

OVERVIEW OF THE
HEXRIVER COMPLEX
PROTECTED AREA MANAGEMENT PLAN



INTRODUCTION TO THE HEXRIVER COMPLEX

The Hexriver Complex is situated in the Western Cape, South Africa and is approximately 19 301 hectares.

The Complex comprises five Protected Areas, namely the Bokkerviere State Forest in the east, the Ben-Etive- and Fonteintjesberg Nature Reserves in the central and the Wittebrug Nature Reserve and Witzenberg Nature Reserve in the west of the Hexriver Mountain range. It forms part of the Northwestern and Karoo Mountain phytogeographical centres of endemism, each of which is delimited by high numbers of plant species endemic to each centre.

The Hexriver Complex is supported and buffered by a network of adjacent conserved areas ranging from Provincial Nature Reserves to Private Nature Reserves, Stewardship sites and Mountain Catchment Areas.

The Hexriver Mountain Catchment Areas collectively provide water to the Breede-, Berg- and Olifants/Doring catchments, which in turn provide water for the City of Cape Town and most of the towns and settlements of the surrounding Overberg, Bergrivier, Drakenstein, Witzenberg and West Coast municipalities. These mountain catchment areas are thus critical for

economic- and agricultural development, especially given the potential and predicted effects of climate change.

The Hexriver Complex was inscribed by the World Heritage Convention, United Nations Educational, Scientific and Cultural Organisation (UNESCO) in 2015 as a part of the Cape Floristic Region Protected Areas World Heritage Site extension.

In compliance with the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) and Chapter 4 of the 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.

This management plan provides the basis for the management, development and operation of the Hexriver Complex over a timeframe of 10 years. The implementation of the management plan is subject to legislation, regulations, policies and guidelines to ensure and promote sound financial and biodiversity management, effective compliance, safety, good neighbour



VISION:

The Hexriver Complex is a montane World Heritage Site, supporting landscape connectivity, where ecological resilience is achieved through catchment management in collaboration with stakeholders.






WHERE TO FIND THE DETAILED PROTECTED AREA MANAGEMENT PLAN

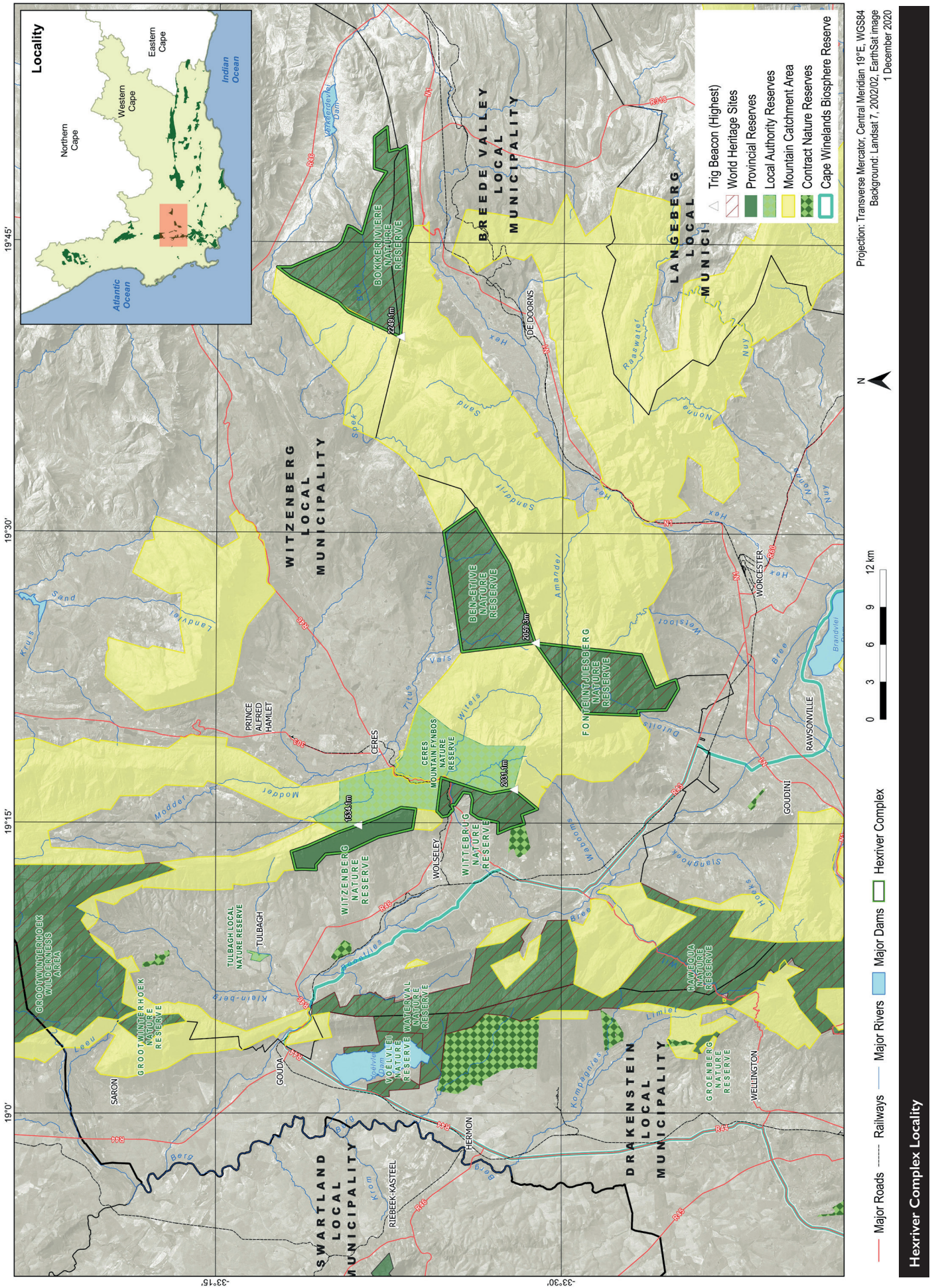
Visit www.capenature.co.za to view the complete version of the Protected Area Management Plan.

relations and to promote sustainable access to the reserve.

Other strategies, plans and protocols that inform biodiversity management in the Hexriver complex include the Integrated Catchment Management Strategy, invasive species monitoring, control and eradication plans, an Integrated Compliance Plan, the Western Cape Protected Area Expansion Strategy, the Fencing and Enclosure of Game and Predators in the Western Cape Province Policy, the Game Translocation and Utilization Policy and strict protocols relating to the management of large game and to deal with species that may be considered to be damage-causing animals.

