

Kabeljous Nature Reserve

Protected Area Management Plan (2020 – 2024)



**Eastern Cape
South Africa**

Acknowledgements

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ABBREVIATIONS

CBA	Critical Biodiversity Areas.
DEDEAT	Eastern Cape Provincial Department of Economic Development, Environmental Affairs and Tourism.
DEA	National Department of Environmental Affairs.
EC	Eastern Cape province.
EIA	Environmental Impact Assessment.
ECPAES	Eastern Cape Protected Areas Expansion Strategy
ECPTA	Eastern Cape Parks and Tourism Agency
ECBCP	Eastern Cape Biodiversity Conservation Plan
ESA	Ecological Support Areas
FOSTER	Friends of St Francis Nature Areas
FPA	Fire Protection Association in terms of the National Veld and Forest Fire Act (No.1 of 1998)
IDP	Municipal Integrated Development Plan
KRAG	Kabeljous Reserve Action Group
MEC	Member of the provincial Executive Council of the Department of Economic Development, Environmental Affairs and Tourism of the Eastern Cape province.
NEMA	National Environmental Management Act
NFEPA	National Freshwater Ecosystem Priority Areas
NPAES	National Protected Area Expansion Strategy
PA	Protected Area
ROD	Record of Decision
SDF	Municipal Spatial Development Framework
WC	Western Cape province.

DEFINITIONS OF TERMS

Alien species	Species or genotypes, which are not indigenous to the Kabeljous Nature Reserve and the surrounding area, including hybrids and genetically altered organisms.
Biodiversity	The variability among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part and also includes diversity within species, between species, and of ecosystems (as per the National Environmental Management: Biodiversity Act, 2004 [Act No. 10 of 2004]).
Buffer zone	An area surrounding a Protected Area that has restrictions placed on its use or where collaborative projects and programmes are undertaken to afford additional protection to the nature reserve.
Cultural heritage	As defined in Article 1 of the World Heritage Convention (UNESCO) 1972 , ‘cultural heritage’ is considered as “monuments, architectural works, works of monumental sculpture and painting, elements or structures of an archaeological nature, inscriptions, cave dwellings and combinations of features, which are of value from the point of view of history, art or science, groups of buildings, groups of separate or connected buildings which, because of their architecture, their homogeneity or their place in the landscape, are of significance from the point of view of history, art or science, sites, works of man or the combined works of nature and man, and areas including archaeological sites which are of value from the historical, aesthetic, ethnological or anthropological point of view.”
Ecological integrity	The sum of the biological, physical and chemical components of an ecosystem and its products, functions and attributes (as per the National Environmental Management: Protected Areas Act, 2003 [Act No. 57 of 2003]).
Ecosystem	A dynamic complex of animal, plant and micro-organism communities and their non-living environment interacting as a functional unit (as per the National Environmental Management: Protected Areas Act, 2003 [Act No. 57 of 2003]).
Ecosystem services	<p>As defined in Section 1 of the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) as “environmental goods and services” meaning:</p> <ol style="list-style-type: none"> a. Benefits obtained from ecosystems such as food, fuel and fibre and genetic resources. b. Benefits from the regulation of ecosystem processes such as climate regulation, disease and flood control and detoxification. c. Cultural non-material benefits obtained from ecosystems such as benefits of a spiritual, recreational, aesthetic, inspirational, educational, community and symbolic nature;” <p>For the purposes of this IMP, sustainable water production is also specifically included under this definition.</p>
Environmental degradation	The deterioration of the environment through depletion of resources such as air, water and soil; the destruction of ecosystems and the loss of species or undesirable reduction of species population numbers from a specific area from an environmental health perspective
Eastern Cape Parks and	Provincial conservation and tourism agency mandated in terms of the Eastern Cape Parks & Tourism Agency Act, Act No. 2 of 2010 (Eastern Cape) with the management of

Tourism Agency	Provincial Protected Areas and responsible authority for the Nature Reserves in the province.
Indigenous species	In relation to a specific Protected Area, means a species that occurs, or has historically occurred, naturally in a free state of nature within that specific Protected Area, but excludes a species introduced in that Protected Area as a result of human activity (as per the National Environmental Management: Protected Areas Act, 2003 [Act No. 57 of 2003]).
Invasive species	Means any species whose establishment and spread outside of its natural distribution range – <ul style="list-style-type: none"> a. Threaten ecosystems, habitats or other species or have a demonstrable potential to threaten ecosystems, habitats or other species. b. May result in economic and environmental harm or harm to human health. (As per the National Environmental Management: Protected Areas Act, 2003 [Act No. 57 of 2003]).
Management	In relation to a Protected Area, includes control, protection, conservation, maintenance and rehabilitation of the Protected Area with due regard to the use and extraction of biological resources, community-based practices and benefit sharing activities in the area in a manner consistent with the Biodiversity Act (as per the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003).
Management Authority	In relation to a Protected Area, means the organ of state or other institution or person in which the authority to manage the Protected Area is vested (as per the National Environmental Management: Protected Areas Act, 2003 [Act No. 57 of 2003]). However, it should be noted that in the case of the Kabeljous Nature Reserve, the Management Authority has not yet been formally assigned in terms of the National Environmental Management: Protected Areas Act, 2003 [Act No. 57 of 2003]. Instead, the reserve is being managed through an informal collaborative partnership between KRAG and DEDEAT, whereby KRAG is managing the reserve under the guidance of the responsible provincial conservation authority, namely DEDEAT. Thus, for the purposes of this management plan, the term Management Authority is therefore used more loosely to generally refer to KRAG and DEDEAT as the two organisations who are currently undertaking and overseeing the management of the Kabeljous Nature Reserve.
Protected Areas	<ul style="list-style-type: none"> • Means any area declared or proclaimed as such in terms of section 3 or listed in the Second Schedule to the KwaZulu-Natal Nature Conservation Management Act, 1997 (Act No. 9 of 1997); or • Means any of the Protected Areas referred to in section 9 of the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003).
Sustainable utilisation	In relation to the use of a biological resource, means the use of such resource in a way and at a rate that would not lead to its long-term decline; would not disrupt the ecological integrity of the ecosystem in which it occurs; and would ensure its continued use to meet the needs and aspirations of present and future generations of people (as per National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).

1) BACKGROUND

This section provides a brief introduction to the framework, structure and layout of the Protected Area management plan for the Kabeljous Nature Reserve.

1.1 Purpose of the plan

A Protected Area management plan is a strategic document that provides the framework for the long-term management, development and operation of a specific Protected Area. It informs the management of a Protected Area at all levels, from the Management Authority through to support staff within partner organisations and conservation authorities. The purpose of the management plan is to:

- Provide the primary strategic tool for management of the Kabeljous Nature Reserve, informing the need for specific programmes and operational procedures.
- Provide for capacity building, future thinking and continuity of management.
- Ensure that the Kabeljous Nature Reserve is developed, managed and utilised in such a way that its values and the purpose for which it has been established remain well protected (e.g., ensure the long-term protection of the reserve's biodiversity and ecological integrity while making the reserve accessible and safe for visitors to enjoy).
- Ensure the effective management of Kabeljous Nature Reserve in accordance with relevant provincial and national legislation and norms and standards.
- Manage the interrelationship between the conservation of the natural environment and the sustainable use of the reserve by visitors (primarily for nature-based recreation activities).

1.2 Participatory approach

The management plan for the Kabeljous Nature Reserve was developed through an inclusive and consultative process with key stakeholders and interested parties. Significant inputs were provided from a variety of stakeholders during the consultation and review process, notably the Department of Economic Development, Environmental Affairs and Tourism (DEDEAT), the Eastern Cape Parks and Tourism Agency (ECPTA), the Kouga Local Municipality, the Kabeljous Reserve Action Group (KRAG), the St Francis Bird Club, and the Friends of St Francis Nature Areas (FOSTER). This inclusive and participatory approach to developing a management plan for the Kabeljous Nature Reserve was followed to promote community and stakeholder involvement, to ensure that the management plan is supported by all stakeholders, and to create a sense of shared ownership of the reserve amongst stakeholders.

1.3 Structure of the plan

The structure of the management plan for the Kabeljous Nature Reserve is summarized in Table 1.1 and illustrated in Figure 1.1 below –

Table 1.1 Structure of the Protected Area management plan.

Section 1:	Provides an introduction and background to the Protected Area management plan.
Section 2:	Establishes the background and context of the Kabeljous Nature Reserve, which form the basis for the strategic and operational management frameworks that follow.
Section 3:	Sets out the strategic management framework for the Kabeljous Nature Reserve (e.g., the vision, management issues, objectives, etc.).
Section 4:	Sets out the Protected Area zonation plan for the Kabeljous Nature Reserve, outlining the land uses in particular zones.
Section 5:	Describes the administrative structure that has been established to assist in managing the Kabeljous Nature Reserve.
Section 6:	Sets out the operation management framework for the Kabeljous Nature Reserve (e.g., management activities, targets, etc.).
Section 7:	Sets out the monitoring measures required to determine if management targets are being met.
Section 8:	Provides an indicative costing plan for management implementation.
Section 9:	Describes the components that must be included in the annual plan of operation .

