological targets and human well-being values.<br>By 2031, the state of all pre-colonial heritage sites has been determined and all unnatural disturbances to heritage features within the Groot Winterhoek Complex are managed to maintain or improve (where possible) the current conditions.<br>By 2031, all human disturbance to heritage structures within the Groot Winterhoek Complex is limited, maintained in the current state, or, if feasible, the condition is improved. | | | | |
| **THREATS:** | Inappropriate fire regime, inappropriate jeep tracks and hiking trails, illegal access, vandalism, fire damage to heritage features. | | | | |
| **Objectives** | **Actions** | **Responsibility** | **Timeframe** | **Measurable Indicators / Outputs** | **References / Existing Procedures** |
| **Objective 5.1:**<br>By 2023, the Groot Winterhoek Complex zone of influence has been incorporated into municipal planning products. | • Identify local municipal Spatial Development Framework review cycles for Bergrivier, Drakenstein and Witzenberg municipalities and ensure incorporation of the Groot Winterhoek Complex zone of influence into the spatial planning products.<br>• Identify district municipal Spatial Development Framework review cycles for West Coast and Cape Winelands municipalities and ensure incorporation of the Groot Winterhoek Complex zone of influence into the spatial planning products. | **Lead:** Conservation Manager On-Reserve.<br>**Enablers:** Landscape Conservation Intelligence Manager, Biodiversity Mainstreaming Specialist. | Year 3. | Comments and spatial data submitted.<br><br>Zone of influence reflected in municipal Spatial Development Framework. | Western Cape Biodiversity Spatial Plan<br><br>Western Cape Provincial Spatial Development Framework<br><br>Western Cape Land Use Planning Act. |
| **Objective 5.2:**<br>By 2026, the Groot Winterhoek Complex promotes responsible heritage tourism. | • Identify and assess the possibility for establishing a unique heritage tourism product/interpretation trail to showcase the rock art of the Groot Winterhoek Complex. | **Lead:** Conservation Manager On-Reserve.<br>**Enablers:** Marketing and Communication Department, Protected Area Staff. | Year 6. | Signage erected and captured into infrastructure register. | Internal signage guidelines.<br><br>Protected Area Management Plan. |

| Objectives | Actions | Responsibility | Timeframe | Measurable Indicators / Outputs | References / Existing Procedures |
|---|---|---|---|---|---|
| | • Promote heritage tourism at hiking overnight sites within the reserve through appropriate means (signage/brochure). | | | | |
| **Objective 5.3:** By 2021, the Groot Winterhoek Complex promotes environmentally sensitive and financially sustainable access. | • Conservation Operations, Biodiversity Capabilities and Eco-Tourism and Access directorates meet and agree on a common principle of use of the De Tronk, Agterdam and Perdevlei jeep tracks within the Groot Winterhoek Complex.<br>• Compile a formal submission from the meeting outcome and submit to the Chief Executive Officer for approval.<br>• Upgrade the water supply at Ribbok hut.<br>• Install an eco-loo system at Ribbok hut.<br>• Initiate the upgrade of the staff village bio-digester system. | **Lead:** Conservation Manager On-Reserve. **Enablers:** Landscape Manager, Landscape Conservation Intelligence Manager, Integrated Catchment Specialist. | Year 1. | Minutes of directorate meeting.<br><br>Approved submissions.<br><br>Installation of relevant water and sewage infrastructure. | Protected Area Management Plan.<br><br>Previous Quarterly Ecological Meeting minutes. |
| **Objective 5.4:** By 2023, the Groot Winterhoek Complex has assessed potential tourism products for implementation. | • Identify stakeholders and partners to assist with identification of additional tourism possibilities.<br>• Assess feasibility and funding potential.<br>• Obtain funding and implement project roll-out when required. | **Lead:** Conservation Manager On-Reserve. **Enablers:** Landscape Manager, Tourism and Infrastructure Development. | Year 3 and beyond. | Tourism assessment undertaken.<br><br>Implementation of possible tourism projects. | Protected Area Management Plan.<br><br>Zonation.<br><br>Sensitivity.<br><br>Project plans. |

# 11 COSTING

This section provides an overview of costing and fund allocation for strategies. It outlines the existing financial resources (current budget), funding shortfalls, sources of alternate funding and future financial projections.

## 11.1 Finance and Asset Management

In line with the legal requirement, the strategies identified for implementation within the Groot Winterhoek Complex, to achieve the desired state, have been costed below.

The complex will adhere to the guiding principles listed below:

- Responsibly manage the allocation of budget, revenue raising activities and expenditure;
- Ensure solid financial management supporting the achievement of the objectives of this plan;
- Compliance with the Public Finance Management Act, 1999 (Act No. 1 of 1999) as well as CapeNature's financial policies and procedures.

A budget was derived based upon the activities in this management plan. When estimating the costing, the following items were considered:

- Those costs and associated resources which could be allocated to specific activities and which were of a recurring nature;
- Those costs and associated resources which could be allocated to specific activities, but which were of a once off nature;
- Unallocated fixed costs (water, electricity, phones, bank fees, *etc.*);
- Maintenance of infrastructure;
- Provision for replacement of minor assets, (furniture, electronic equipment, vehicles, *etc.*).

### 11.1.1 Income

CapeNature's budget is funded by the Medium-Term Expenditure Framework (MTEF) allocation, other government grants and generated from own revenue sources derived from commercial activities. Any surplus revenue generated is used to fund shortfalls in management costs across the organisation.

CapeNature has overhead costs relating to support services such as human resources, communications, marketing and learning, finance, biodiversity capabilities, conservation operations, eco-tourism and access, legal services, *etc.* which is not allocated to individual protected area complexes and must also be funded through grant funding or own revenue generated.

This management plan is a 10-year plan, and thus straddles multiple MTEF periods that impact on actual budget allocation and projection. Due to the challenging fiscal position the country faces, and additional strain brought on by the COVID-19 pandemic, the organisation is facing budget cuts and reduced tourism income that will have to be considered during the implementation of this management plan.

Total income projected for 2021/22 is budgeted at R 2 082 028. An annual summary is presented in Table 11.1.

**Table 11.1:** An annual summary of the total projected income for the Groot Winterhoek Complex.

| Allocation | 2021/22 |
|---|---|
| Total Income | R 2 082 028.00 |
| Medium Term Expenditure Framework Allocation | R 288 720.00 |
| Projected Tourism Income* | R 198 200.00 |
| External Funding (Expanded Public Works Programme) | R 717 481.00 |
| External Funding (Working for Wetlands)** | R 877 627.00 |

* Tourism income does not get allocated directly to the Groot Winterhoek Complex budget.
** Working for Wetlands allocated budget for 2020-22.

### 11.1.2 Expenditure

#### 11.1.2.1 Recurring costs

Annual direct costs may include staff, transport and travel, stores and equipment and fixed costs. This expenditure is split according to strategies as illustrated in Figure 11.1.