FAST FACTS ABOUT THE HEXRIVER COMPLEX

<p>19 301 ha in size</p>	 <p>Part of the Cape Floristic Region Protected Areas World Heritage Site since 2015</p>	 <p>Located in Cape Winelands District Municipality, Witzenberg Local Municipality and Breede Valley Local Municipality</p>	 <p>Experiences 200mm of rainfall per annum in the eastern parts and 1000mm per annum in the western parts</p>	 <p>Is a Strategic Water Source Area supplying water to City of Cape Town and other towns</p>	 <p>Has the second highest peak in the Western Cape - Matroosberg Peak at 2 249 meters</p>
-------------------------------------	---	--	---	--	--



HOW IS A PROTECTED AREA MANAGEMENT PLAN DEVELOPED?

CapeNature has adopted, and applies, the Open Standards for the Practice of Conservation (Conservation Measures Partnership 2020) adaptive management framework as illustrated in Figure 1. The Conservation Standards facilitates strategic adaptive management through a systematic evidence based participatory process with stakeholders. 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:

1. Assessing 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.
2. Planning actions and monitoring.
3. Implementing actions and monitoring.
4. Analysing and using results to adapt i.e. deciding if what was planned is working; and
5. Capturing results, sharing and learning.



Figure 1: Diagram showing Strategic Adaptive Management Framework adapted from The Open Standards for the Practice of Conservation (CMP 2020).

Step one of the adaptive management framework is foundational to effective management of the area. Focal conservation targets identified for the Hexriver Complex are indicated in Table 1 below:

Table 1: Summary of the Hexriver Complex focal conservation target and viability as at 2019.

Focal Target	Description, Nested Values, Key Attributes & Associated Human well-being values	Current Status
Freshwater Ecosystems	<p>Description: Comprising of all natural seasonal rivers and riparian zones, streams, seeps and groundwater, wetlands and wetland buffers.</p> <p>Nested targets of note: Freshwater invertebrates, freshwater fish communities (especially <i>Galaxias</i> sp. nov. 'breede' (Endangered)), riparian zone, lowland and high altitude wetlands and seeps, rivers, groundwater, priority small mammal species (Laminated vlei rat (Near Threatened), Cape march rat (Vulnerable)).</p> <p>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 (includes threatened fish species)).</p> <p>Associated human well-being values: Security from natural disasters; water security and environmental resilience.</p>	Fair
Terrestrial Ecosystems	<p>Description: Comprising the terrestrial vegetation that consists of 9 distinct vegetation types of which two are of conservation concern and the associated flora and fauna species.</p> <p>Nested targets of note: Serotinous Proteaceae, Breede Alluvium Fynbos (Endangered), Ceres Shale Renosterveld (Vulnerable), Northern Inland Shale Band Vegetation, Altimontane vegetation, priority small mammal species (Spectacled dormouse (Near Threatened), White-tailed mouse (Vulnerable)), Verreux's Eagle, <i>Colophon</i> beetles (<i>Colophon haughtoni</i> (Endangered) and <i>C. kawaii</i>), all fauna and flora communities associated with the terrestrial ecosystems, rock art.</p> <p>Key attributes: Fire regime, Indigenous vegetation species composition (%).</p> <p>Associated human well-being values: Security from natural disasters; water security and environmental resilience.</p>	Fair

MAIN THREATS TO THE HEXRIVER COMPLEX

Inappropriate fire regime (High):

Too frequent, too large and out of season fires have severe ecological impacts. The majority of fires are human induced either through accidental ignition or are intentionally set.

Invasive alien plants (Medium):

Freshwater and terrestrial ecosystems are threatened by invasive alien flora. *Pinus*, *Hakea* and Australian *Acacia* species are amongst the most problematic woody invasive species although several other species, such as poplars (*Populus canescens*) and eucalyptus (*Eucalyptus diversicolor*) are also problematic in the low-lying drainage areas.

Unauthorised access (Medium):

The control of 4x4 tourists is not managed

well once they are on certain 4x4 routes and regularly access Bokkeriviere Nature Reserve illegally, disregarding the CapeNature sign boards indicating the boundary. The route from the look-out point to Matroosberg Peak is in a bad condition and must be formally closed and rehabilitated.

Unauthorised access also occurs on the other nature reserves in the Complex leading to erosion, damage to rock art and illegal harvesting of certain plant species.

Illegal utilisation of natural

resources (Low): This specifically refers to illegal harvesting of fauna and flora (poaching). Harvesting and utilisation of natural resources without authorisation undermines appropriate resource

management. Snaring occurs along the boundaries of the protected areas. In addition, two species of the *Colophon* (stag-beetles) that are endemic to Matroosberg are threatened by illegal poaching due to international trade amongst beetle enthusiasts and collectors.

Invasive alien fish (Low):

Invasive alien species is a threat to both the Hexriver Complex and the catchment as a whole. Five invasive alien fish species are present in the Hexriver Complex, namely rainbow trout *Oncorhynchus mykiss*, smallmouth bass *Micropterus dolomieu*, bluegill sunfish *Lepomis macrochirus*, sharptooth catfish *Clarias gariepinus* and common carp *Cyprinus carpio* (the latter species is native to South Africa but alien and invasive in the rivers of the Cape Floral Region. Invasive alien species

affect indigenous fishes through predation, habitat alteration, competition for resources, the introduction of diseases and the disruption of ecological processes.

Instream structures (Low): Instream structures include weirs, instream dam walls, bridges and causeways. The presence of weirs and other structures also causes upstream inundation (pooling) and alters the natural flow velocity and pattern of the river. In the case of weirs, rivers are blocked to varying degrees by the presence of diversion weirs just outside of the protected area boundaries.

Over abstraction of surface water (Low): Extensive agricultural development

in the region, especially in the catchments of Fonteintjiesberg- and Ben-Etve Nature Reserves within the Breede River system, has resulted in many river reaches outside of protected areas being severely affected by over abstraction of surface water. Water is being abstracted from the Bokke River (Bokkeriviere Nature Reserve) as bulk water supply for the town of Touwsrivier. The Titus River (Ben Etive Nature Reserve) is also being severely impacted due to surface water abstraction for agriculture.

Impacts linked to climate change (Very high): Although the exact effects of climate change are speculative, it is likely to have major impacts such as an increase

in the frequency of extreme weather events (for example droughts, floods and storm surges), habitat shifting and alteration, a hotter and drier climate and a rise in sea level.

In order to assist the Hexriver Complex to adapt and manage threats and contributing factors effectively, both inside and outside the reserve boundaries, the reserve will incorporate spatial planning tools that include the Sensitivity, Zonation and Zone of Influence.

A summary rating of critical threats, highlighting the natural and cultural historic focal conservation targets at greatest risk within the Hexriver Complex is provided in Table 2.

Table 2: Summary rating of critical threats to the conservation targets of the Hexriver Complex.