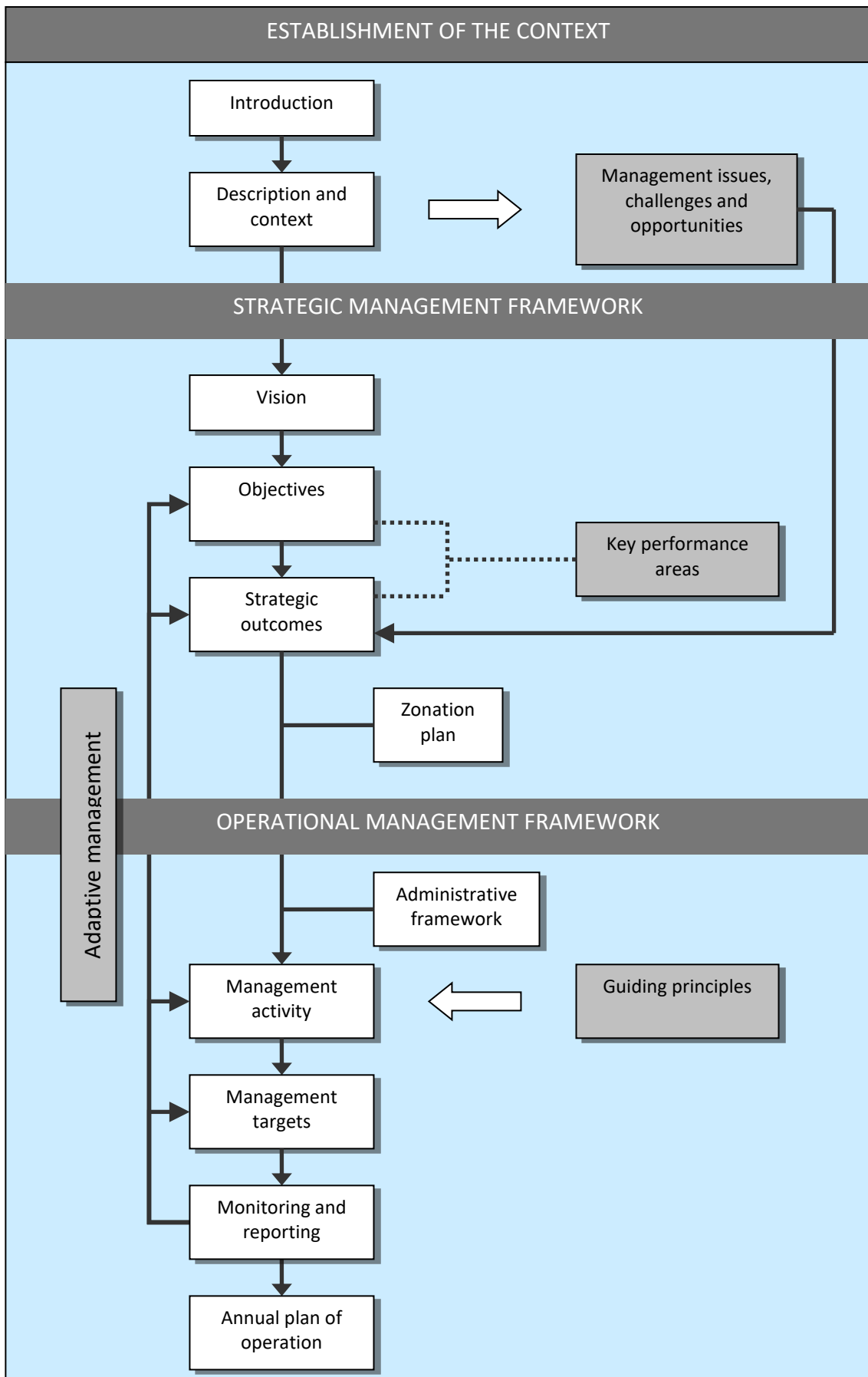


Figure 1.1 Structure of the Protected Area management plan.

1.4 Adaptive management

The preparation of this Protected Area management plan has been undertaken based on the guiding principles of adaptive management, which is a structured, iterative process in which decisions are made using the best available information and past experiences, with the aim of obtaining better information through monitoring of performance (Figure 1.2). In this way, decision making is aimed at achieving the best outcome based on current understanding, whilst accruing the information needed to improve future management. Adaptive management can lead to revision of a part or, if necessary, the whole Protected Area management plan. Adaptive management enables landowners and managers to:

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

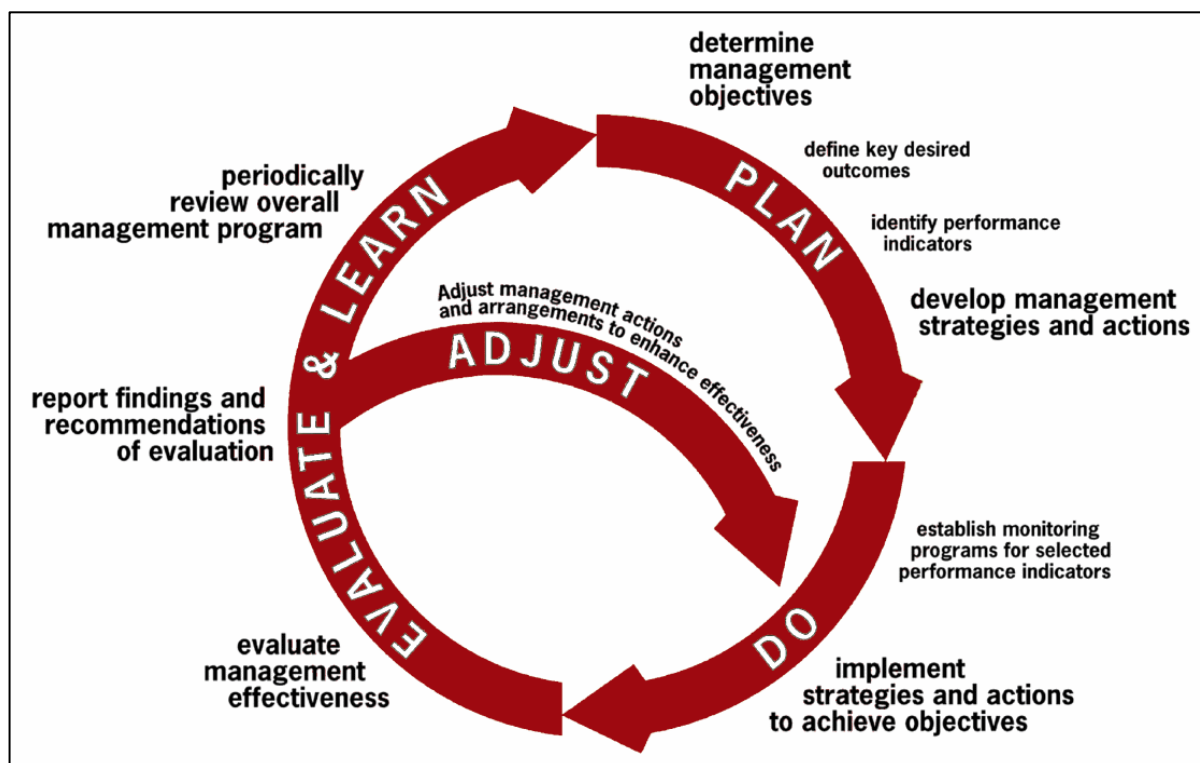


Figure 1.2 The adaptive management cycle (Management Strategy Evaluation, 2009).

2) DESCRIPTION AND CONTEXT OF THE KABELJOUS NATURE RESERVE

2.1 Introduction to the Kabeljous Nature Reserve

The Kabeljous Nature Reserve is a 681 hectare reserve that is located just outside the town of Jeffrey's Bay, along the coast and on the north-eastern bank of the Kabeljous estuary. The reserve falls within the Sarah Baartman District Municipality and the Kouga Local Municipality of the Eastern Cape Province of South Africa. The reserve is bounded by the R102 provincial road along its north-western boundary, by the Kabeljous estuary along its south-western boundary, by a pristine coastline along its south-eastern boundary, and by privately owned land along its north-eastern boundary (refer to Figure 2.1 and Figure 2.2).

The Kabeljous Nature Reserve is a very diverse area with an exceptionally high level of habitat heterogeneity. The reserve contains a significant part of the Kabeljous estuary with its associated estuarine salt marches, a pristine coastline with primary sand dunes, a network of important wetlands and wetland clusters, and a variety of different vegetation types. A number of threatened and endemic species are also present in the reserve. The reserve contains significant archaeological features, which also makes it a conservation priority. Furthermore, the reserve falls within the planning domain of a number of important landscape-level biodiversity conservation initiatives which seek to expand and link key Protected Areas and ecological corridors across the region. The Kabeljous Nature Reserve is therefore of significant conservation value.

2.2 Cadastral boundaries, ownership, conservation status and management

The Kabeljous Nature Reserve consists of two main sections – namely the **Kabeljous section** (153 ha) and the **Papiesfontein section** (528 ha) – **which jointly constitute the Kabeljous Nature Reserve** (as shown in Figure 2.2). The Kabeljous section of the reserve consists of two land parcels that are owned by the provincial Department of Roads and Public Works, under the formal custodianship of DEDEAT (see Table 2.1 and Figure 2.2). Although the Kabeljous section of the reserve is widely recognised as a *de facto* Nature Reserve, it has never been formally declared as a Nature Reserve and, consequently, it does not yet enjoy any formal Protected Area status in terms of the NEM: Protected Areas Act (No. 57 of 2003). The Papiesfontein section of the reserve, on the other hand, consists of three land parcels that are currently vested with the provincial Department of Human Settlements (see Table 2.1 and Figure 2.2). The Department of Human Settlements recognises the exceptional conservation value of the Papiesfontein state land, the sensitivity of its natural features, and the fact that the area is not suitable for development purposes. As a result, the Department of Human Settlements has initiated a process to transfer the Papiesfontein state land to an appropriate conservation authority for conservation purposes. This transfer process is currently underway. Although the Papiesfontein section of the reserve is thus currently earmarked for conservation, it also does not yet enjoy formal Nature Reserve status in terms of the NEM: Protected Areas Act (No. 57 of 2003).

Although the Kabeljous Nature Reserve is of significant conservation value, provincial conservation authorities simply do not have the necessary resources and capacity to manage and maintain the reserve. To overcome the resource constraints that exist within provincial

conservation authorities, personnel of the local DEDEAT office together with concerned members of the local community decided to establish the Kabeljous Reserve Action Group (KRAG) as a joint initiative to provide management support to the Kabeljous Nature Reserve. KRAG was established in April 2018 as a non-profit volunteer organisation that consists of members of the community wanting to play an active role in preserving and maintaining the Kabeljous Nature Reserve, under the guidance of DEDEAT. The overall vision of KRAG is to support the conservation and management of the Kabeljous Nature Reserve in order to preserve its unique biodiversity and provide an enhanced, beautiful and diverse natural environment that is accessible for all residents and visitors to enjoy. Since KRAG's establishment in April 2018, a significant amount of funding, resources and volunteer capacity have been generated to support the management of the Kabeljous Nature Reserve.

Table 2.1 Properties and ownership of the Kabeljous Nature Reserve.