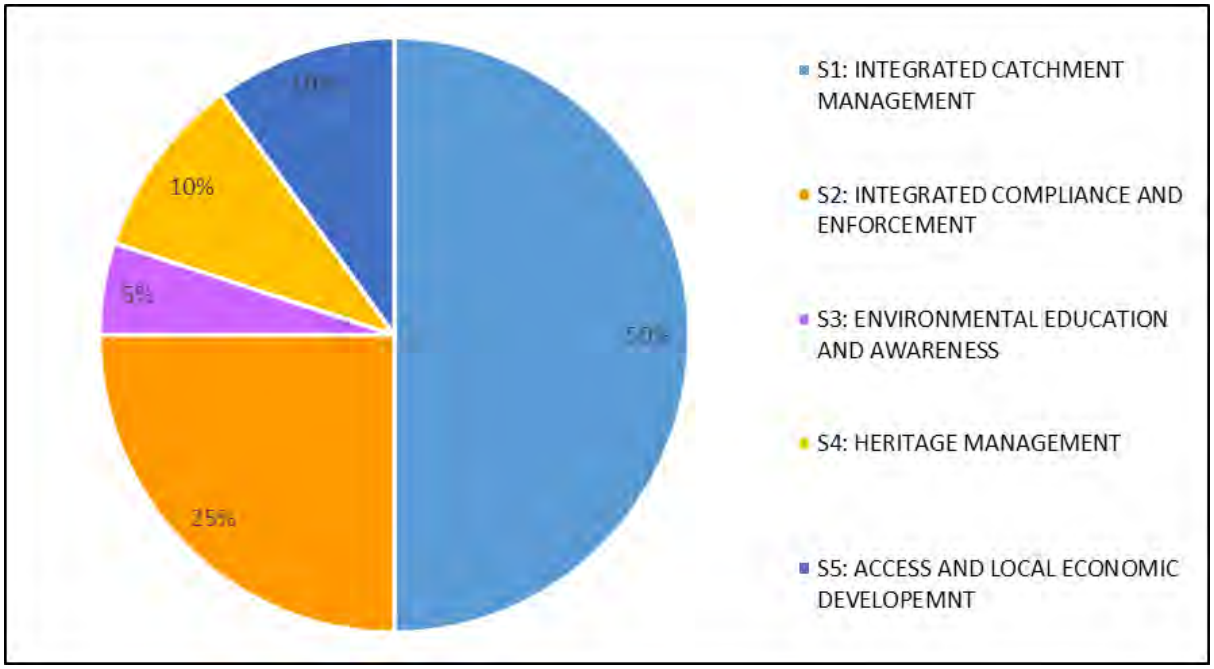


**Figure 11.1:** The estimated proportion of annual operational costs for the Groot Winterhoek Complex for year 2021/22 aligned with the identified and prioritised strategies.

#### 11.1.2.2 Once off costs

In addition to the recurring costs there might be once-off replacement costs of assets, *e.g.,* tractor, firefighting equipment, field equipment, *etc*. that are aligned with the life span of the relevant assets being replaced.

#### 11.1.2.3 Maintenance

An annual earmarked allocation is provided for the development of new tourism infrastructure, upgrades and maintenance of existing tourism and management infrastructure. Tourism projects are prioritised across all CapeNature facilities and maintenance is scheduled accordingly.

#### 11.1.2.4 Implications

Unsuccessful securing of external funding and replacement of crucial capital equipment could lead to potential shortfall and will have a negative impact on strategies throughout. Further reductions in organisational budget can be expected during the management plan cycle. The implications of this being that the strategic plan may not be fully achieved. Available funding will have to be prioritised accordingly.

A zero-based budget approach is needed to determine the true financial needs of the complex.