Focal conservation targets	Critical Threats	Threat Rating
Freshwater Ecosystems	Invasive alien fish; invasive alien plants, over abstraction of surface water; instream structures.	High
Terrestrial Ecosystems	Inappropriate fire regime; invasive alien plants; illegal utilisation of natural resources; unregulated access, impacts linked to climate change.	Very High

Fynbos is a fire-driven ecosystem and all Fynbos species require periodic fires to stimulate regeneration and maintain species richness. 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. The Hexriver Complex falls within the western inland zone (Van Wilgen & Forsyth 2008). Here, a healthy fire regime constitutes that <50% of the 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. The proportion of the area in the Hexriver Complex that burns in summer should be >80% (less than 20% winter fires).

Approximately 49% of the catchment has a veld age of six years and younger. According to the data from the last 40 years approximately 79% of the area has burnt in the summer and most of the fires occur in the summer months. Approximately 10% of the area burnt in October, which may affect breeding success of certain bird species in the area. Birds breed largely during the winter and spring months (July – October), suggesting that spring burns will adversely affect breeding bird populations (van Wilgen & Viviers 1985).

Since 1980 most of the fires in the Hexriver Complex were small to medium with approximately 84% of the catchment burnt in fires larger than 1 000 ha. The latter constituted 43 fires (18% of all fires between 1980 and 2020). The catchment area has experienced 11 fires larger than this since 1980. This is especially true for 2016 where 36% of the catchment burnt in two fires at the same time in the central part of the Complex. These large fires typically burn during December to February.



Leucadendron rubrum. Photo: Rika du Plessis.



Crassula fascicularis. Photo: Arnelle Collison.

MANAGEMENT OF THE HEXRIVER COMPLEX

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 core service areas by setting measurable, time-bound goals directly linked to the values and their key attributes.

GOALS:

To maintain the healthy ecological infrastructure that supports life on earth and provides resilience to the impacts of climate change, management needs to achieve the following goals by 2031:

1. The upper and middle river reaches in the Hexriver Complex support macro invertebrate species communities with an Average Score Per Taxon of 6 - ≥8, and viable indigenous fish communities are present in on-reserve rivers identified for fish conservation.
2. The health of the wetland ecosystems in the Hexriver 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 75-89%.
3. The terrestrial ecosystems in the Hexriver Complex have an ecologically healthy fire regime and comprises >85% indigenous species.
4. The Hexriver Complex will, through integrated catchment management, protect and enhance the provision of water quality and quantity contributing to the water resilience for the Berg, Breede and Gouritz catchment areas.
5. Access to, and utilisation of, natural resources within the Hexriver Complex are in accordance with CapeNature policy and procedures.
6. The Hexriver Complex environmental education, awareness and interpretation programme will promote all ecological and human well-being values.

Achieving human well-being, derived from healthy responsibly managed ecological infrastructure and heritage by 2031, requires that:

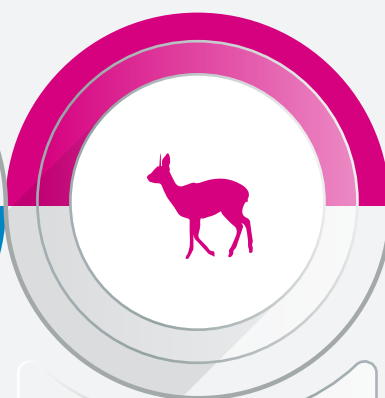
KEY HUMAN WELL-BEING VALUES OF THE HEXRIVER COMPLEX



WATER SECURITY AND ENVIRONMENTAL RESILIENCE

Description: Healthy ecosystems protect and enhance the provision of water quality and quantity and contributes to the water resilience for the Breede-Gouritz water management area.

Key attributes: Access to clean water in sufficient quantity.



RESPONSIBLE UTILISATION OF NATURAL RESOURCES

Description: Utilisation (consumptive and non-consumptive) of natural resources in a sustainable and non-damaging way.

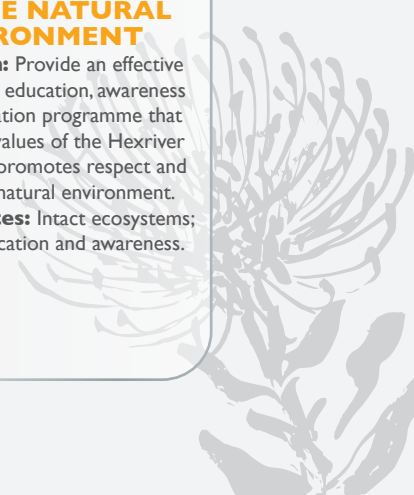
Key attributes: Permitted utilisation of resources; access to capacity and skills development opportunities; access to sites for non-consumptive utilisation (e.g. events, filming) and intact ecosystems and abundant wildlife.