Kabeljous Nature Reserve	
Property description	Current landowner
Kabeljous section of the reserve	
Remainder of the Farm No. 808, Registration Division of Humansdorp, Eastern Cape Province, measuring in extent 104.6016 hectares, held by Title Deed T39870/1986 and shown in SG Diagram No. 5336/86.	Eastern Cape Department of Roads & Public Works (under the custodianship of DEDEAT).
Farm No. 807, Registration Division of Humansdorp, Eastern Cape Province, measuring in extent 48.1197 hectares, held by Title Deed T39870/1986 and shown in SG Diagram No. 5335/86.	
Papiesfontein section of the reserve	
Portion 5 of the Farm Papiesfontein No. 319, Registration Division of Humansdorp, Eastern Cape Province, measuring in extent 429.1224 hectares, held by Title Deed T13563/1987 and shown in SG Diagram No. 8756/74.	Eastern Cape Department of Human Settlements.
Portion 24 of the Farm Kabeljaauwsrivier No. 321, Registration Division of Humansdorp, Eastern Cape Province, measuring in extent 3.4193 hectares, held by Title Deed T13563/1987 and shown in SG Diagram No. 214/77.	
Portion 23 of the Farm Kabeljaauwsrivier No. 321, Registration Division of Humansdorp, Eastern Cape Province, measuring in extent 95.3082 hectares, held by Title Deed T13563/1987 and shown in SG Diagram No. 2838/74.	

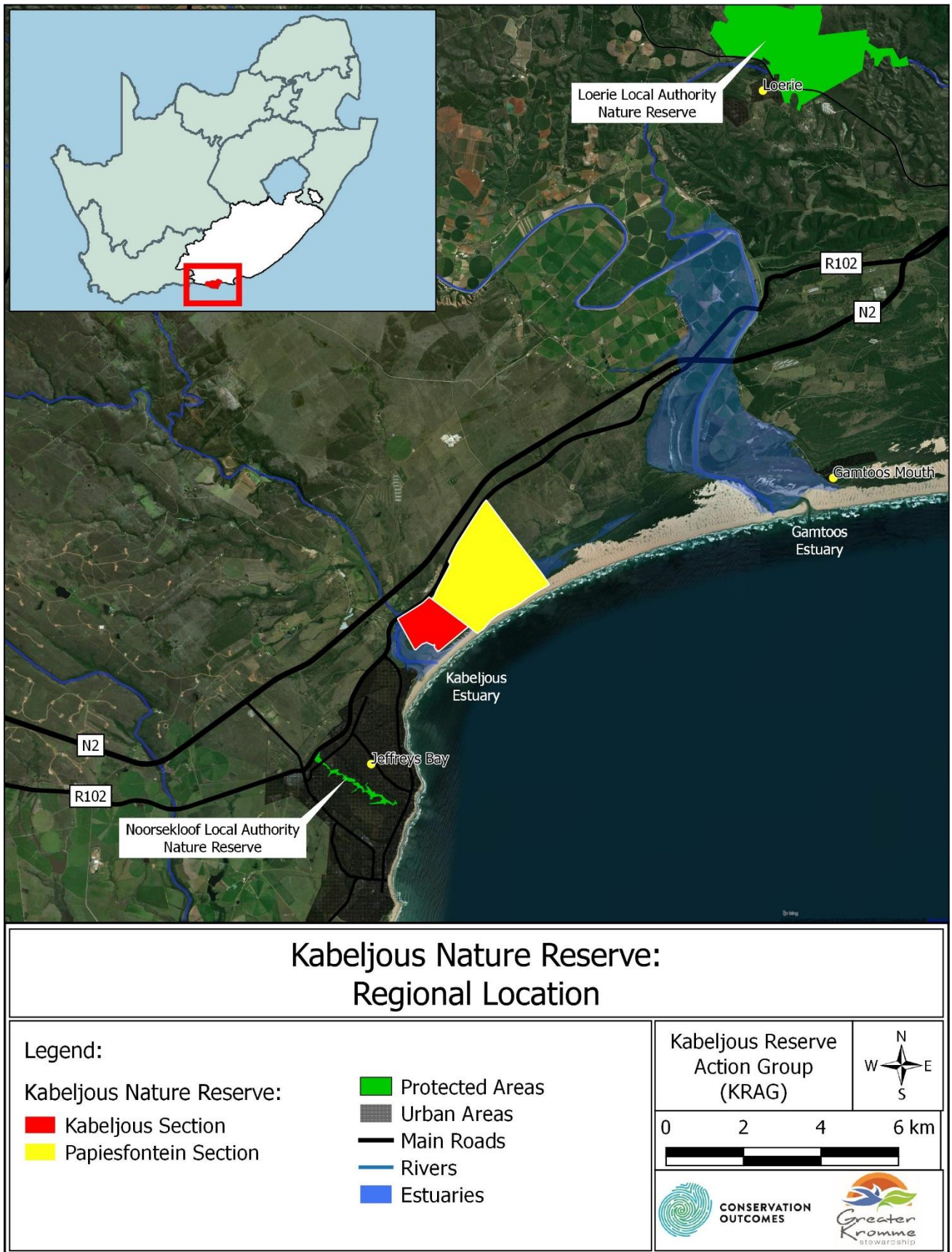
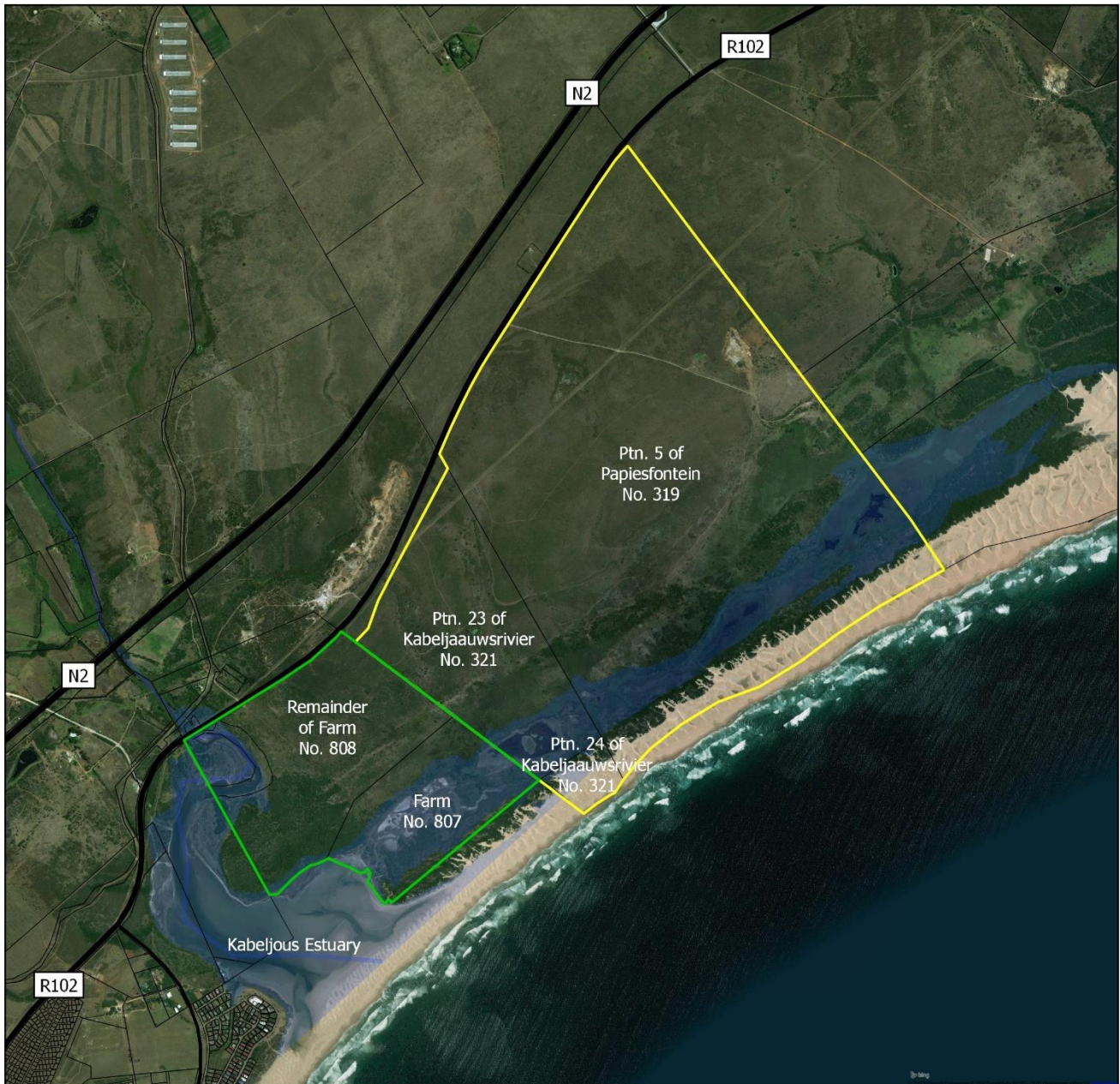


Figure 2.1 Regional location of the Kabeljous Nature Reserve.



Kabeljous Nature Reserve: Cadastral Boundaries and Spatial Layout

Legend:

Kabeljous Nature Reserve:

- Kabeljous Section
- Papiessfontein Section

- Property Cadasters
- Main Roads
- Estuaries
- Rivers

Kabeljous Reserve
Action Group
(KRAG)



0 500 1000 m



Figure 2.2 Properties constituting the Kabeljous section and the Papiessfontein section of the Kabeljous Nature Reserve.

2.3 The values of the Kabeljous Nature Reserve

The values of a reserve are those remarkable attributes which led to it being identified as a conservation priority and which make it worth of being conserved as a Nature Reserve. The values of a Nature Reserve are important in planning and management, as they are the aspects of the reserve that must be protected. The most important values of the Kabeljous Nature Reserve, as identified by stakeholders, are summarised in Table 2.2 below.

Table 2.2 Values of the Kabeljous Nature Reserve.

Habitats and species values	<ul style="list-style-type: none"> • A number of unique and ecologically sensitive habitat types are present in the Kabeljous Nature Reserve, including an estuary system with its associated estuarine salt marches, wetlands, coastal dunes, Humansdorp-Shale Renosterveld, and a variety of coastal thickets. • A large variety of rare, threatened and endemic plant and animal species are found at Kabeljous Nature Reserve. • The Kabeljous Nature Reserve has an exceptionally high level of habitat heterogeneity and high levels of endemism. • The Kabeljous Nature Reserve provides an important breeding site for birds and habitats for migrant water birds. • The interrelationship between the plant and animal life in the reserve and the people using the reserve (co-habitation by animals, plants and humans).
Ecosystem functioning and regional conservation values	<ul style="list-style-type: none"> • The Kabeljous Nature Reserve contains significant areas of irreplaceable biodiversity that are of regional, provincial, and national conservation significance. • The Kabeljous Nature Reserve is important for the maintenance of coastal corridors and critical process areas (e.g., regulation of sand movement along the coastline, maintenance of the region’s beaches, etc.). • A significant part of the Kabeljous estuary system and important coastal wetland systems are conserved by the Kabeljous Nature Reserve. • The Kabeljous Nature Reserve forms part of a vital macro-ecological corridor where it acts as an important coastal-interior transition zone.
Scenic values	<ul style="list-style-type: none"> • The pristine natural beauty and natural features of the Kabeljous Nature Reserve makes it a place of high aesthetic appeal and scenic value. • The Kabeljous Nature Reserve is a place of natural beauty that makes an important contribution to the sense of place for local residents of the region.
Nature-based recreational values	<ul style="list-style-type: none"> • The range of nature-based recreation opportunities that the Kabeljous Nature Reserve offer for visitors to enjoy (e.g., hiking, trail-running, horse riding, mountain biking, fishing, bird watching, etc). • The solitude experience offered by the pristine natural landscape of the Kabeljous Nature Reserve allowing visitors to reconnect with nature on a physical, emotional and spiritual level. • The fact that the Kabeljous Nature Reserve provides an easily accessible and safe natural environment for all to enjoy.
Cultural and historic values	<ul style="list-style-type: none"> • Important archaeological and paleontological artefacts are found within the Kabeljous Nature Reserve, primarily of Khoisan origin.