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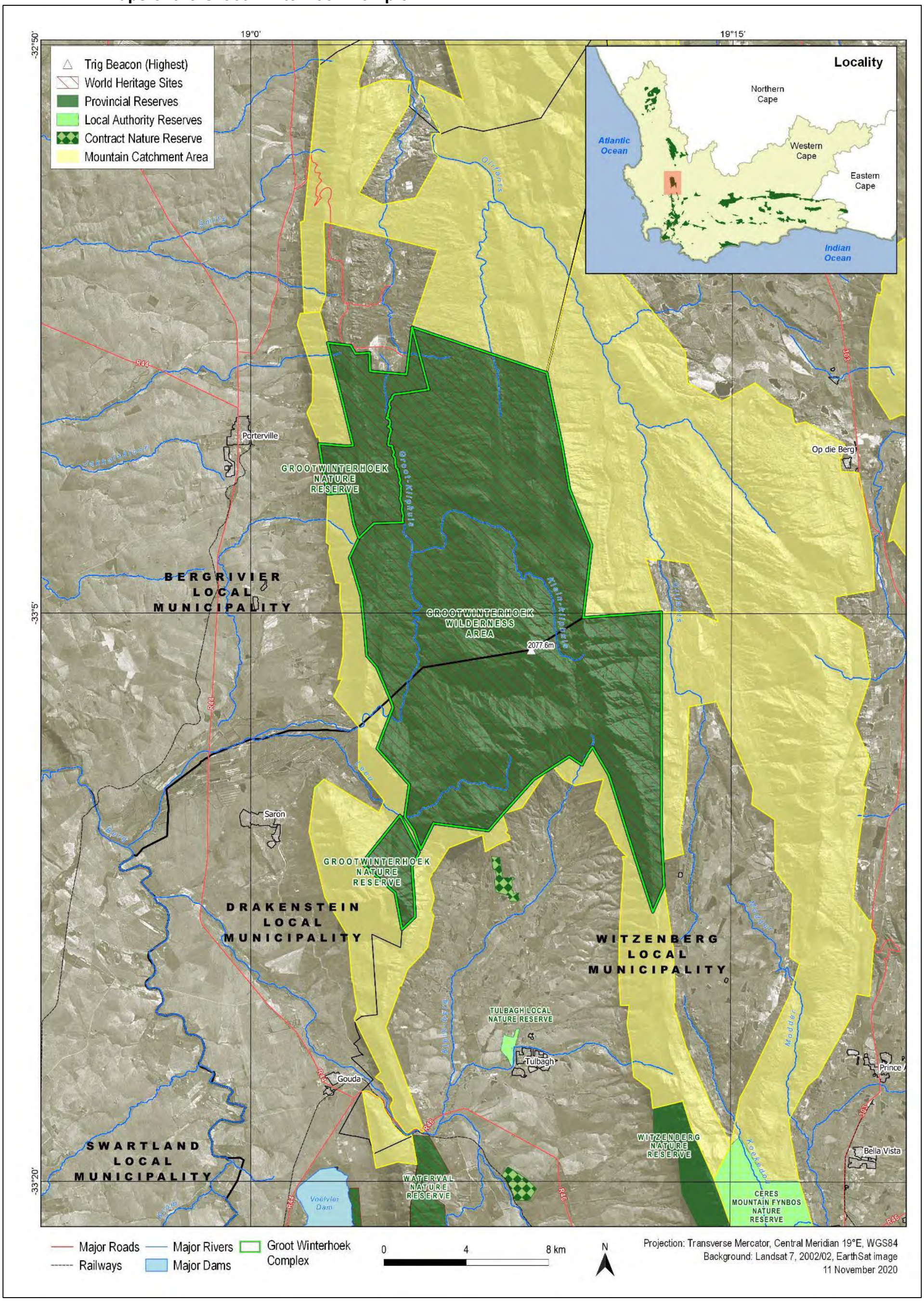
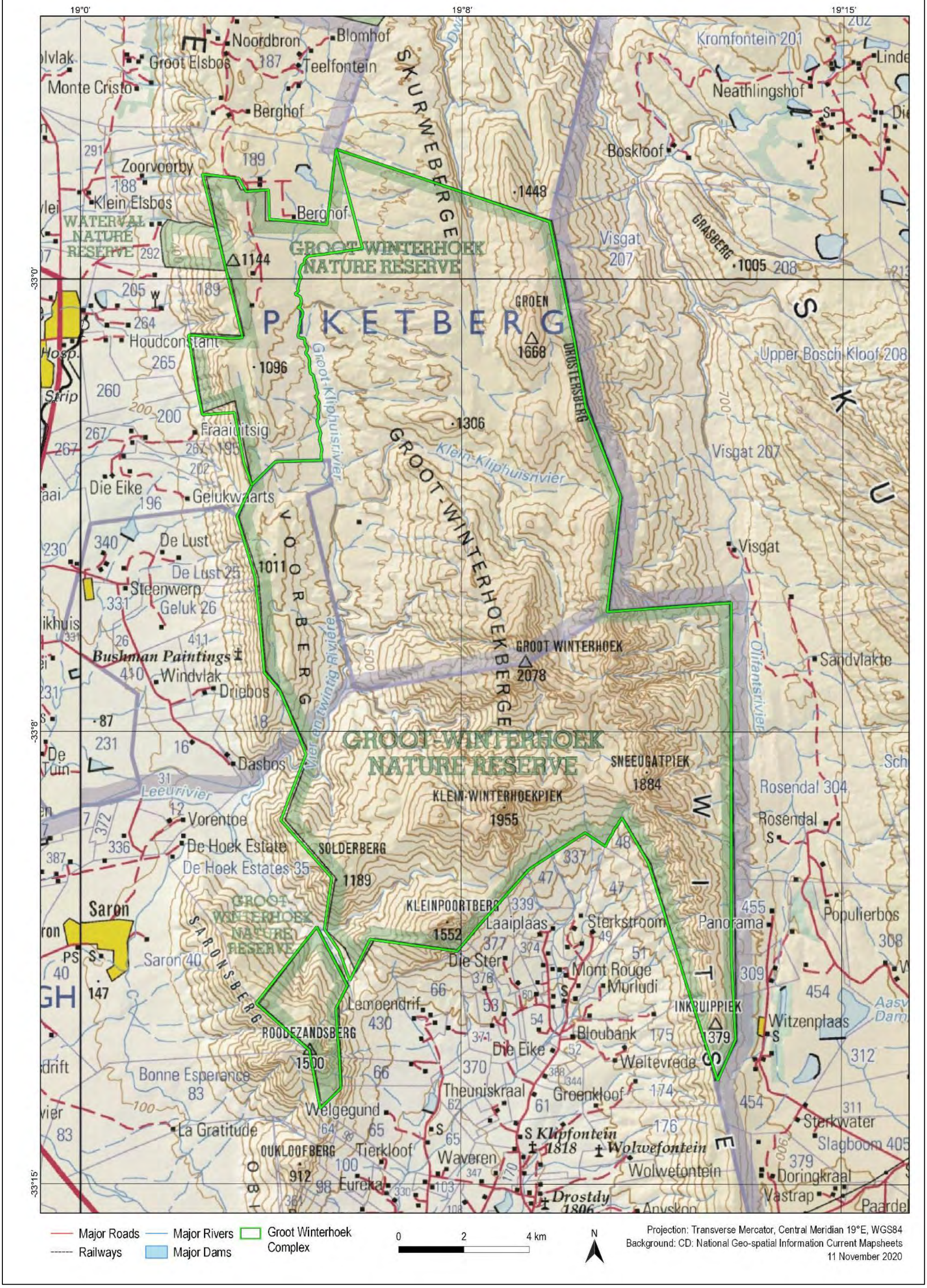
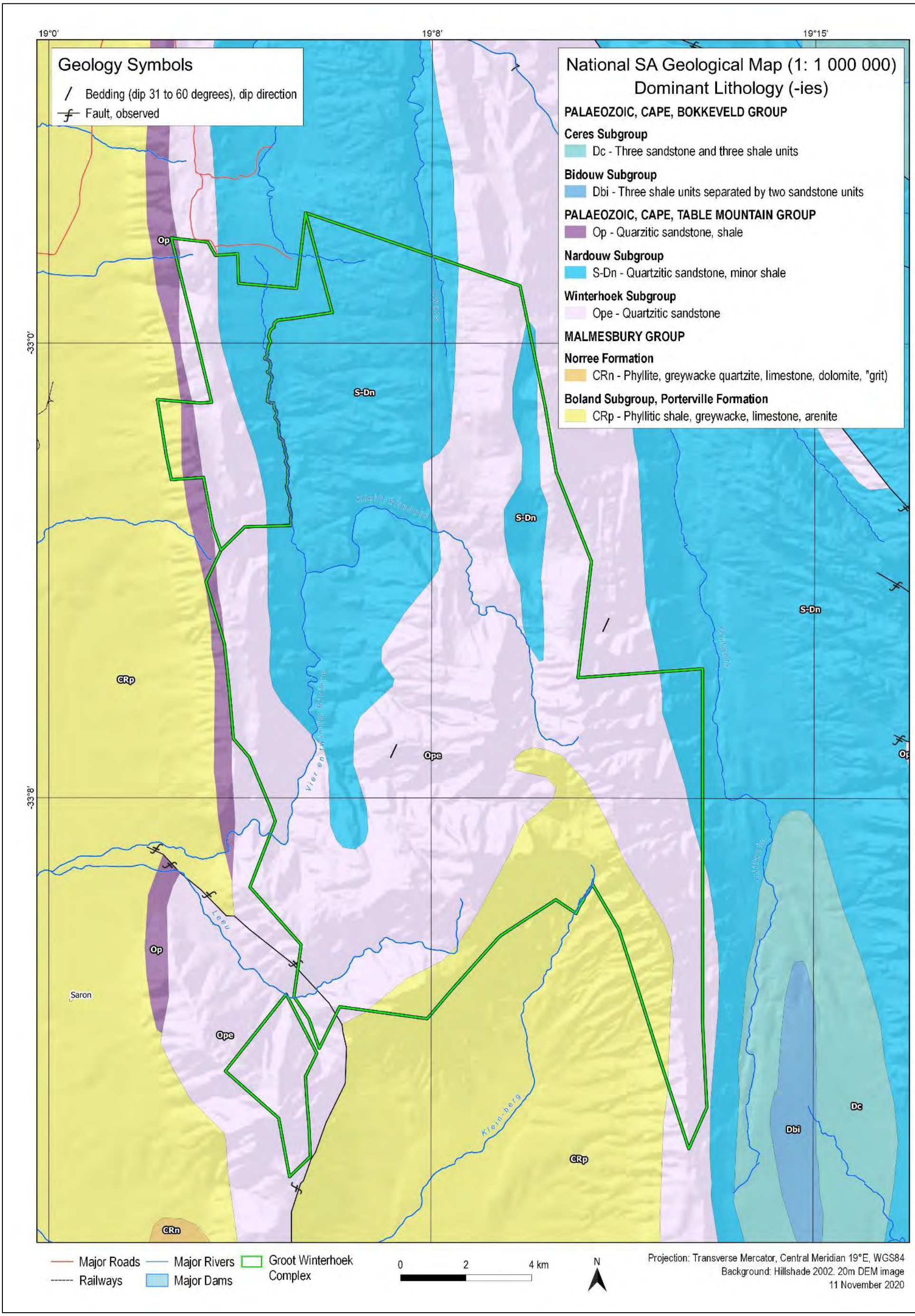
## APPENDIX 1 Maps of the Groot Winterhoek Complex.