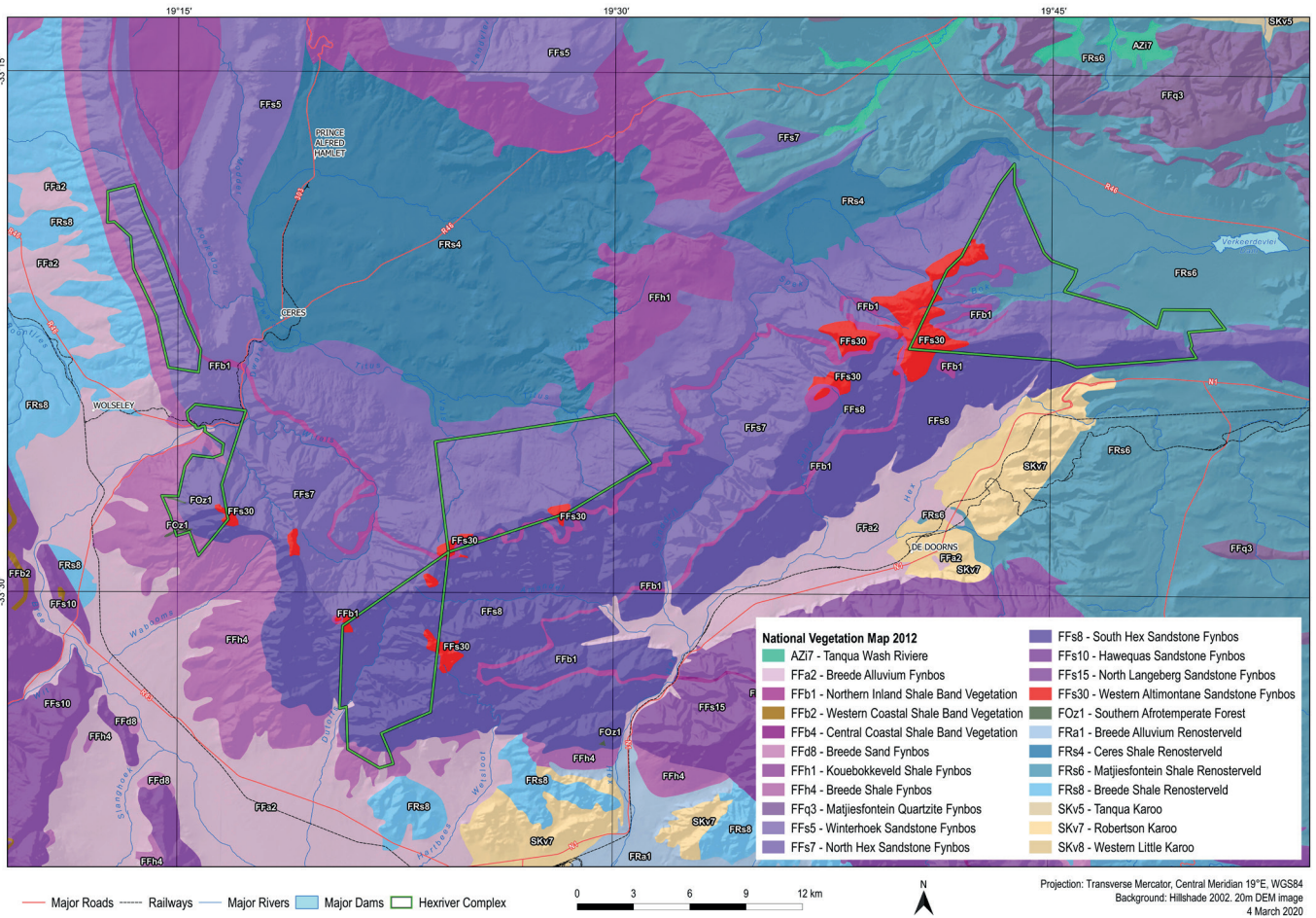


RESPECT AND CARE FOR THE NATURAL ENVIRONMENT

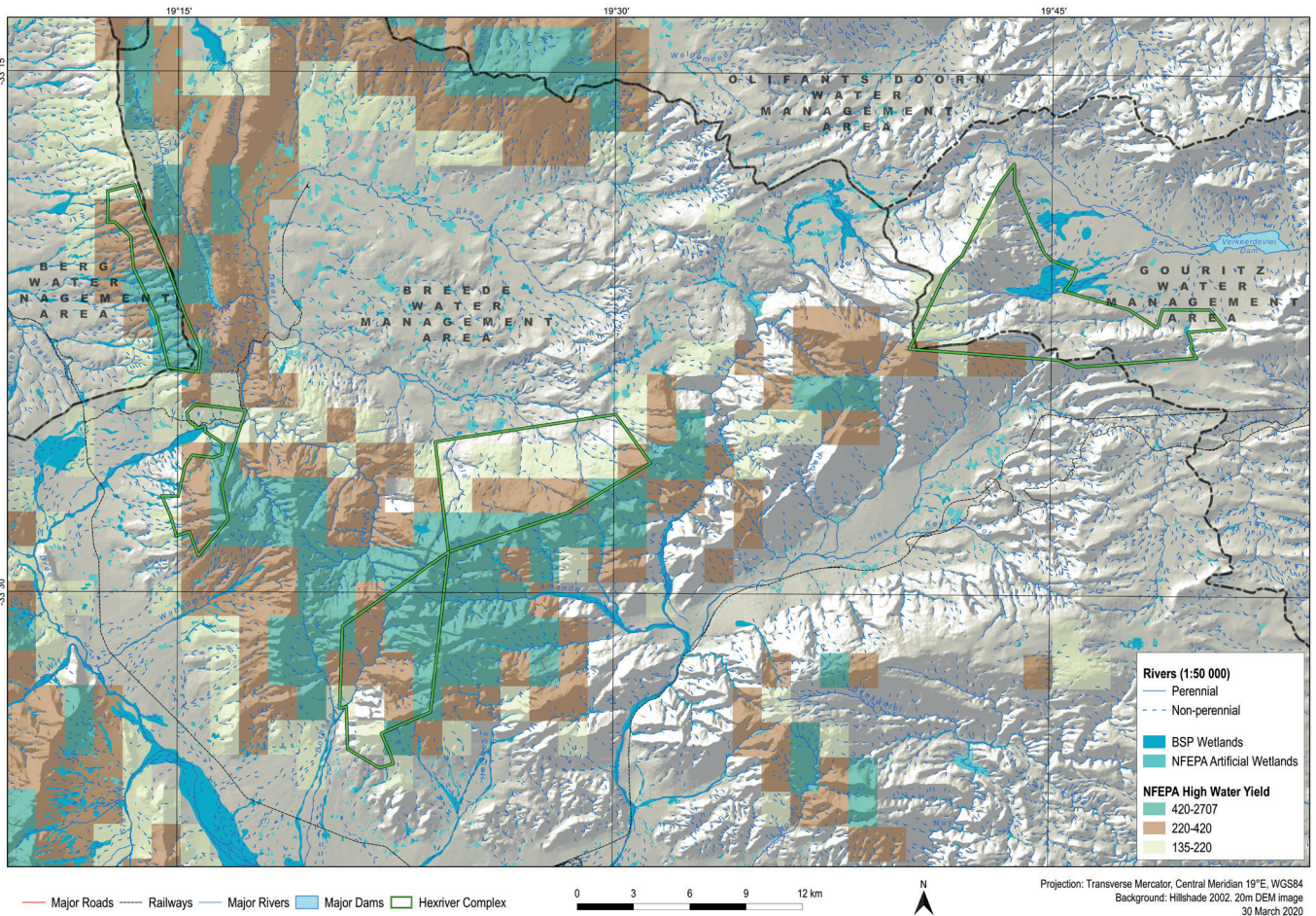
Description: Provide an effective environmental education, awareness and interpretation programme that supports the values of the Hexriver Complex and promotes respect and care for the natural environment.

Key attributes: Intact ecosystems; advocacy; education and awareness.





Hexriver Complex Vegetation



FAST FACTS ABOUT THE PLANTS AND ANIMALS

THE HEXRIVER COMPLEX SUPPORTS:

10

vegetation types representing Fynbos, Renosterveld and Forest types.

15

known plant Species of Conservation Concern



A diversity of *Colophon* beetle species in the Hexriver Complex which is considered to be indicative of the capacity of this area to provide refuge to biodiversity during periods of climate change.