Table 2.2 (Continued from previous page).

<p>Scientific, research and educational values</p>	<ul style="list-style-type: none"> • The Kabeljous Nature Reserve is an educational asset that enables people of all ages and education levels to improve their understanding and appreciation of nature. • The Kabeljous Nature Reserve holds potential for research on species, ecology and ecosystem function that contributes to the understanding of the biodiversity and conservation imperatives of such systems.
<p>Socio-economic values</p>	<ul style="list-style-type: none"> • The Kabeljous Nature Reserve provides benefits for the people from the region flowing from tourism opportunities. • The Kabeljous Nature Reserve contributes to achieving a balance between the economic development and biodiversity conservation of the particular coastal region.

2.3.1 Protection of the values

The Protected Area’s values, in particular those that underlie the functioning of its ecosystems and the protection of its rare and threatened species, will be given the highest degree of protection to ensure the persistence of these systems predominantly unaltered by human activity. The reserve’s ecosystems will be managed with minimal interference to natural processes. However, specific management interventions may be desirable when the structure or function of a habitat or ecosystem has been significantly altered by human induced impacts or previous management. Specific management intervention should only be considered if it is the best alternative available to restore ecological integrity. Where directed management is required, management interventions should strive to emulate natural processes as closely as possible and should be scientifically based and in accordance with accepted principles of conservation biology. Furthermore, to protect and uphold the values of the Kabeljous Nature Reserve, a number of internal rules have been put in place for the reserve which all visitors and users of the reserve must adhere to. The internal rules of the Kabeljous Nature Reserve appear in Annexure A of the management plan.

2.4 Purpose of the Kabeljous Nature Reserve

The purpose of the Kabeljous Nature Reserve, in broad terms, is to preserve those remarkable attributes of the reserve which are most valued (refer to section 2.3 of the management plan). Consistent with Section 17 of the NEM: Protected Areas Act (No. 57 of 2003), the purpose of the Kabeljous Nature Reserve is to:

- Protect, conserve and maintain the significant biodiversity, natural features and archaeological interests of the reserve.
- Protect representative areas of the vegetation types, habitats and natural features present in the reserve, particularly those that are vulnerable or ecologically sensitive (e.g., estuary system with its associated estuarine salt marches, wetlands, primary coastal dunes, unspoiled coastline, Humansdorp Shale Renosterveld, etc.).
- Protect threatened, rare and endemic species found on the reserve.

- Contribute to landscape level biodiversity conservation through the protection of landscape corridors and ecological process areas that are essential for maintaining the ecological integrity of the region.
- Support a variety of nature-based recreation opportunities in a scenic and diverse natural environment that is accessible and safe for all to enjoy.
- Be an asset for science and education whereby people of all ages and education levels can improve their understanding and appreciation of the biodiversity and natural systems of the reserve.

2.5 The legislative basis for the management of Kabeljous Nature Reserve

There is a large body of legislation that is relevant to the management of the Kabeljous Nature Reserve. The relevant Management Authority of the Kabeljous Nature Reserve should familiarise itself with the purpose and contents of the statutes and their subsequent amendments and regulations.

2.5.1 National Environmental Management: Protected Areas Act

The primary legislation guiding the establishment and management of all formal Protected Areas in South Africa is the NEM: Protected Areas Act (No. 57 of 2003). The NEM: Protected Areas Act (No. 57 of 2003) sets out the legal framework for the declaration, administration and management of Protected Areas in South Africa. The NEM: Protected Areas Act (No. 57 of 2003) makes provisions “*for the protection and conservation of ecologically viable areas representative of South Africa’s biological diversity and its natural landscapes*”.

➤ Declaration status of the Kabeljous Nature Reserve –

None of the land parcels constituting the Kabeljous Nature Reserve (see Table 2.1 and Figure 2.2) has yet been formally declared as a Nature Reserve and, consequently, the reserve does not currently enjoy any formal Protected Area status or security in terms of the NEM: Protected Areas Act (No. 57 of 2003). The Kabeljous section of the reserve has, however, been under the formal custodianship of a provincial conservation authority (namely DEDEAT) for many years, and it is widely recognised as a *de facto* Nature Reserve. The formal declaration of the Kabeljous Nature Reserve has, however, been hindered by the resource constraints that exists within provincial conservation authorities. The Papiessfontein section of the reserve, on the other hand, is currently still vested with the Department of Human Settlements. The Department of Human Settlements does, however, recognise the exceptional conservation value of the Papiessfontein state land and efforts to transfer the Papiessfontein section of the reserve to an appropriate provincial conservation authority is well underway. Discussions with the relevant provincial conservation authorities to have the Kabeljous Nature Reserve formally declared as a Nature Reserve in terms of NEM: Protected Areas Act (No. 57 of 2003) are underway. This matter is addressed in the operational management framework under section 6.1 of the management plan.

➤ Management of the Kabeljous Nature Reserve –

Although the management of provincial state-owned reserves is generally a function of the relevant provincial conservation authority (in this case ECPTA and DEDEAT), resource

constraints often make it very difficult for provincial conservation authorities throughout South Africa to allocate adequate resources to sustain the management of smaller reserves. Furthermore, the management costs per hectare for smaller reserves are generally significantly higher than those of larger reserves, and it is thus often more difficult to make smaller reserves financially viable. As a result, provincial conservation authorities often focus on the management of larger reserves where their resources can be used more efficiently. Traditional management models (where provincial conservation authorities accept sole responsibility for the management of a reserve) are thus generally not well suited to smaller reserves. As a result, provincial conservation authorities should consider alternative management models and innovative partnerships to achieve the effective management of smaller reserves. Due to the resource constraints that exist within provincial conservation authorities, personnel of the local DEDEAT office and concerned members of the local community decided to establish KRAG as a joint initiative to provide management support to the Kabeljous Nature Reserve. KRAG was established in April 2018 as a non-profit volunteer organisation and consists of members of the community wanting to play an active role in preserving and maintaining the Kabeljous Nature Reserve, under the guidance of DEDEAT. The overall objective of KRAG is to support the protection and management of the Kabeljous Nature Reserve, and to make it more accessible for people to enjoy. Since KRAG's establishment, a significant amount of funds, resources and volunteer energy have been generated to support the ongoing conservation and management of the Kabeljous Nature Reserve.

It is important to note that once the Kabeljous Nature Reserve is formally declared as a Nature Reserve, the MEC must in writing assign the management of a Nature Reserve to a suitable person, organisation or organ of state, as stipulated in terms of Section 38(2)(a) of the NEM: Protected Areas Act (No. 57 of 2003). The person, organisation or organ of state to which the management of a Protected Area has been assigned will be regarded as the Management Authority of the particular reserve. In accordance with the Eastern Cape Parks and Tourism Agency Act (No. 2 of 2010), ECPTA is the provincial conservation agency mandated with the expansion and management of state-owned provincial Protected Areas in the Eastern Cape province. Although resource constraints have previously prevented provincial conservation authorities (e.g., ECPTA) from accepting management responsibility for the Kabeljous Nature Reserve, a tremendous opportunity now exists for provincial conservation authorities to overcome those resource constraints by formalizing their partnership with KRAG. It is worth noting that Section 42 of the NEM: Protected Areas Act (No. 57 of 2003) explicitly makes provision for a Management Authority of a Protected Area to enter into an agreement with another party for the co-management of the area by the parties. This essentially provides a legal basis for provincial conservation authorities to be assigned as the Management Authority of the Kabeljous Nature Reserve, but to enter into a co-management agreement whereby their management responsibilities are delegated to a credible conservation partner, such as KRAG. KRAG is eager to partner with the relevant provincial conservation authorities (e.g., ECPTA and DEDEAT) to ensure the ongoing protection and management of the Kabeljous Nature Reserve, under the guidance of the relevant conservation authorities. The issues of establishing appropriate management structures and generating adequate resources for the management of the Kabeljous Nature Reserve are addressed in the operational management framework under section 6.1 and section 6.2 of the management plan, respectively.

2.5.2 National Environmental Management: Biodiversity Act

The NEM: Biodiversity Act (No. 10 of 2004) provides planning instruments for various aspects of biodiversity conservation. The planning tools provided are aimed at assisting provincial authorities and conservation agencies in identifying biodiversity priorities and addressing threats. The identified tools include the National Biodiversity Framework, bioregional plans, biodiversity management plans, the listing of threatened and protected species or ecosystems, and the control and enforcement of species and organisms posing a potential threat to biodiversity. It is worth noting that Section 76(1) of the Biodiversity Act states that the Management Authority of a Protected Area must incorporate an invasive species control and eradication strategy into their management plan. The alien invasive species regulations (Notice 598, 2014) and alien and invasive species lists (Notice 864, 2016) of the NEM: Biodiversity Act (No. 10 of 2004) will therefore apply.

2.5.3 National Environmental Management Act: EIA Regulations

The National Environmental Management Act (No. 107 of 1998), EIA Regulations of 2014 (as amended on 7 April 2017) lists activities that cannot proceed without prior Environmental Authorisation from the Provincial Department of Economic Development, Environmental Affairs and Tourism (DEDEAT) or the National Department of Environmental Affairs (DEA). A Basic Assessment process (Listing Notice 1 and 3) or a Scoping and Environmental Impact Reporting process (Listing Notice 2) is required depending on the location, nature and extent of certain proposed activities. In terms of the EIA Regulation Listing Notice 3, certain activities may require Environmental Authorisation specifically as a result of their proximity to Protected Areas. The implication of this is that if any activities listed in the EIA Regulations Listing Notice 3 are proposed within 10 kilometres from National Parks or World Heritage sites, or within 5 kilometres from any other Protected Area identified in terms of the NEM: Protected Areas Act (No. 57 of 2003) or from the core area of a Biosphere Reserve, this may require Environmental Authorisation. Furthermore, certain activities within a Critical Biodiversity Area (CBA) may also require Environmental Authorisation.