**Map 1:** Location and extent of the Groot Winterhoek Complex.

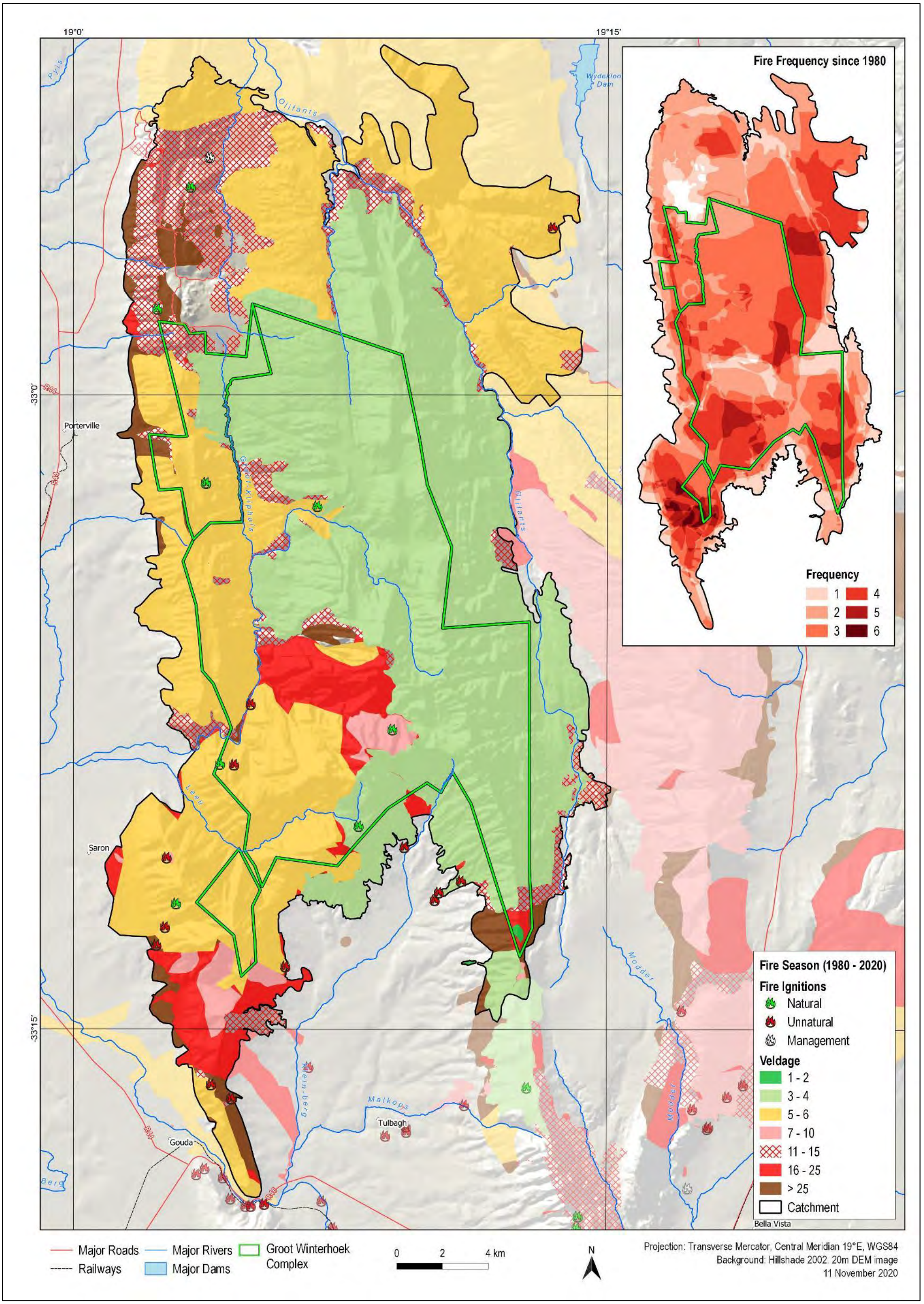



**Map 2:** Topography of the Groot Winterhoek Complex.