5 rare butterfly species and 3 dragonfly Species of Conservation Concern



4 indigenous fish species



5 frog and 6 reptile species



105 bird species



83 mammal species, 5 of which have been identified for priority actions namely grey rheebuck, leopard, Cape clawless otter, laminate vlei rat and spectacled dormouse.



Agama atra. Photo: Koos Steenkamp.



Colophon haughtoni. Photo: Hennie de Klerk.



Breede River redfin *Pseudobarbus* sp. 'burchelli Breede'. Photo: Riaan van der Walt.



Cape galaxias *Galaxias zebratus*. Photo: Andrew Turner.

FAST FACTS ABOUT THE AQUATIC FEATURES



The Hexriver Complex spans three river systems, namely the Breede River system (Wittebrug-, Fonteintjesberg- and Ben-Étive Nature Reserves), Berg River system (Witzenberg Nature Reserve) and Gouritz river system (Bokkeriviere Nature Reserve).



A section of the upper Breede River runs through the Wittebrug Nature Reserve in Mitchell's Pass near Ceres.



Ben-Étive Nature Reserve encompasses the headwater of the Titus River and its main tributary the Vals River.



Few wetlands occur within the Hexriver Complex, however, several of these are National Freshwater Ecosystem Priority Area (NFEPA) wetlands.



The threat statuses of the mapped wetlands vary from least threatened and well protected to critically endangered and poorly protected. All of the wetlands mapped in protected areas are in a good to natural condition (according to NFEPA mapping).



Bothaspruit River. Photo: Newill Dynaard.



Jan du Toits River in the Fonteintjesberg Nature Reserve. Newill Dynaard.

SENSITIVITY ANALYSIS

Sensitivity analysis which is 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:

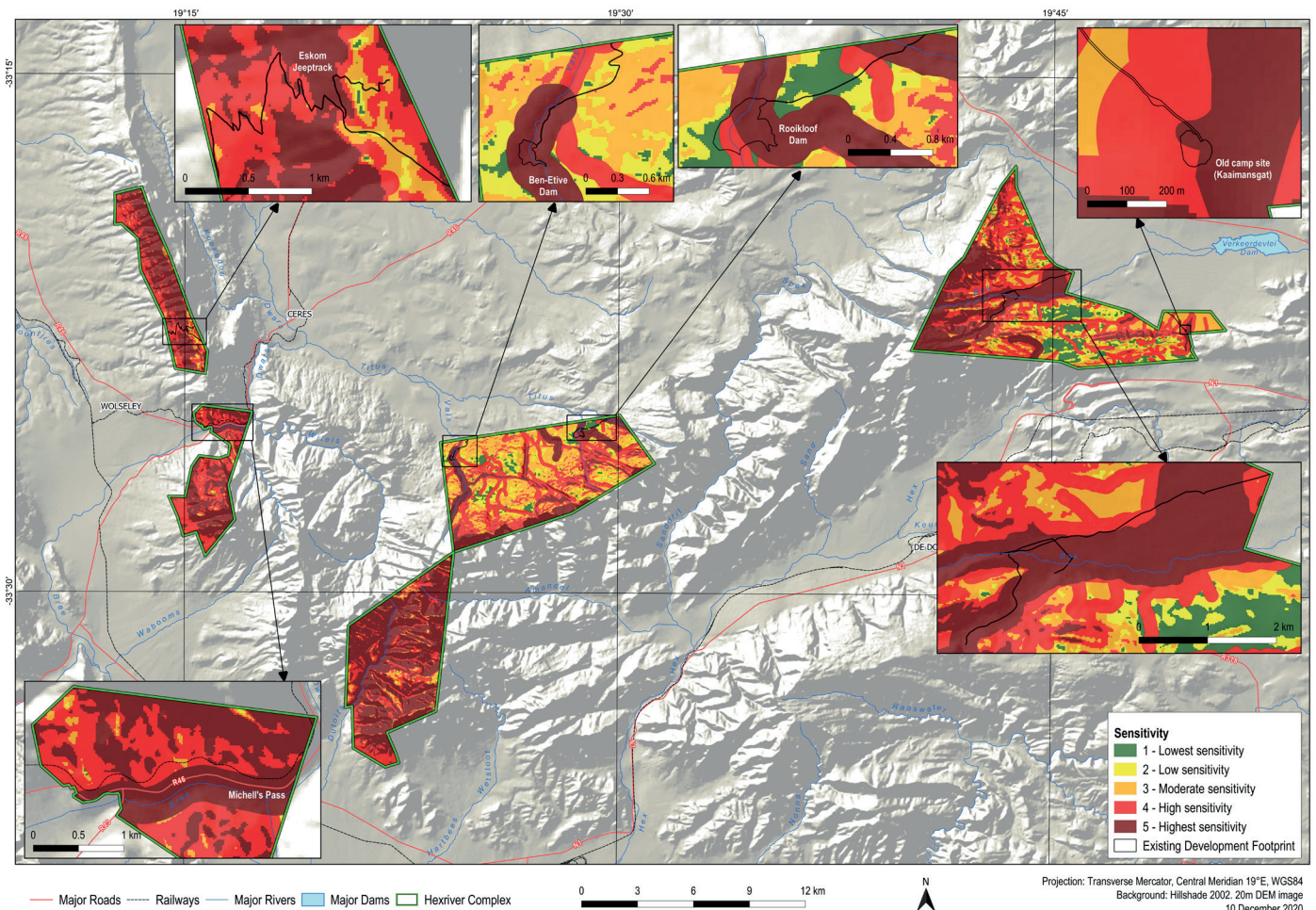
- Highlight areas containing sensitive biodiversity and heritage features;
- Inform all infrastructure development e.g. location of management and tourism buildings and precincts, roads, trails, firebreaks;
- Facilitate holistic reserve planning and zonation; and
- Support conservation management

decisions and prioritisation of management actions.

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 the 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. Sensitivity maps do

not replace site-level investigation, although do allow for rapid assessment of known environmental risks, guiding planning to minimise negative impacts.

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’. 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.



Hexriver Complex Sensitivity



PROTECTED AREA ZONATION

The primary function of the Hexriver 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 Hexriver 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; and
- Confines development within the Complex to areas deemed appropriate to tolerate transformation without detracting from sense of place.

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;
 - Increasing costs the further developments are from existing infrastructure;

- The socio-economic benefit of existing tourism nodes and access routes; and
- Infrastructure design and services with due consideration for focal conservation targets.