2.5.4 Conservation of Agricultural Resources Act

The Conservation of Agricultural Resources Act (No. 43 of 1983) compels landowners to control declared invader plants on their properties and makes provision for penalties for landowners who do not comply. Section 6 of the Conservation of Agricultural Resources Act (No. 43 of 1983) relates to the prescription of measures which all land users have to comply with (e.g., the prohibition of modifying run-off flow patterns and the restoration of eroded land), while Section 7 provides protection to any vlei, marsh, wetland, water sponge or watercourse.

2.5.5 National Veld and Forest Fire Act

In terms of the National Veld and Forest Fire Act (No. 101 of 1998), landowners may form fire protection associations for the purpose of preventing, managing and extinguishing veld fires. A fire protection association currently exists for the region, namely the Sarah Baartman West Fire Protection Association (SBWFPA). The National Veld and Forest Fire Act (No. 101 of 1998) requires landowners to prepare and maintain firebreaks on the boundaries of their land; to have equipment, protective clothing and trained personnel for extinguishing fires; and to

ensure that in the landowner's absence responsible persons are present on or near the land who, in the event of fire, will react. It is worth noting that Section 12 (7) of the National Veld and Forest Fire Act (No. 101 of 1998), makes provision for adjoining landowners to maintain a common firebreak rather than having firebreaks from each individual property that constitute the site. Of particular importance to the Kabeljous Nature Reserve is Section 4(8) of the National Veld and Forest Fire Act (No. 101 of 1998), which requires that "*the owner in respect of State land must join any fire protection association registered in the area in which the land lies*". The fire management requirements for the Kabeljous Nature Reserve are addressed in the operational management framework under section 6.4.3 of the management plan.

2.5.6 National Water Act

The National Water Act (No. 36 of 1998) provides guidelines on the usage, management and protection of water resources. The National Water Act (No. 36 of 1998) identifies certain water uses and activities which may not proceed without prior authorisation from the Department of Water and Sanitation. This include water uses and activities such as the abstraction of water from a natural water resource (e.g., river); the building of farm dams and water storage infrastructure; wastewater discharge and irrigation with wastewater; discharging effluent or any other form of pollution into natural water resources (e.g., river); altering the beds, banks and course or characteristics of a watercourse, even if the flow is erratic/seasonal; etc.

2.5.7 National Forest Act

The National Forest Act (No. 84 of 1998) promotes the sustainable management and development of forests and provides special measures for the protection of certain forests and trees. Any area that has vegetation that is characteristic of a closed and contiguous canopy is defined as a forest and, as a result, falls under the authority of the Department of Forestry (of the Department of Agriculture Forestry and Fisheries). Any protected or indigenous trees in a natural forest may not be cut, disturbed, damaged or destroyed without the required permits and authorisations.

2.5.8 Provincial biodiversity legislation

In addition to national legislation, the Eastern Cape also has its own provincial biodiversity legislation, as nature conservation is a concurrent function of national and provincial government in terms of the Constitution (No. 108 of 1996). DEDEAT is the provincial state department responsible for environmental matters in the Eastern Cape. The relevant provincial legislation includes, but is not limited to, the Nature and Environmental Conservation Ordinance (No. 19 of 1974).

2.5.9 National Heritage Resources Act

The National Heritage Resources Act (No. 25 of 1999) aims to lay down the legislative framework and principles for governing heritage resources management in South Africa, to introduce an integrated system for the identification, assessment and management of heritage resources, and to set norms and maintain essential national standards for the

management and protection of heritage resources in South Africa. The National Heritage Resources Act (No. 25 of 1999) provides protection to heritage or archaeological sites and stipulates that such sites may not be destroyed, damaged, excavated, altered, defaced or otherwise disturbed. The South African Heritage Resources Agency (SAHRA) is a statutory organisation established in terms of the National Heritage Resources Act (No. 25 of 1999) as the national body responsible for the protection of South Africa's cultural heritage resources.

2.5.10 Servitudes register

The municipal water pipeline of the Nelson Mandela Bay Municipality runs through the Kabeljous Nature Reserve. Furthermore, one district road (namely the R102) runs along the northern boundary of the Kabeljous Nature Reserve. It is advisable that a register of these servitudes be compiled and maintained.

2.6 The regional and local planning context of Kabeljous Nature Reserve

2.6.1 Regional and local planning frameworks

It is important to ensure that local government planning mechanisms such as Integrated Development Plans (IDPs) and Spatial Development Frameworks (SDFs) are aligned with the conservation objectives and principles of Protected Areas within their jurisdiction. According to the demarcation of district and local municipalities, the Kabeljous Nature Reserve falls within the Sarah Baartman District Municipality, and within Ward 8 of the Kouga Local Municipality in the Eastern Cape Province of South Africa. The SDF of the Kouga Local Municipality recognises the Kabeljous Nature Reserve as a Critical Biodiversity Area that is important for conservation and heritage tourism. Despite the conservation importance and ecological sensitivity of the reserve, the SDF of the Kouga Local Municipality identifies the area between the Gamtoos River, the Kabeljous River, the coastline and the R102 road as the Gamkab SDF planning area where possible restricted low density residential and resort type developments may be desirable (refer to Figure 2.3). This is likely to pose a serious threat to the long-term conservation of the Kabeljous Nature Reserve. It is thus imperative for conservation authorities to provide inputs into local government planning mechanisms such as IDPs and SDFs in order to ensure that all local and regional plans are adequately aligned with the conservation values and purpose of the Kabeljous Nature Reserve.

2.6.2 Protected Area buffer requirement

In terms of the EIA Regulations of the National Environmental Management Act (No. 107 of 1998), various activities require Environmental Authorisation before they may commence. In terms of Regulation RN.985 of 2014, Listing Notice No. 3, there are a number of activities that require environmental approval specifically as a result of their proximity to a Protected Area. The implication of this is that if any of the activities listed in Notice No. 3 of the EIA Regulations are proposed within a Nature Reserve or within 5 km of it, the proposed activities will be subject to either a basic assessment or a full scoping and EIA process. Figure 2.4 indicates the 5 km Protected Area buffer in which Listing Notice No. 3 of the EIA Regulations will apply once the reserve has been formally declared as a Nature Reserve in terms of the NEM: Protected Areas Act (No. 57 of 2003).

2.6.3 Eastern Cape Protected Area Expansion Strategy

The National Protected Areas Expansion Strategy (NPAES) was commissioned by the National Department of Environmental Affairs and serves as a national framework for an integrated, coordinated and uniform approach to the expansion and consolidation of the national Protected Areas system (DEAT, 2008). The NPAES sets targets at a national level for Protected Area expansion, identifies expansion priority areas, and makes recommendations on mechanisms for expansion. The NPAES recognizes that provincial Protected Area agencies are important implementers of the NPAES and, therefore, requires that each province develop its own provincial Protected Area expansion implementation plan, based on the NPAES's targets and focus areas. To fulfil this requirement, ECPTA prepared the Eastern Cape Protected Area Expansion Strategy (ECPAES) (Skowno *et al.*, 2012). The ECPAES offers a defensible provincial Protected Area expansion strategy and identifies spatial priority areas for Protected Area expansion in the province of the Eastern Cape.

The Kabeljous Nature Reserve is situated in an area that is regarded by the ECPAES as a high spatial priority for Protected Areas expansion (refer to Figure 2.5). Thus, the Kabeljous Nature Reserve makes a significant contribution towards achieving provincial and national Protected Area expansion targets and biodiversity targets in the Eastern Cape Province. It is also worth mentioning that the Kabeljous Nature Reserve forms part of an area that is recognized for its importance as a macro-ecological corridor and natural process area which supports the functioning of critical ecological processes (refer to section 2.7.9 for more information). At a landscape level this means that the Kabeljous Nature Reserve plays an important role in supporting large-scale ecological processes across the region and forms part of a landscape-level biodiversity conservation initiative.



Kabeljous Nature Reserve: 5 km Protected Area Buffer Zone

Kabeljous Nature Reserve:

- Kabeljous Section
- Papiestfontein Section

5 km Protected Area Buffer Zone of the Kabeljous Nature Reserve

- Protected Areas
- Estuaries
- Rivers
- Farm_Cadasters
- Main Roads

Kabeljous Reserve
Action Group
(KRAG)



0 2 4 km



Figure 2.4 The 5 km Protected Area buffer in which Listing Notice No. 3 of the EIA Regulations applies around Kabeljous Nature Reserve.