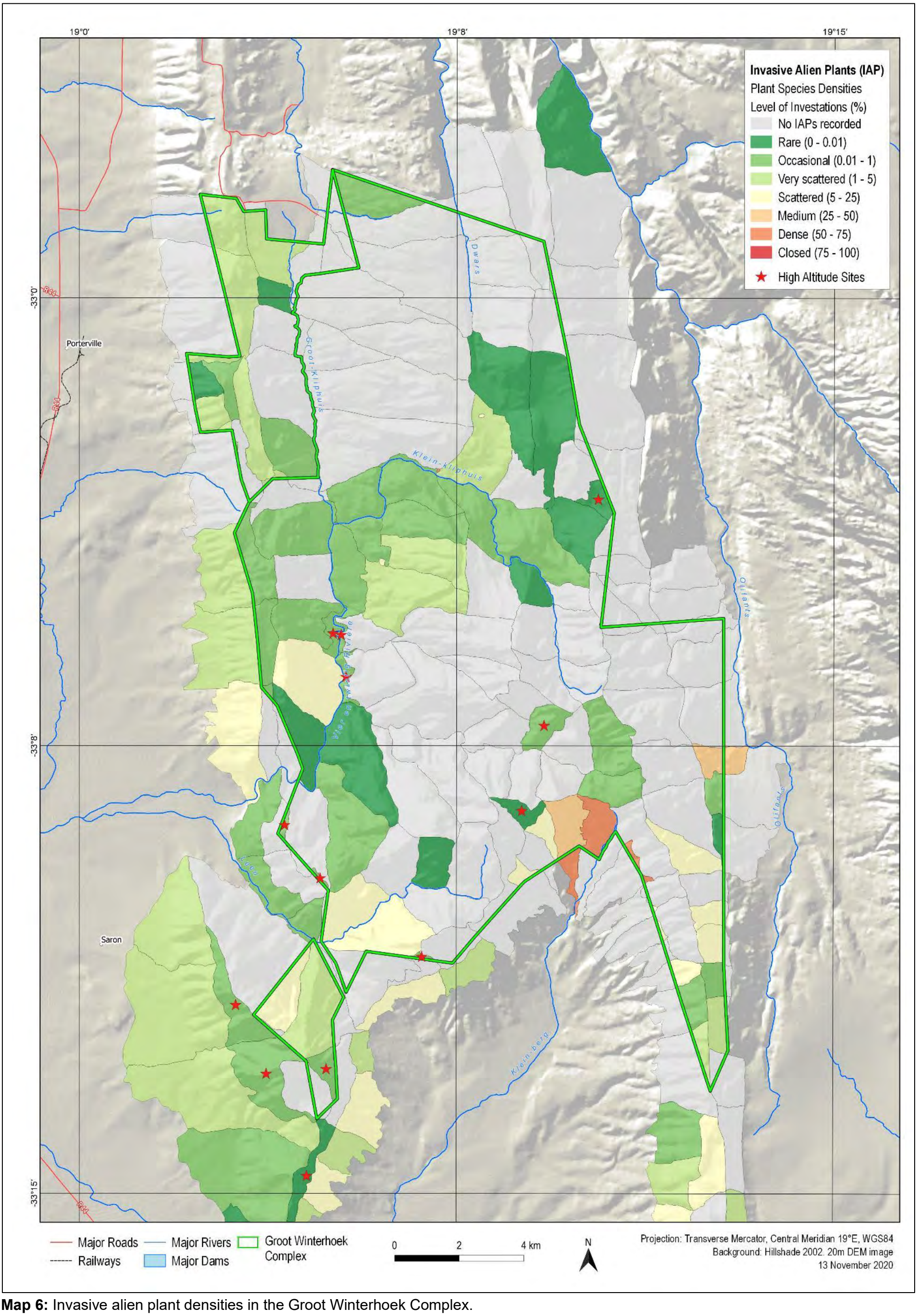



**Map 3:** Geology of the Groot Winterhoek Complex.

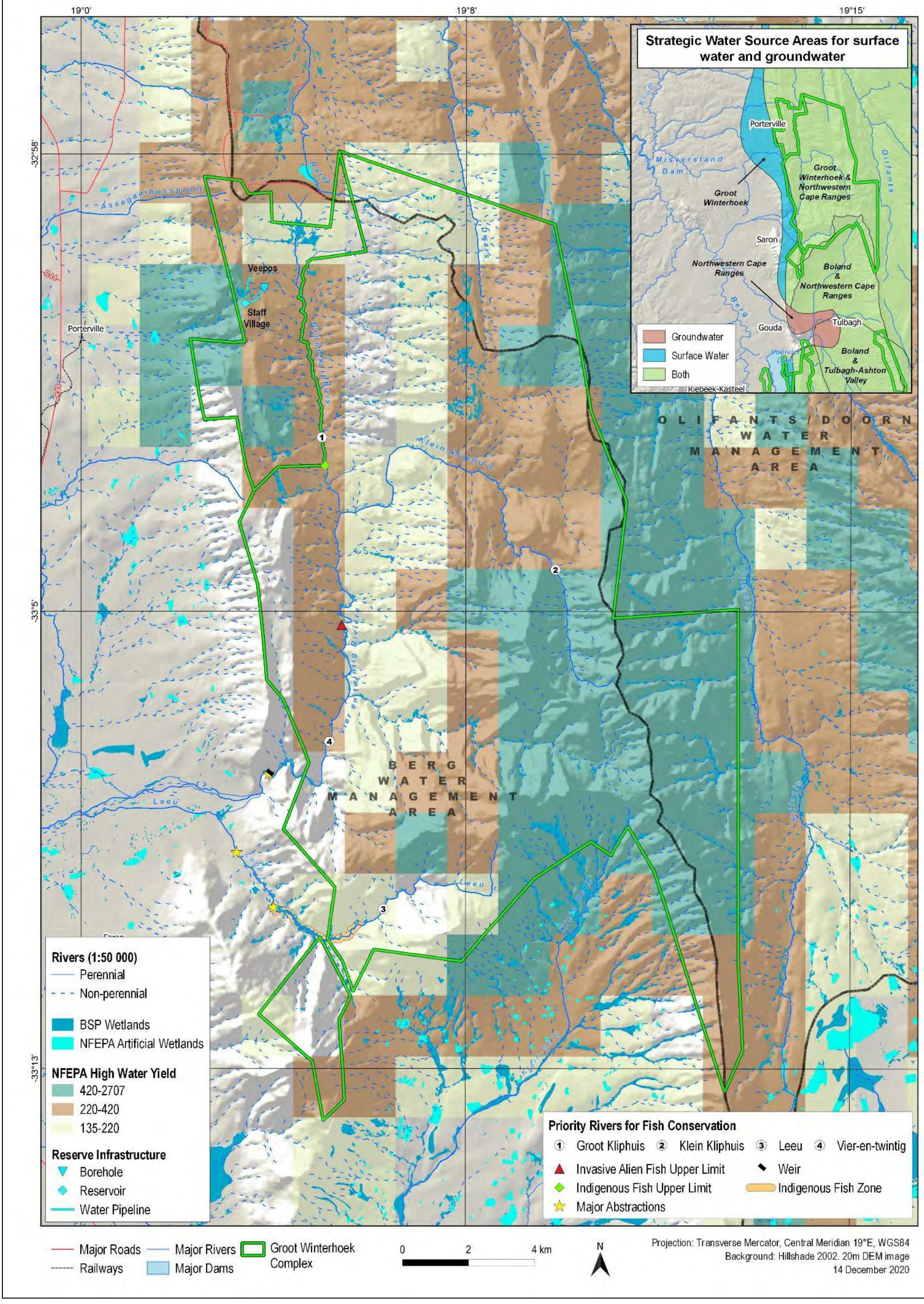
**Map 4:** Vegetation of the Groot Winterhoek Complex.