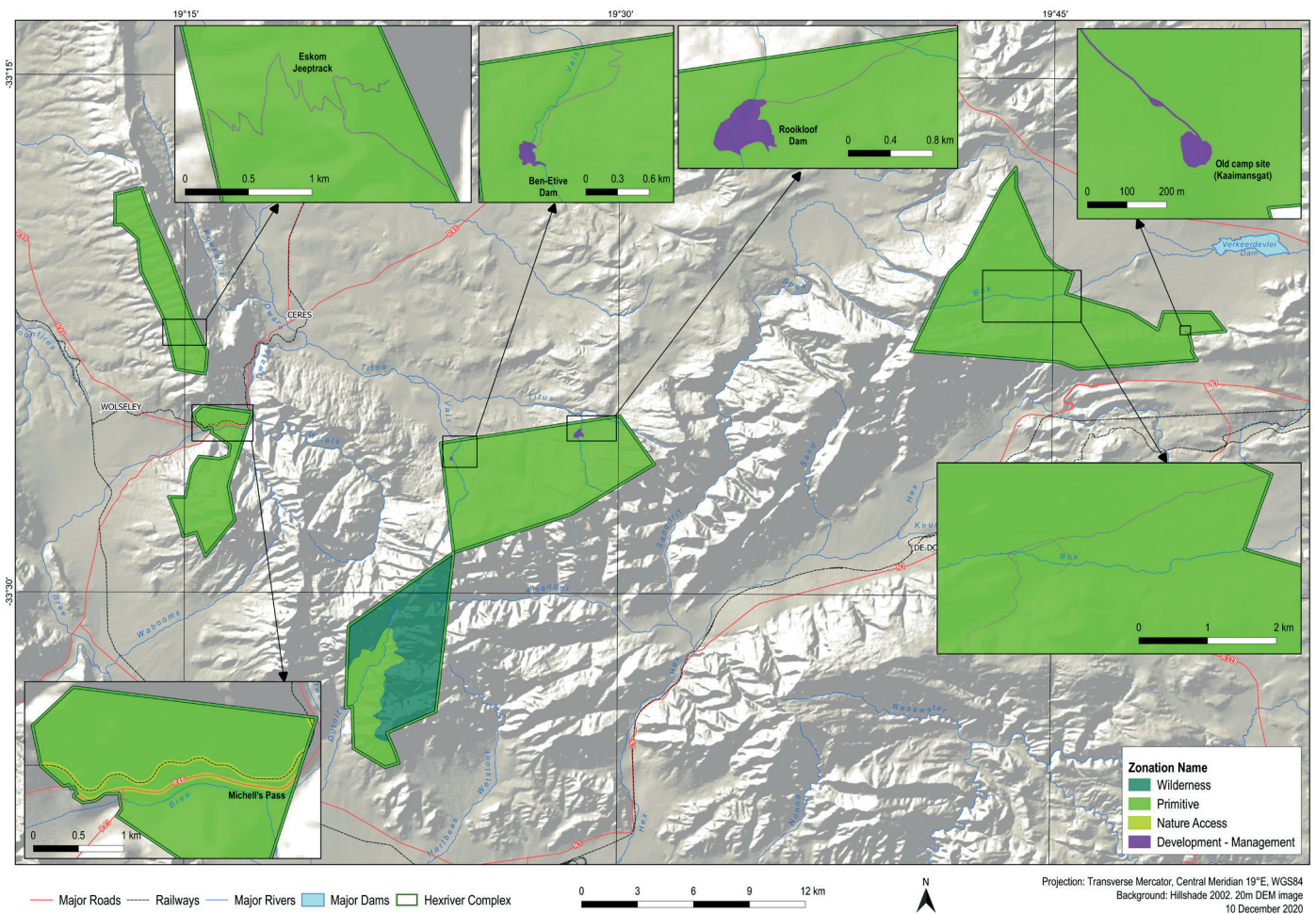
3. Where existing development nodes, tourist sites and access routes occur in areas with high sensitivity-value, associated zonation must aim to confine the development footprint as much as possible and preferably within the existing transformed site.
4. Sites with high biodiversity sensitivity value are put into stronger protection zones and peripheral development is favoured.

Possible zonation categories used in Protected Area Management Plans include Wilderness, Declared Wilderness, Nature Access, various Development categories (low intensity, high intensity, management, production, private), Species/Habitat/Cultural Protection, as well as special management overlays.

Table 3: Summary of CapeNature zonation categories applicable to the Hexriver Complex.

Category	Explanation	Description
Wilderness / Wilderness	Areas with pristine landscape, sensitive areas or threatened ecosystems. Very limited access.	Only a portion of the Fonteintjiesberg Nature Reserve was zoned as wilderness. This area has no infrastructure, is very remote and difficult to access.
Primitive	Areas providing natural landscape, solitude and limited access. Normally a buffer area to wilderness zones.	The following protected areas in the Hexriver Complex are zoned as primitive except for the areas zoned for wilderness, nature access, and development areas: Witzenberg Nature Reserve – Entire reserve except for road buffer zoned as Management Development. Wittebrug Nature Reserve – Entire reserve except for road and railway line zoned as nature access. Ben-Etive Nature Reserve – Entire reserve except for dams and road buffers zoned as management - development. Fonteintjiesberg Nature Reserve – The valley of the Jan du Toits river and area not zoned as wilderness. Bokkeriviere Nature Reserve – Entire reserve except for roads, canal, camp area and reservoir zoned as management - development.

Category	Explanation	Description
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.	For all the reserves within the Hexriver Complex the public roads (such as the Mitchell's Pass) and the Transnet railway line with unrestricted access were buffered by 25m.
Development – Management	Location of infrastructure and facilities for reserve administration and management.	The following areas were digitized and zoned as development – management: Witzenberg Nature Reserve – ESKOM jeep track buffered by 2.5m. Ben-Etive Nature Reserve – The two farm dams zoned as management due to agreement with landowners. The access roads to the dams were buffered by 2.5m. Bokkeriviere Nature Reserve –The the camp area indicated in south-eastern part of the reserve. Visible gravel roads that have servitudes running between the reservoir and two weirs, and the canal that has a servitude buffered by 2.5m.



Hexriver Complex Zonation



ZONE OF INFLUENCE

The zone of influence is a non-legislated area spatially depicted around the Complex boundaries. 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; and/or
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; and
- All-encompassing mechanism that includes all or part of a buffer zone as prescribed in terms of legislative frameworks and conventions.