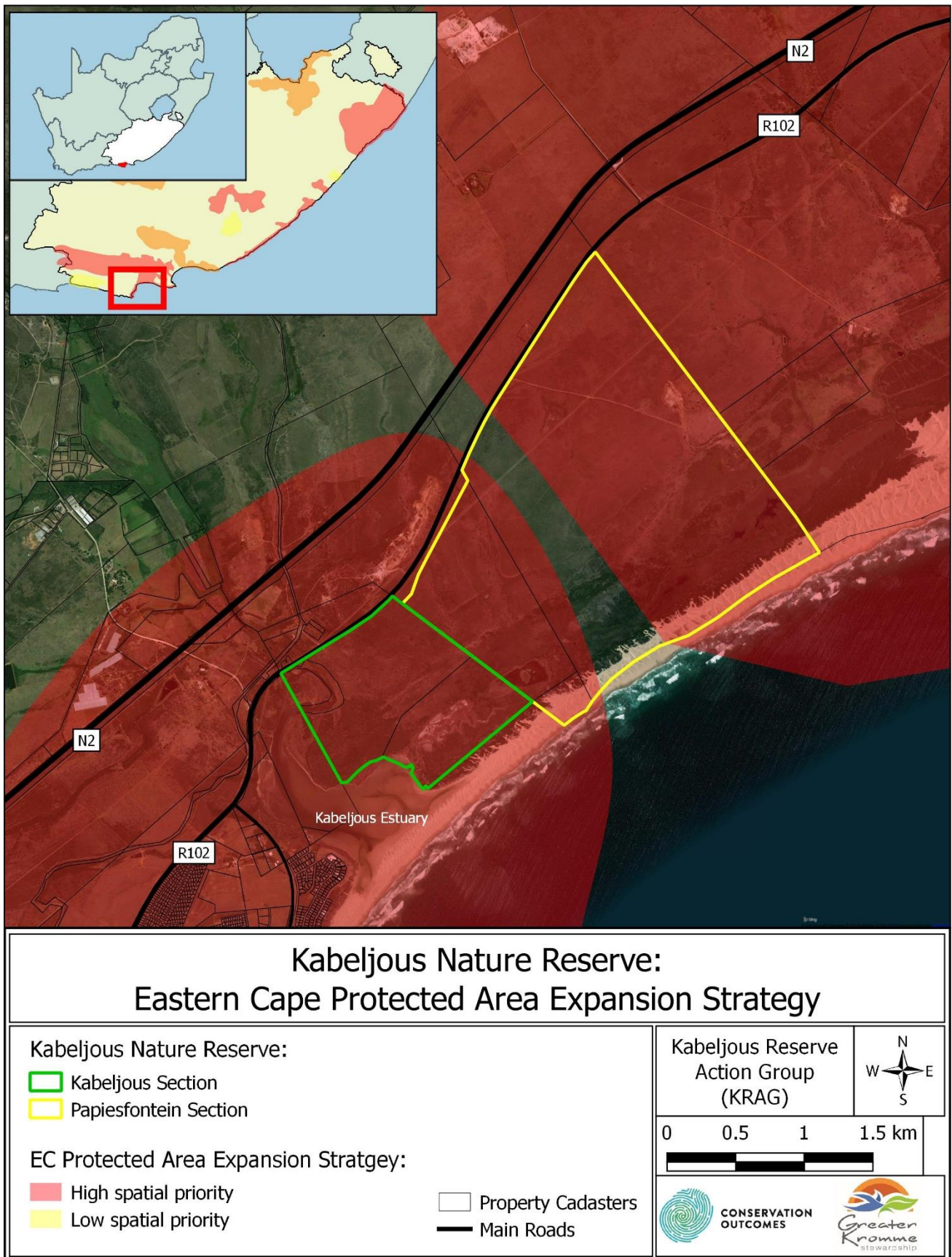


Figure 2.5 Location of Kabeljous Nature Reserve in relation to the spatial priority areas of the EC Protected Area Expansion Strategy.

2.6.4 Eastern Cape Biodiversity Conservation Plan

The Eastern Cape Biodiversity Conservation Plan (ECBCP) (Berliner & Desmet, 2007) use an integrative systematic conservation planning approach to map Critical Biodiversity Areas (CBAs) and to offer guidelines for land-use and resource-use planning and decision making at both a local and regional level in the Eastern Cape. CBAs are terrestrial and aquatic features in the landscape that are critical for conserving biodiversity and maintaining ecosystem functioning. In terms of the EIA Regulations of the National Environmental Management Act (No. 107 of 1998), various activities require Environmental Authorisation before they may commence. The implication of this is that if any of the activities listed in the EIA Regulations are proposed in a CBA, they may be subject to either a basic assessment or a full scoping and EIA process.

The Kabeljous Nature Reserve is situated in an area that is regarded by the ECBCP as a Critical Biodiversity Area 1 (CBA 1) and a Critical Biodiversity Area 2 (CBA 2), primarily due to its importance as part of a macro-ecological corridor, its threatened vegetation types and ecosystems, and its location within the sensitive coastal zone (refer to Figure 2.6). The importance of the reserve as part of a macro-ecological corridor is discussed in more detail in section 2.7.9 of this management plan.

2.6.5 Baviaanskloof Mega-Reserve

The Baviaanskloof Mega-Reserve project was a previous partnership initiative between the ECPTA and the Wilderness Foundation, which aimed to achieve landscape level conservation through the expansion and consolidation of the Protected Areas network and to create a mega-reserve in which the conservation of the regions biodiversity and natural resources are aligned with rural and agricultural development needs.

As part of the Baviaanskloof Mega-Reserve project, a detailed biodiversity assessment process and irreplaceability analysis was conducted for the region (Skowno, 2007). Through this systematic biodiversity planning process, the habitats found on Kabeljous Nature Reserve were identified as 100% irreplaceable habitats (refer to Figure 2.7). The Baviaanskloof Mega-Reserve project also identified the area where the Kabeljous Nature Reserve is located as part of a macro-ecological corridor which creates an important link between coastal and inland habitats, and which allows for the functioning of large-scale ecological processes that are essential for conservation at a landscape level (Skowno, 2007). The importance of the reserve as part of a macro-ecological corridor is discussed in more detail in section 2.7.9 of this management plan.

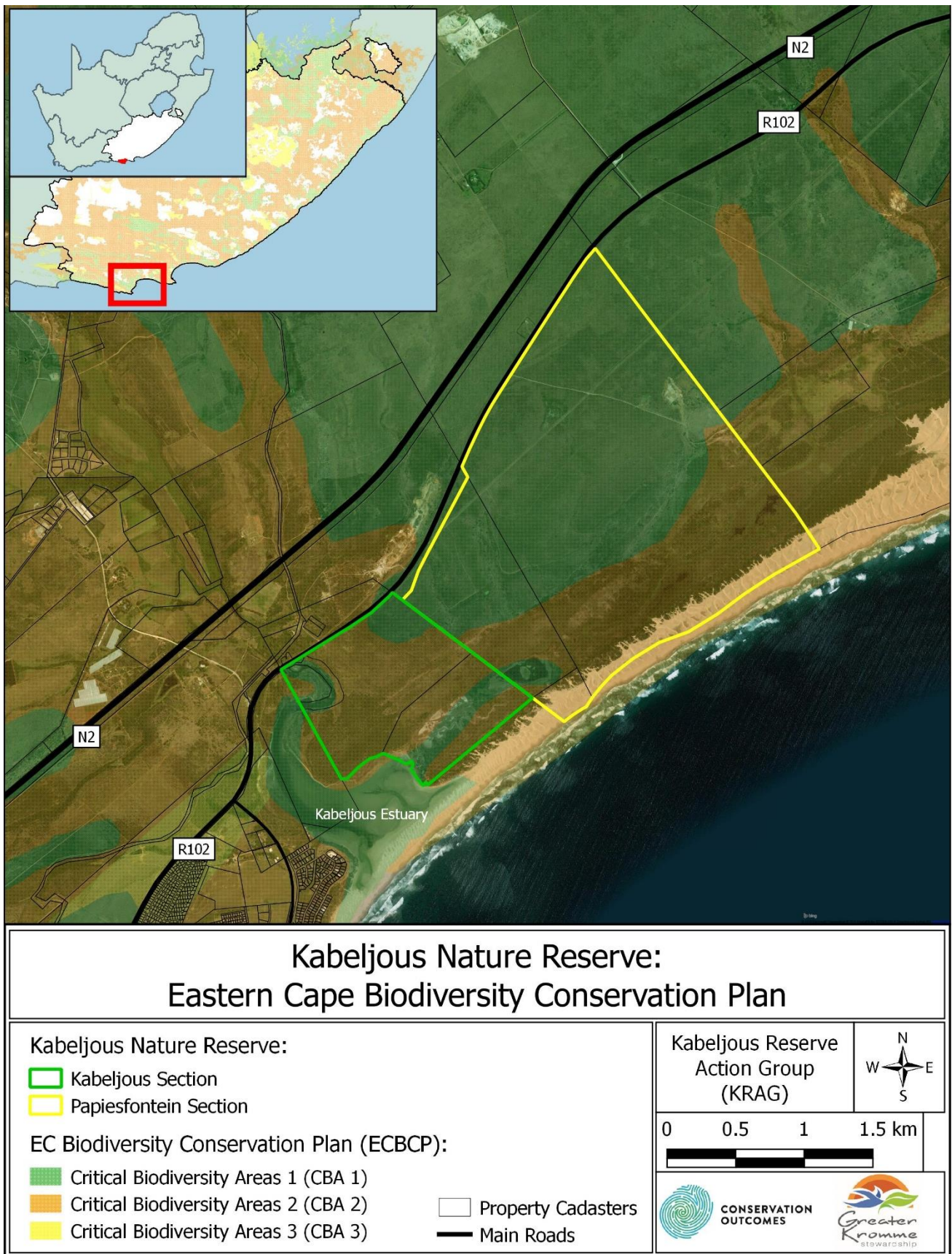
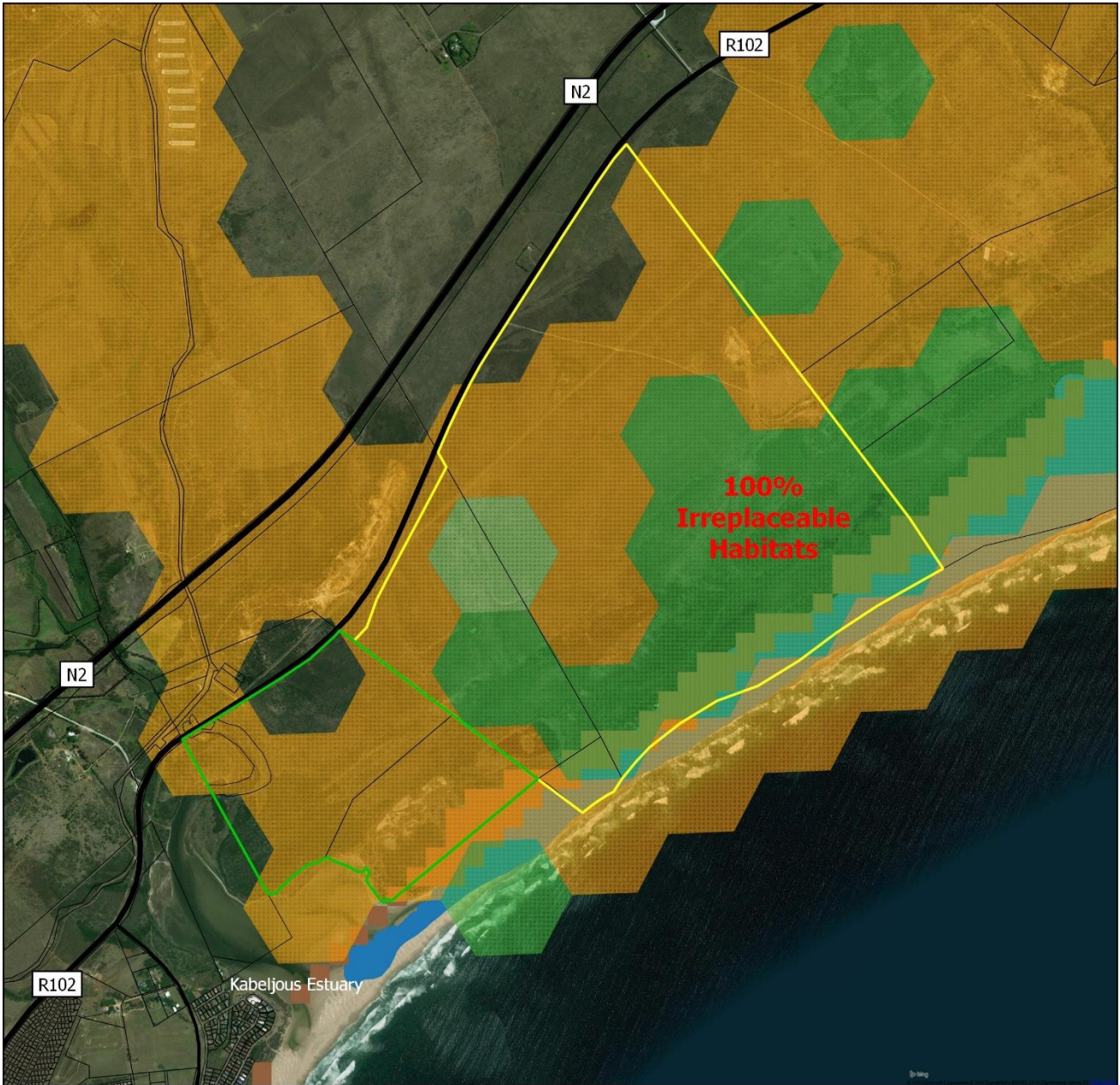