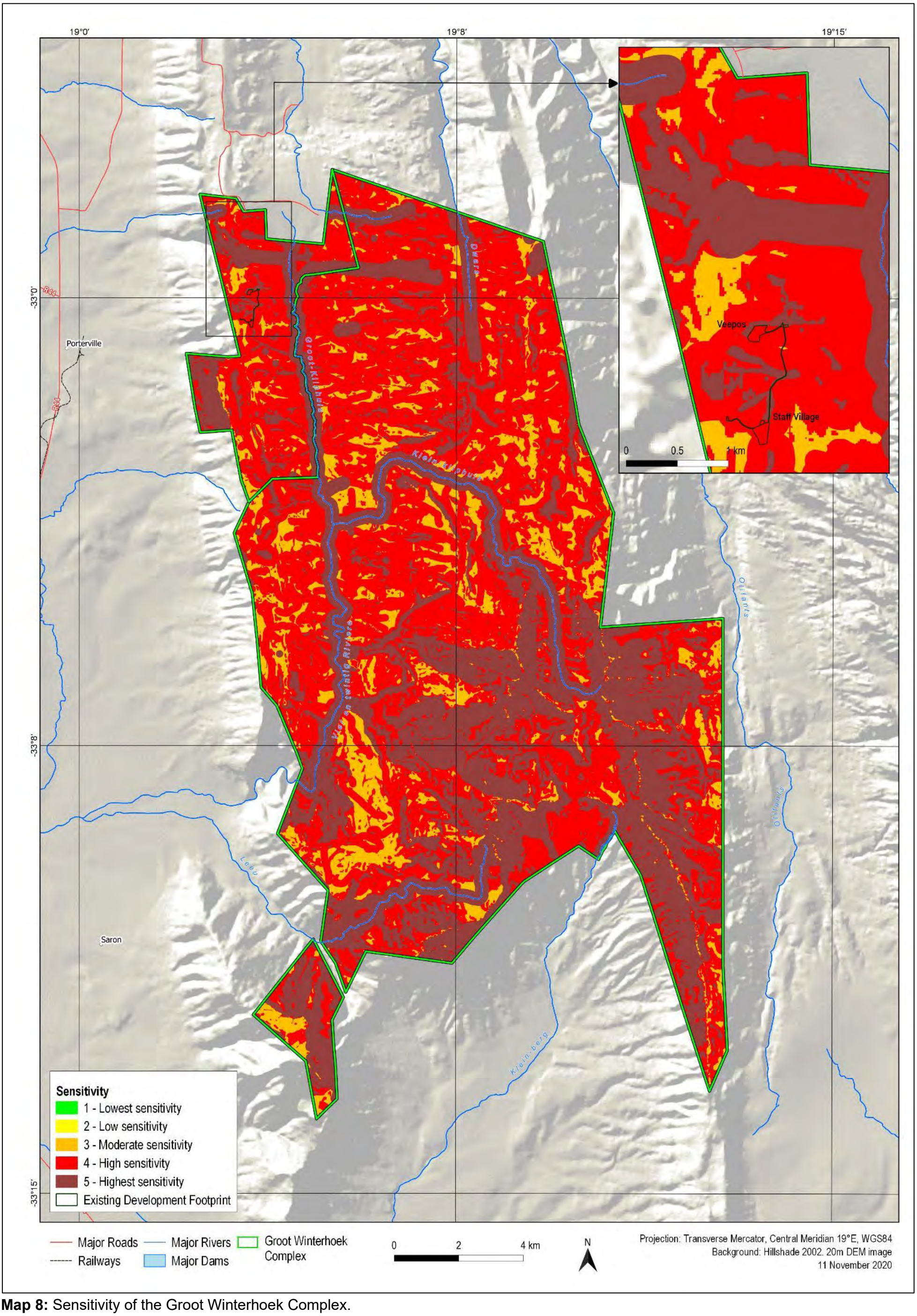

**Map 5:** Veld age and fire frequency of the Groot Winterhoek Complex.



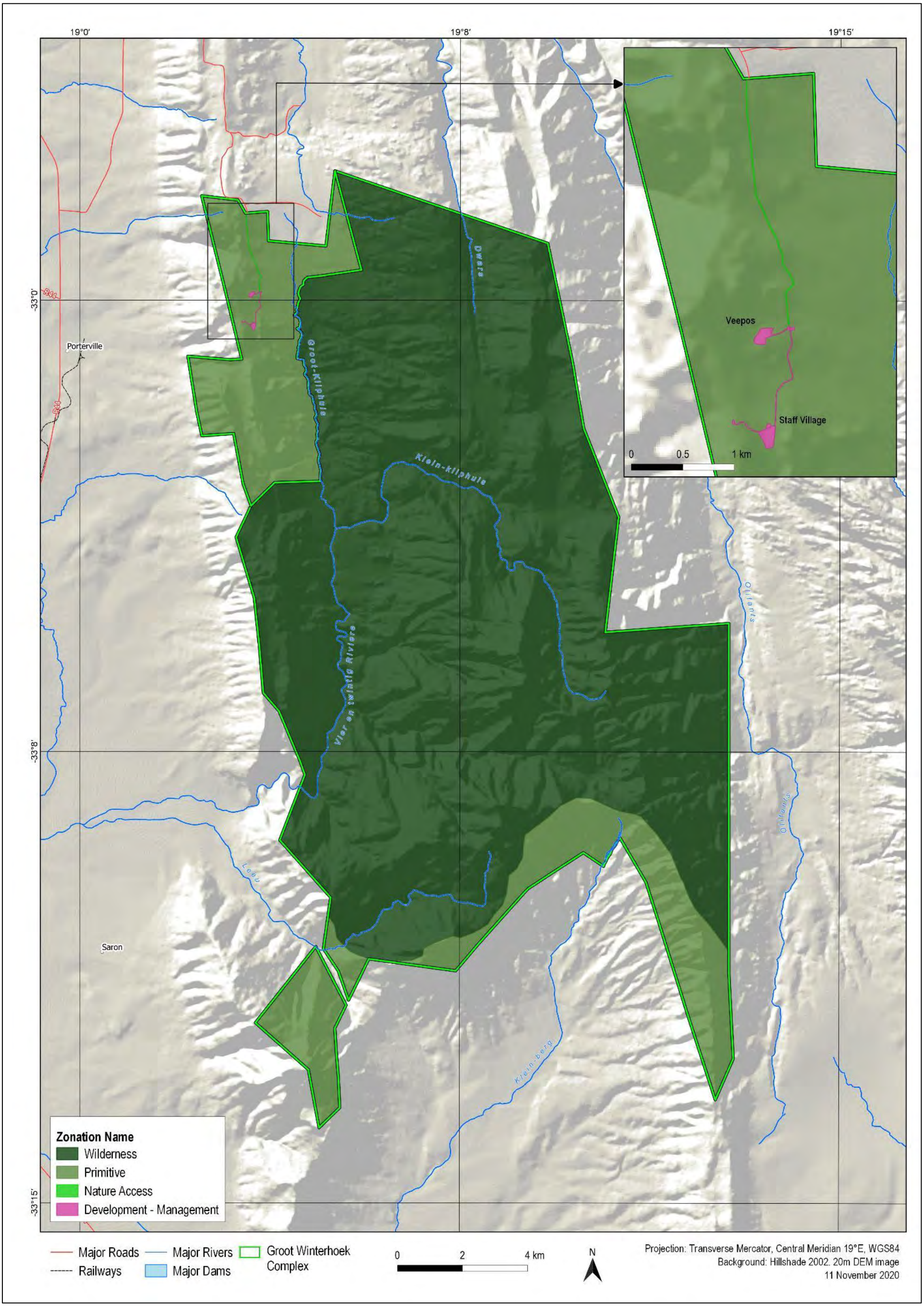

**Map 6:** Invasive alien plant densities in the Groot Winterhoek Complex.



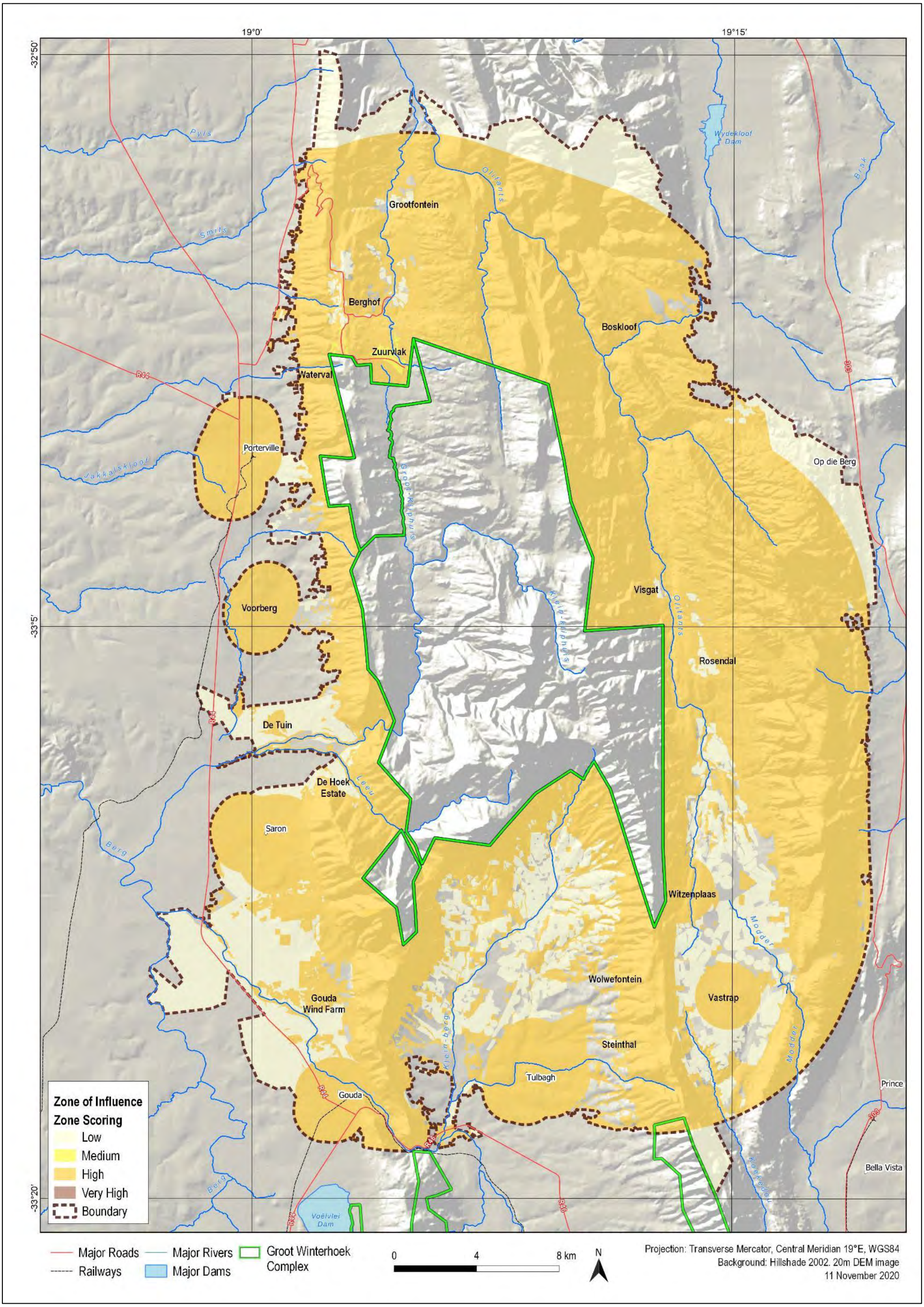

**Map 7:** Aquatic systems of the Groot Winterhoek Complex.



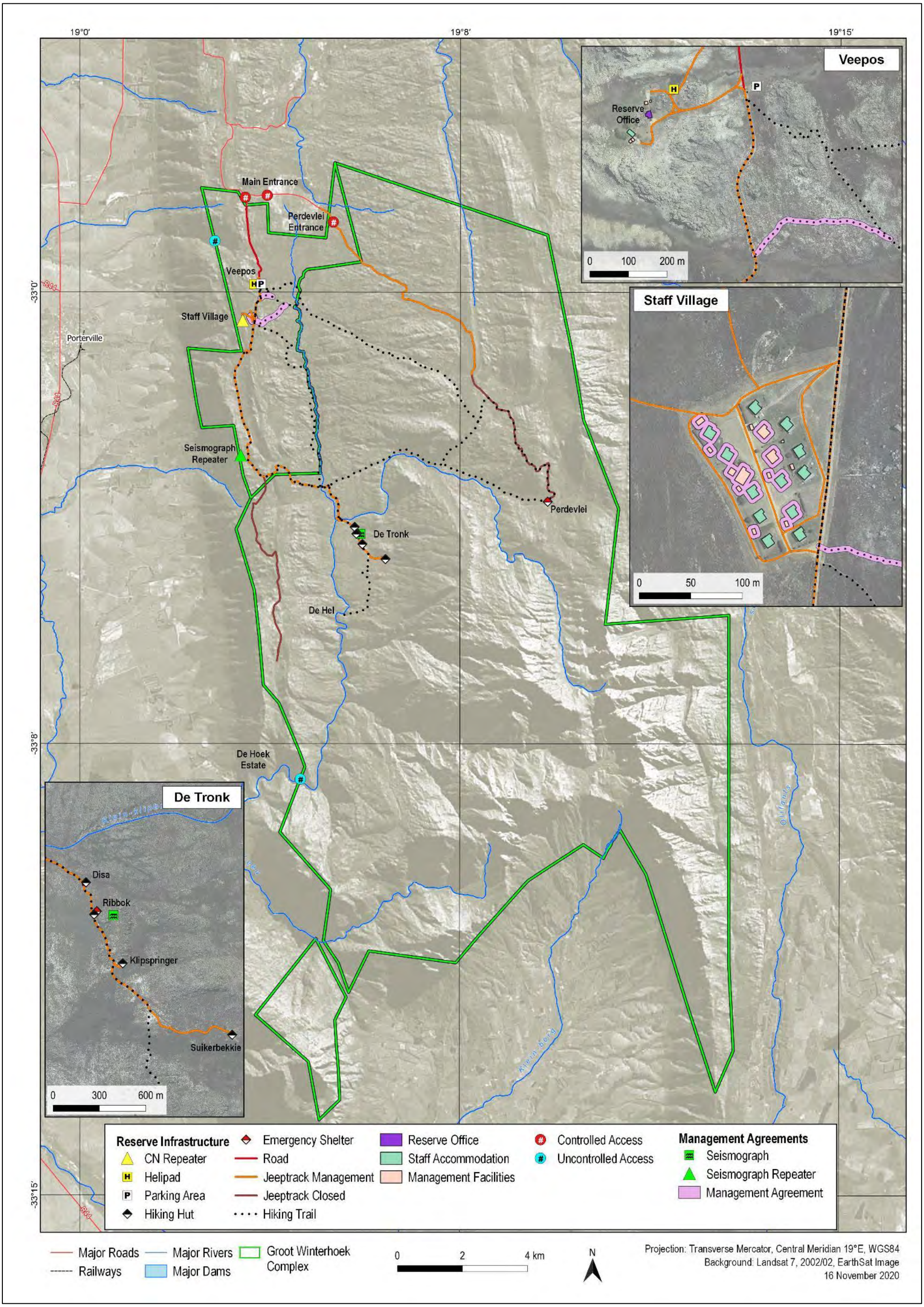