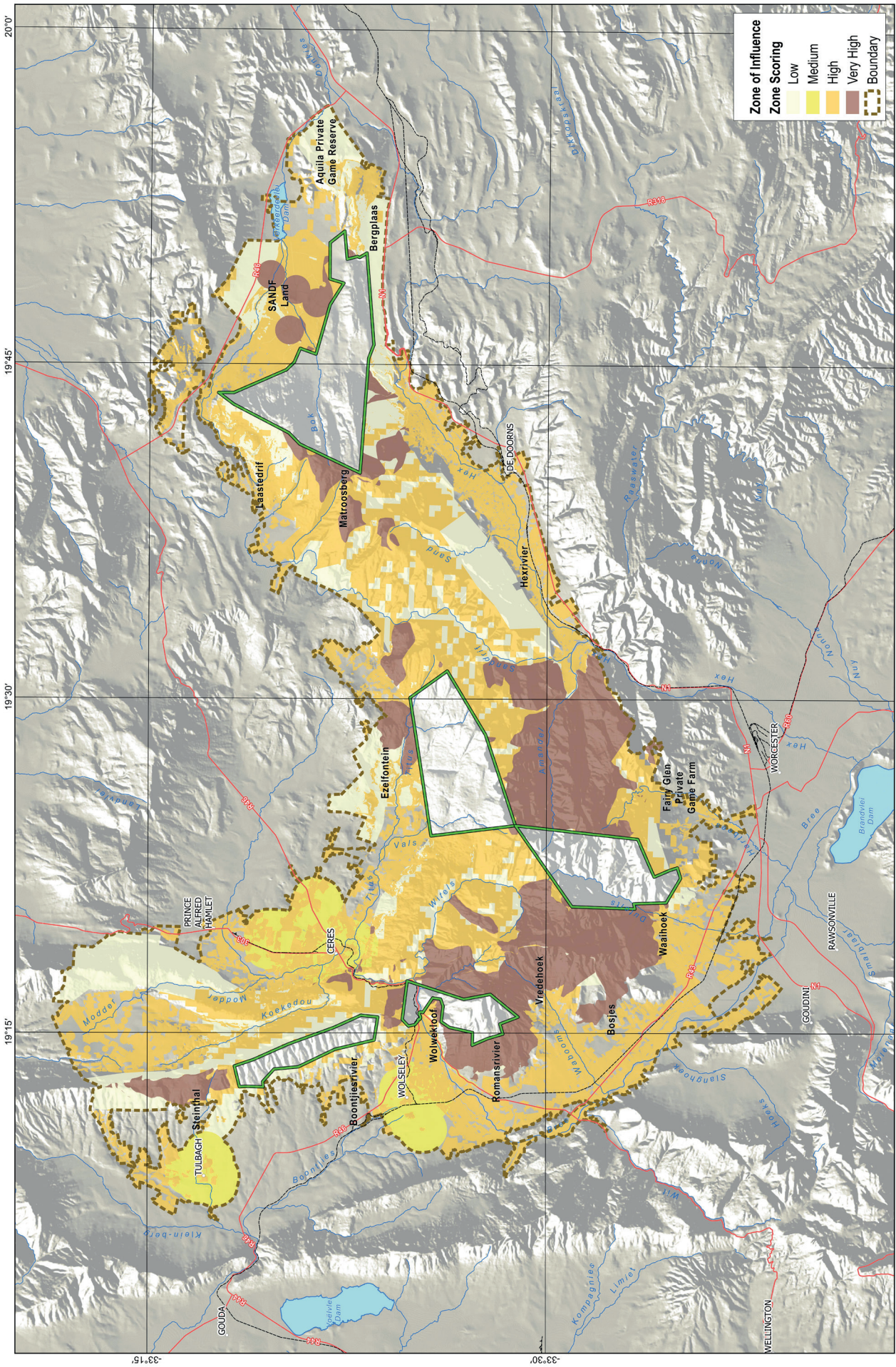
The spatial features used in the zone of influence calculation are rated on a standard scale of one to four: Low (1), Medium (2), High (3), and Very high (4). These ratings are assigned to each input feature within the zone of influence. Higher scores represent areas where many features overlap, elevating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

The zone of influence for the Hexriver Complex has a total extent of 137360.2 hectares.

Fire hazards and species of special concern were identified as the features that have the highest score in the analysis of the zone of influence. However, the areas where the species of special concern occurs only constitute a very small area in the zone of influence. These species are mainly *Colophon* beetles that occur on Matroosberg Peak in Altimontane fynbos, and certain Critically Endangered *Protea* species that occur in the Waaihoek valley. Invasive alien plants and surface water abstraction were rated as features having a high influence on the zone of influence. Stands of invasive alien plants bordering the protected areas are a major source of re-infestation and will affect clearing effort within the Complex. The zone of influence is positively impacted on by Mountain Catchment Areas. Three Mountain Catchment Areas (Koue Bokkeveld, Matroosberg and Winterhoek) occur in the protected area network of the Hexriver Complex. These areas are important buffering mechanisms to the Complex.

Table 4: Features with very high or high ratings impacting the zone of influence

Feature	Criteria	Rating	Zone area (ha)	% of zone
Fire hazards (high fire frequency)	Inappropriate fire frequency due to anthropogenic fires. Areas identified as hotspots for fire risk adjacent to protected areas: 1) areas with a fire frequency of 5 and more since 1980; 2) areas where fires occurred more than once in 15 years; 3) areas where incompatible practices can lead to high fire risks.	Very high (4)	23 628.1	17.2
Species of special concern	Known locations of fauna and flora species of special concern occurring outside the protected areas. These species includes rare and endangered species or ecological areas identified where special species occur.	Very high (4)	3 442.9	2.5
New agriculture	Identify areas under threat of potential agriculture in the future due to climate change and CARA regulations. The areas at risk are those in shale substrate and at a gentler slope (up to 20%).	High (3)	12 248.6	8.1
Fish monitoring areas	Rivers identified for low level of conservation intervention, due to the presence of threatened fish species, as a preventative measure (for timeous intervention should invasion occur). Rivers where weirs occur for water abstraction and / or serves as barriers to invasive alien fish.	High (3)	476.0	0.3
Over abstraction of surface water	Agricultural fields falling within 10km of the protected areas were used as a surrogate for surface water abstraction from the water recharge area.	High (3)	25 859.5	18.8
Over commercialisation	Areas under threat of over-commercialisation.	High (3)	2 299.7	1.5
Invasive alien plants	No formal plantations have been recorded within the buffer area. The National Invasive Alien Plant Survey, compiled by Kotze <i>et al.</i> (2010), was used to extract data.	High (3)	42 687.2	31.1



FAST FACTS ABOUT THE HERITAGE



The Hex River Valley region (e.g. Hex River Pass, Matroosberg) marine sediments contain abundant, well-preserved moulds of the trilobite *Metacryphaeus caffer*, chonetid brachiopods, molluscs, tentaculitids, and carpoid echinoderms.



The mountains in and surrounding the Hexriver Complex in the Hex River Valley contain rock art painted on the cliffs and caves that are up to 7000 years old and attests to habitation of the area by the /Xam San.



Mitchell's Pass was constructed under the supervision of Andrew Geddes Bain and named after Colonel Charles Mitchell, surveyor-general of the Cape Colony at the time.