Figure 2.6 Location of Kabeljous Nature Reserve in relation to the Critical Biodiversity Areas of the EC Biodiversity Conservation Plan.



Kabeljous Nature Reserve: Baviaanskloof Mega-Reserve

Kabeljous Nature Reserve: Kabeljous Section Papiesfontein Section		 Property Cadasters Main Roads	Kabeljous Reserve Action Group (Krag)
Baviaanskloof Mega-Reserve: Critical Biodiversity Area 1a (CBA 1a) - 100% Irreplaceable Critical Biodiversity Area 1b (CBA 1b) Critical Biodiversity Area 2 (CBA 2)		0 500 1000 m 	
		CONSERVATION OUTCOMES Greater Kromme Stewardship	

Figure 2.7 Location of Kabeljous Nature Reserve in relation to the Critical Biodiversity Areas of the Baviaanskloof Mega-Reserve project.

2.7 Ecological context of the Kabeljous Nature Reserve

2.7.1 Climate and weather

The Kabeljous Nature Reserve is situated along a coastline in an area that is known for its windy weather and temperate climate. The average midday temperatures range from about 17 – 21°C during summer months, to about 14 – 18°C during winter months. It is typically coldest during July with an average minimum temperature of 8°C at night. The variation in annual temperature is around 6.7 °C. The Kabeljous Nature Reserve receives an average rainfall of approximately 611 mm per year, with rainfall occurring throughout the year. Summer months are usually humid and relatively dry, with the lowest rainfall typically occurring during December (34 mm), and the highest in August (68 mm). The variation in the precipitation between the driest and wettest months is approximately 34 mm. The monthly temperature and rainfall distributions are shown in Figure 2.8 and Figure 2.9, respectively.

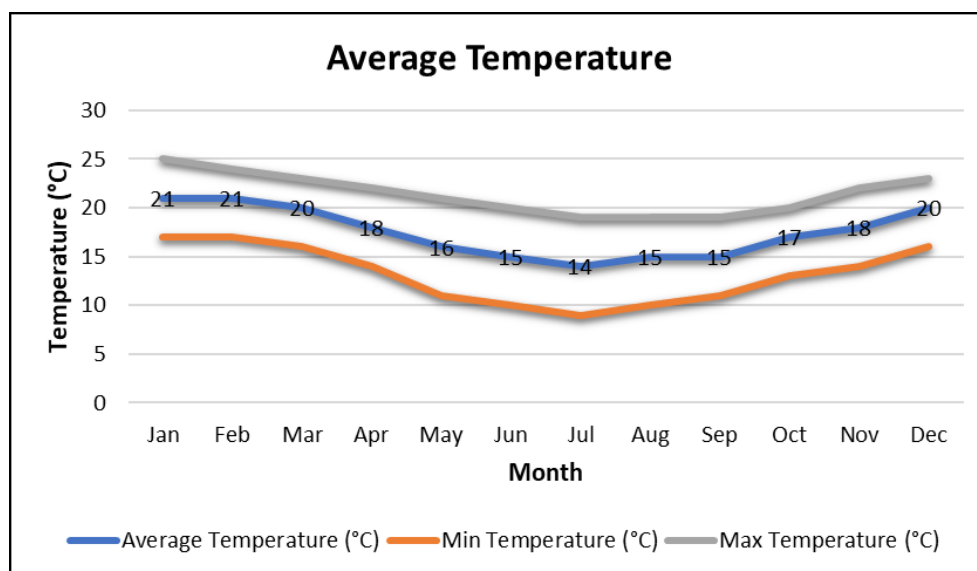


Figure 2.8 Average temperatures at the Kabeljous Nature Reserve.

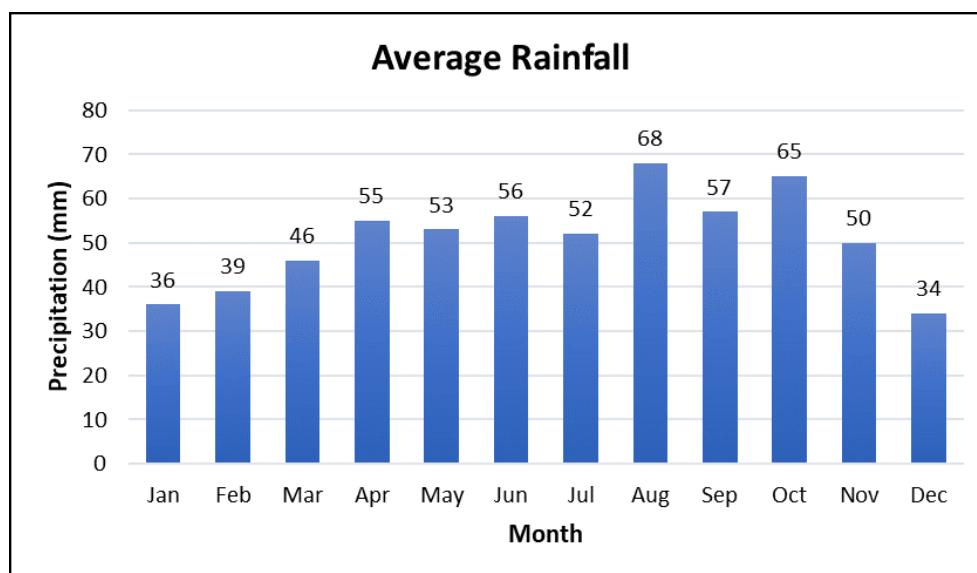


Figure 2.9 Average monthly precipitation at Kabeljous Nature Reserve.

2.7.2 Topography

The altitude of the Kabeljous Nature Reserve ranges from 1 meter above sea level in the south-east, to approximately 61 meters above sea level in the north-western parts of the reserve. The areas along the coastline, wetlands and estuarine salt marches form the lowest lying parts of the reserve. There is a gradual increase in altitude of the reserve towards the R102, with the highest point in the north-western corner of the reserve (see Figure 2.10).

2.7.3 Geology and soils

Three main geological formations are found in the Kabeljous Nature Reserve, namely the Enon Formation of the Uitenhage Group, the Schelm Hoek Formation of the Algoa Group, and deposits of the Bokkeveld Group.

The Enon Formation consists of reddish-brown, coarse-grained conglomerate, sandstone, shale and limestone. The Enon Formation contains pebbles, cobbles and boulders, typically of quartzite and other hard rock (Lubke & de Moor, 1998). The Enon Formation was deposited in the form of alluvial fans by rivers draining the high Cape Fold Belt Mountains during the Late Jurassic to Early Cretaceous in age. The variable nature of the Enon beds in terms of the mode of deposition and resultant parent material is fully expressed in the complexity of soil types associated with the Uitenhage Group. A rough distinction can be made between soils derived from parent material deposited under lacustrine and estuarine conditions and those deposited under fluvial conditions. The former are fine grained rocks (e.g., mudstone, shales, soft sands) which are strongly weathered, giving rise to deep uniformly yellow-brown to red soils. The fluvial Enon sediments are massive coarse grained conglomerates and sandstone (CEN Integrated Environmental Management Unit, 2007; Lubke & de Moor, 1998).

The Schelm Hoek Formation contains aeolian, coastal and shallow marine sediment types, predominantly calcareous sandstones (both marine and aeolian), sandy and shelly clastic limestones, conglomerates and coquina (e.g., gritty to gravelly "shell hash"). Due to the high content of finely comminuted (ground-up) shell material of marine origin, many of these units are very lime-rich. Since deposition, they have frequently been modified to form well-consolidated calcareous rocks ("coastal limestones"). These include tough, white surface calcretes (pedogenic limestones) that have been formed through the solution and reprecipitation of carbonate minerals by groundwaters and that are typical of semi-arid climates. The complex overlapping distribution of the various Algoa Group formations reflects the pattern of continental uplift and global changes in sea levels during the late Cenozoic Era. Useful summaries of Algoa Group geology have been given by Le Roux (1990), Maud & Botha (2000) and Roberts, Botha, Maud, & Pether (2006).

Deposits from the Bokkeveld Group consist of quartzite, sandstone and generally impervious shales. The Bokkeveld shales can be grouped into two classes. The first class comprises the shallow duplex soils of the level interfluvies below the Coastal Platform. These soils are at a relatively young stage of development as is evidenced by the poorly developed B horizons. The second class comprises deeper well drained soils of the slopes and bottoms of the river valleys. These soils are invariably covered by thicket vegetation and have a superficial enrichment of organic matter and a high water-holding capacity (CEN Integrated Environmental Management Unit, 2007).



Kabeljous Nature Reserve: Topography

Legend:

Kabeljous Nature Reserve:

- Kabeljous Section
- Papiessfontein Section

- 5m Contours
- Main Roads
- Rivers
- Estuary & Wetlands

Kabeljous Reserve
Action Group
(Krag)



0 500 1000 m



Figure 2.10 Topography of the Kabeljous Nature Reserve and its surroundings.