**Map 8:** Sensitivity of the Groot Winterhoek Complex.



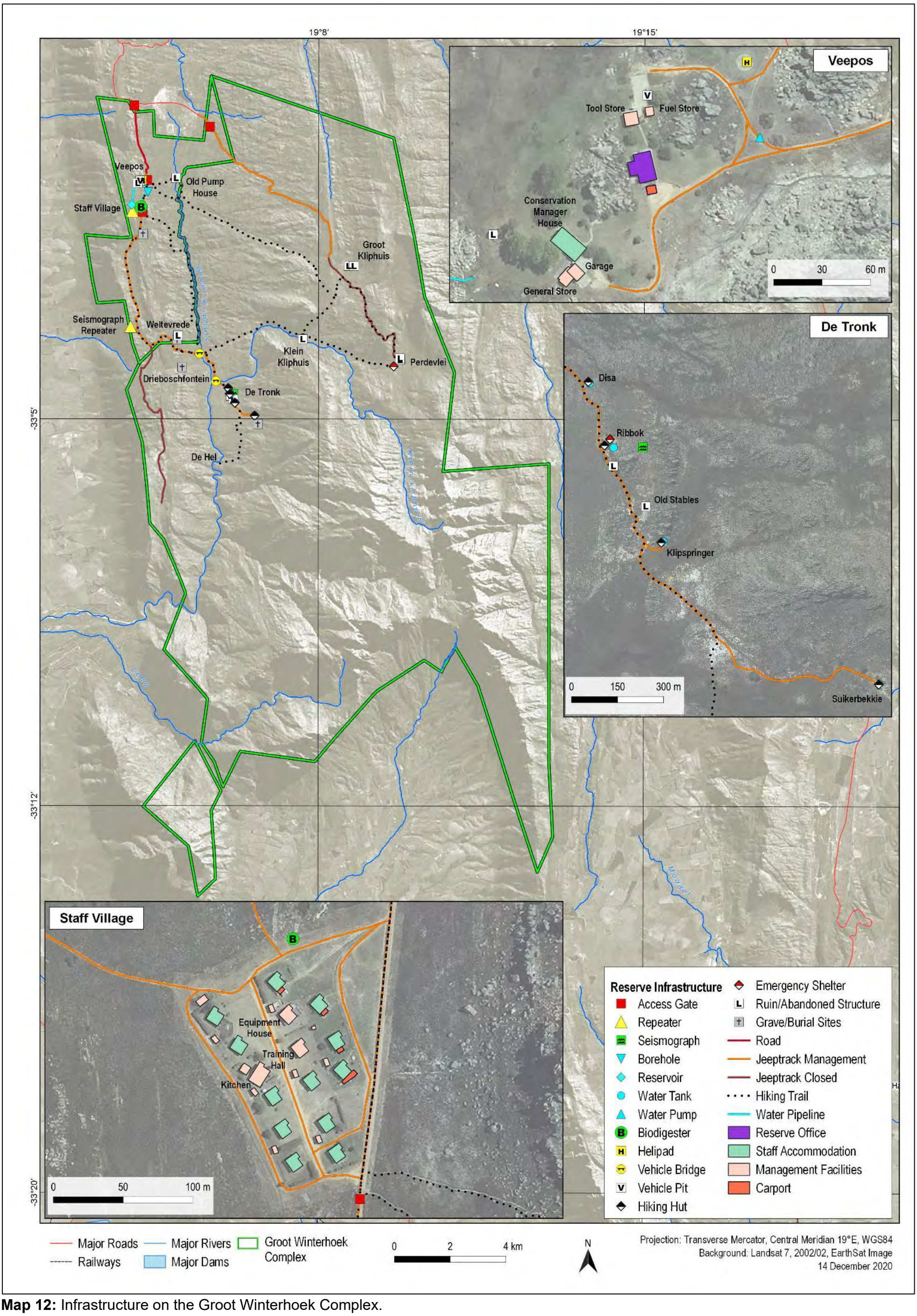

**Map 9:** Zonation of the Groot Winterhoek Complex.



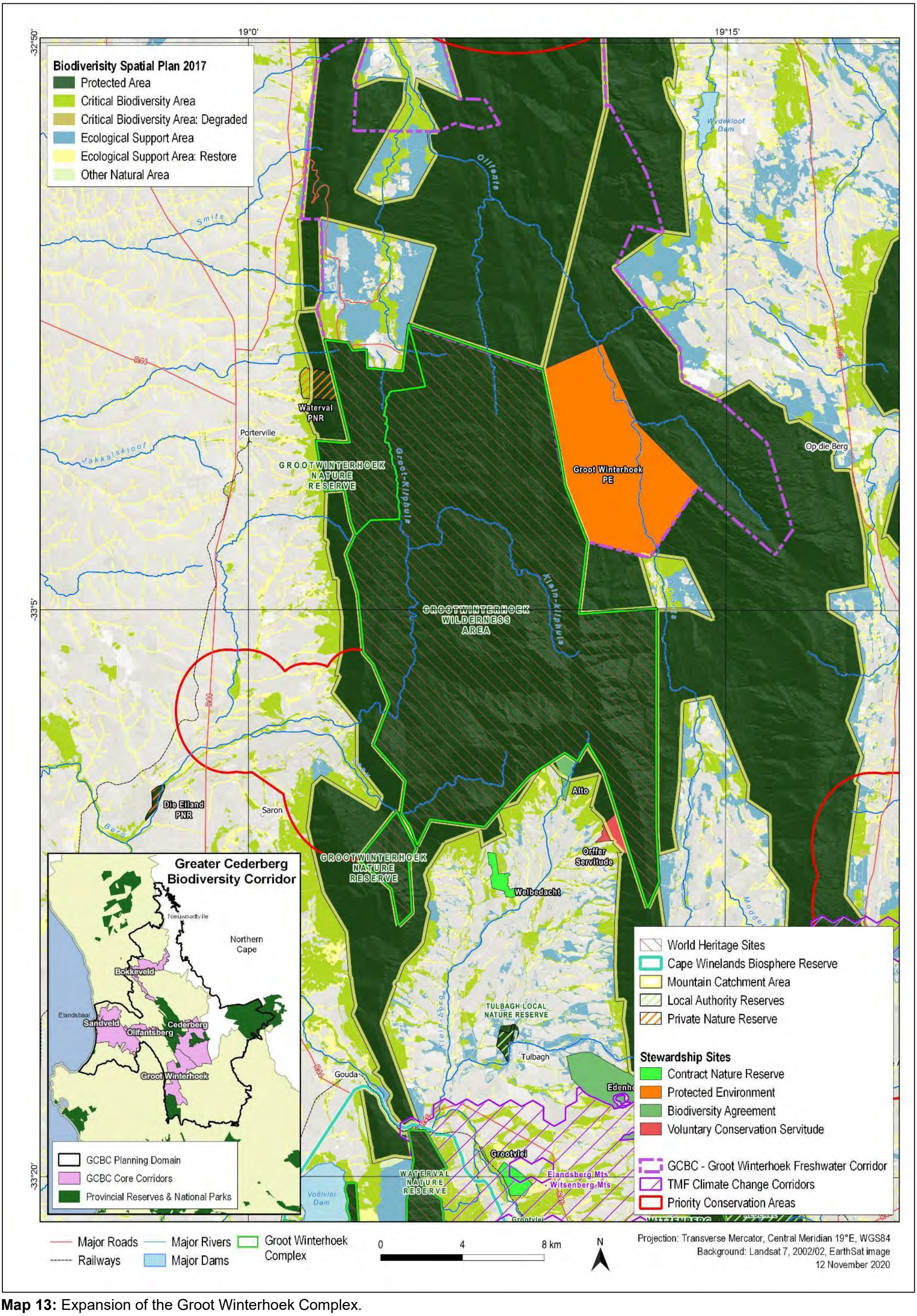

**Map 10:** Zone of influence around the Groot Winterhoek Complex.




**Map 11:** Access and servitudes on the Groot Winterhoek Complex.




**Map 12:** Infrastructure on the Groot Winterhoek Complex.




**Map 13:** Expansion of the Groot Winterhoek Complex.

**APPENDIX 2 Public Participation Report for the Groot Winterhoek Complex.**



# GROOT WINTERHOEK COMPLEX

## PART OF THE CAPE FLORAL REGION PROTECTED AREAS WORLD HERITAGE SITE

Western Cape, South Africa

# STAKEHOLDER ENGAGEMENT PROCESS REPORT

COMPILED BY FOOTPRINT ENVIRONMENTAL SERVICES

DATE: 31 MARCH 2021

CapeNature