Image of an indeterminate antelope species. Photo: Earl Roode.



Leaf-shaped finger painting. Photo: Earl Roode.



Rainbow shaped pattern. Photo: Earl Roode.

ACCESS TO THE HEXRIVER COMPLEX

Access points include controlled and uncontrolled entrances to the protected areas for various activities. Controlled access is through established, manned entrance gates while uncontrolled access is regulated with displayed signage only. Due to the lay of the land and distance of Nature Reserves from the reserve office it is not possible to have full access control to the entire Hexriver Complex. CapeNature rely on the assistance of partners and neighbours to control

illegal access into the Hexriver Complex. Agreements for access to Protected Areas are signed with specific clubs and neighbouring landowners. Servitude access for water-users association to dams and pipelines also exist. Access into Bokkeriviere Nature Reserve from the east is compromised since the property of the South African National Defence Force must be crossed. Public, more specifically members of the ski-club, access the reserve from the west to get access to

Matroosberg peak during winter for skiing. Wittebrug Nature Reserve is traversed by a provincial tarred road. This results in easy uncontrolled access at various points into the reserve. During summer the public is drawn to the Breede- and Witels rivers where they picnic, make illegal braai fires and swim in the rivers. Witzenberg Nature Reserve has no hiking trails. A 4x4 track provides access to communication towers and the ESKOM servitude.

Table 5: Managed public access points to the Hexriver Complex

Locality	Name	Type of Access	Activity
Fonteintjesberg Nature Reserve	Main Entrance (Somarso Farm)	4x4 vehicle to cross private land and on-foot	Fishing and hiking
Ben-Etve Nature Hiking	Main Entrance (Ezelfontein farm)	Reserve 4x4 vehicle to cross private land and park on reserve and on-foot	Hiking

Except for the provincial tarred road traversing Wittebrug Nature Reserve roads and jeep tracks within the Hexriver Complex are gravel and only accessible with 4x4 vehicles. These roads and jeep tracks are used for management purposes and access to these remote areas of the Hexriver Complex. These roads and tracks are maintained on rotational schedule. Due to the high risk of soil erosion the grading of jeep tracks is not allowed, maintenance work is done with hand tools only.

The Hexriver Complex has hiking trails within the Ben-Etive-, Wittebrug- and Fonteintjiesberg Nature Reserves that is used by the University of Cape Town, piscatorial society, members of the public and the mountain club of South Africa to access the reserves. These trails are maintained on a rotational schedule.

There are no buildings in the Hexriver Complex that are managed by CapeNature. A small A-frame steel hut at

Fonteintjiesberg Nature Reserve, named Perry Refuge, is maintained and managed by the Mountain Club of South Africa. A ski-hut was constructed on Bokkeriviere Nature Reserve below the Matroosberg peak by members of the ski club. This was done with approval by the former owner of Bokkeriviere in the 1970's when still in private position. The ski-club manage and maintain this structure and no additional structures can be erected.



STRATEGIC PLAN FOR THE HEXRIVER 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 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 value restoration / stress reduction;
- Behavioural change / threat reduction; and
- Establishing / promoting enabling conditions.

A summary of selected strategies and objectives for the Hexriver Complex is provided in Table 6. 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 6: Summary of Strategies and Objective for the Hexriver Complex

Threat(s) abated	Strategy	Objectives
The negative impact of invasive alien vegetation on fire regime, biodiversity and water availability; Inappropriate fire regime; Invasive alien fish.	Strategy 1: Implement fire and invasive alien species management in the Hexriver Complex to abate the negative impact that invasive alien species have on fire regime, biodiversity and water availability.	<p>Objective 1.1: By 2022, CapeNature has revised, approved and implemented the Hexriver Complex Invasive Alien Species control plan.</p> <p>Objective 1.2: By 2021, the internal efficiency of the implementation of the Fire management policy and procedures have been evaluated and shortcomings have been identified and reported.</p> <p>Objective 1.3: By 2022, the identified shortcomings have been addressed.</p> <p>Objective 1.4: By 2021 and beyond, the fire regime in the Hexriver Complex is determined in order to support fire management decisions.</p> <p>Objective 1.5: By 2025, CapeNature have obtained commitment from partners and neighbours to assist with IAP clearing and compliance on the boundaries of the Hexriver Complex.</p>
Unauthorised access; Illegal utilisation of natural resources; Lack of access to guidelines for responsible and sustainable utilisation; Stakeholders have a lack/insufficient knowledge on the sustainable use of natural resources.	Strategy 2: Address illegal and unsustainable resource utilisation (unauthorised access and poaching) within the Hexriver Complex.	<p>Objective 2.1: By 2022 revise and implement the integrated compliance plan for the Hexriver Complex.</p>
The negative impact of invasive alien vegetation on fire regime, biodiversity and water availability, inappropriate fire regime, Unauthorised access, Illegal utilisation of natural resources, incompatible practices on adjacent properties, invasive alien fish, instream structures, vandalism, over abstraction of surface water, climate change; Stakeholders have a lack/insufficient knowledge on the sustainable use of natural resources.	Strategy 3: Enhance and raise awareness of ecological targets of the Hexriver Complex.	<p>Objective 3.1: By 2022 and beyond CapeNature has developed and implemented the Hexriver Complex environmental education and awareness programme.</p>
Unauthorised access, illegal utilisation of natural resources, incompatible practices on adjacent properties, vandalism.	Strategy 4: Support sustainable tourism-based livelihoods in partnership with role players in the Hexriver Complex.	<p>Objective 4.1: By 2026 memorandums of understanding have been signed with relevant partners.</p>



Matroosberg view point. Photo: Alana Duffell-Canham

REFERENCES

Conservation Measures Partnership. 2020. Open Standards for the Practice of Conservation. Version 4.0 / February 2020.

Department of Environmental Affairs (DEA). 2015. Nomination of the Extension of the Cape Floral Region Protected Areas: World Heritage Site. Compiled for the Department of Environmental Affairs, South African National Parks, Western Cape Nature Conservation Board, Eastern Cape Parks and Tourism Agency and Eastern Cape Economic Development, Environmental Affairs and Tourism. Compiled by Indigenous Vegetation Consultancy. For submission to UNESCO.

Van Wilgen, B.W. & Forsyth, G.G. 2008. The historical effects and future management of fire regimes in the Fynbos Protected Areas of the Western Cape Province. CSIR Report prepared for CapeNature (CSIR/NRE/ECO/ER/2008/0078/C).

Maps compiled by Therese Forsyth and Sheila Henning.



Drosera capensis. Photo: Rika du Plessis.



Syncarpha speciosissima. Photo: Rika du Plessis.