2.7.4 Hydrology

The most significant hydrological features found on the Kabeljous Nature Reserve include a network of large wetland systems (Figure 2.11), as well as the Kabeljous estuary and its estuarine functional zone (see Figure 2.12).

The Kabeljous Nature Reserve contains a network of large wetland systems that are recognized as National Freshwater Ecosystem Priority Areas. The wetlands found in the Kabeljous Nature Reserve therefore make a significant contribution to meeting national biodiversity conservation goals for freshwater ecosystems (CSIR, 2011). This is particularly significant because wetlands are the most threatened of all ecosystems in South Africa. Furthermore, the wetlands on the Kabeljous Nature Reserve are unique in the sense that they extend along the primary coastal sand dunes in close proximity to the coastline. The network of wetlands also stretches from the Kabeljous River estuary to the Gamtoos River estuary, where it forms an ecological connection between the estuarine salt marshes of both estuary systems. As these wetlands transition into the intertidal estuarine salt marshes, they form a marshy creek behind the primary coastal dunes. The system of wetlands on the Kabeljous Nature Reserve is highly sensitive and any unnatural impacts on these wetlands should be minimised.

The Kabeljous Nature Reserve lies on the banks of the Kabeljous estuary and provides protection to the eastern side of the estuary system. The estuary consists of three parts: a wide shallow coastal lagoon with an average depth of only about 0.5 meters; an upstream converging appendix-shaped channel section with water depths ranging from 1.6 to 2.3 meters; and a marshy estuarine creek which extends behind the primary coastal dunes in a north-easterly direction where it transitions into a wetland system. The lagoon area is approximately 35 hectares in size and is separated from the sea by a massive sandbar which stretches about 800 meters across the mouth of the estuary. The sandbar is approximately 200 – 250 meters wide and effectively blocks river discharge and tidal exchange for most of the year. The estuary typically only breaches the sandbar with periodic flood events. Deep drainage of the estuary during open mouth and low-water spring tide conditions causes excessive loss of water surface. This results in large areas of the estuarine bed becoming dry during low tides (Bickerton & Pierce, 1988; Fromme & Badenhorst, 1987). A sedimentary survey of the estuary in 1984 showed that the wide estuarine basin behind the sandbar is dominated by flat deposits of marine sand, while the appendix-shaped channel is the domain of fluvial sediment dynamics. Estuarine salt marshes associated with the Kabeljous estuary are present along the banks of the estuary. The intertidal salt marshes associated with the Kabeljous estuary are generally not clearly defined and are typically bordered by a floodplain comprised of grassland. The estuarine floodplains are flooded only during river floods or after high rainfall events. The estuarine salt marshes and floodplains play an important role in the aquatic food web by delivering nutrients to the estuary system and coastal waters. The estuarine salt marshes also serve numerous important ecological functions, including the stabilisation of the estuary banks by trapping and binding sediments. This protects the banks of the estuary against accelerated erosion, particularly during flood events. Estuaries, along with their estuarine salt marshes are highly sensitive systems, and therefore all unnatural impacts to these systems should be minimised.

The Kabeljous estuary system is sustained by the Kabeljous River. Any obstructions of flow of water, and any reduction in the volume or quality of water, in the Kabeljous catchment and

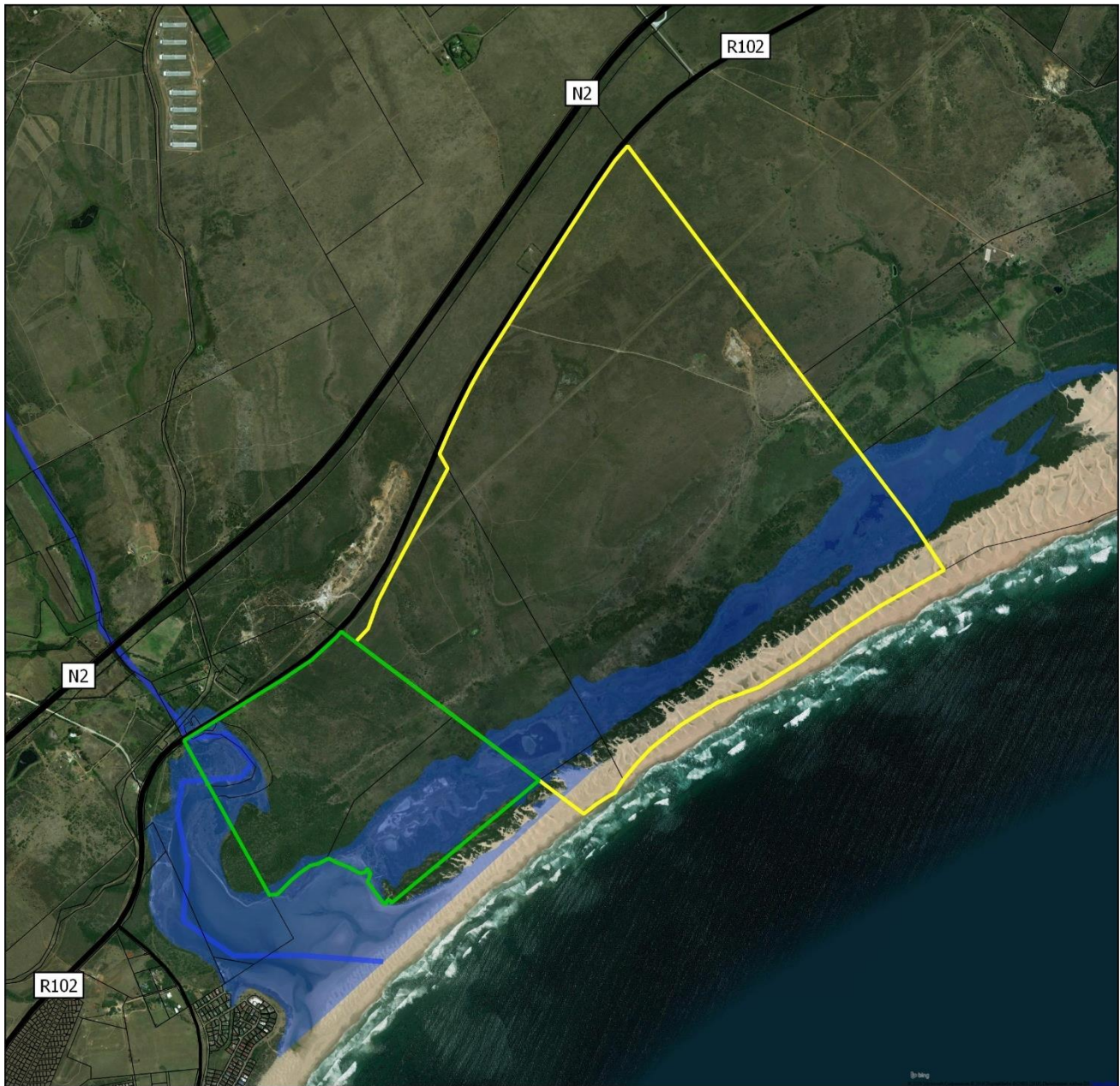
river system therefore pose a direct threat to the Kabeljous estuary system. Currently, the most significant threats in this regard include:

- A number of small farm dams exist in the Kabeljous catchment areas and along minor tributaries of the Kabeljous River.
- Relatively high levels of alien invasive plants are prevalent in the Kabeljous catchment areas and along the tributaries and riparian areas of the Kabeljous River.
- The current national road (N2), a secondary road (R102), and a narrow-gauge railway-line traverse the Kabeljous River just upstream of the Kabeljous Nature Reserve.
- Agricultural activities (e.g., cultivation, irrigation) on the banks of the Kabeljous river system and in its catchment areas.

Despite the abovementioned threats, the Kabeljous river system is relatively undisturbed and has been classified by the National Freshwater Ecosystem Priority Areas (NFEPA) as a largely natural river system (NFEPA Class: B) where only small change in natural habitats and biota may have taken place, but the ecosystem functions are essentially unchanged. According to the NFEPA, the Kabeljous River is also recognised as a Freshwater Ecosystem Priority Area which makes a significant contribution to meeting national biodiversity conservation goals for priority freshwater ecosystems in South Africa.



Figure 2.11 Wetlands and water bodies of the Kabeljous Nature Reserve.



Kabeljous Nature Reserve: Hydrology

Kabeljous Nature Reserve:

- ▭ Kabeljous Section
- ▭ Papiessfontein Section

National Freshwater Ecosystem Priority Areas (NFEPA):

- ▭ NFEPA Priority Areas
- NFEPA Priority Rivers

Kabeljous Reserve
Action Group
(Krag)



0 500 1000 m



Figure 2.12 Hydrological features of the Kabeljous Nature Reserve.

2.7.5 Vegetation types

The classification of the vegetation types found on the Kabeljous Nature Reserve was based on the 2018 version of the Vegetation Map of South Africa, Lesotho and Swaziland (South African National Biodiversity Institute, 2006 – 2018), as this classification system is used to determine provincial and national biodiversity and Protected Area targets. This version offers further refinements to the original Vegetation Map of South Africa, Lesotho and Swaziland that was produced in 2006 and its subsequent updated versions produced in 2009 and 2012.

According to the classification of the Vegetation Map of South Africa, Lesotho and Swaziland (South African National Biodiversity Institute, 2006 – 2018), the Kabeljous Nature Reserve falls within the Fynbos Biome and the Albany Thicket Biome of South Africa, with some Azonal areas occurring primarily along the coastline. A total of four different vegetation types occur within the Kabeljous Nature Reserve, along with a number of non-terrestrial habitats which are primarily associated with the estuarine functional zone (refer to Table 2.3 and Figure 2.13).

The Kabeljous Nature Reserve makes a substantial contribution to meeting provincial and national conservation targets. The reserve plays a key role in protecting vegetation types with a high degree of endemism to the Eastern Cape Province, and that are not currently adequately conserved in the existing Protected Areas network in South Africa. Of particular importance is the fact that Humansdorp Shale Renosterveld is the largest vegetation type found on the Kabeljous Nature Reserve. Humansdorp Shale Renosterveld is nationally listed as an endangered vegetation type, it is endemic to the Eastern Cape Province, and it is currently not conserved elsewhere in any statutory conservation areas. The Kabeljous Nature Reserve thus plays a critical role in the conservation of Humansdorp Shale Renosterveld.

Table 2.3 Vegetation types in the Kabeljous Nature Reserve and their contribution towards Protected Area targets.

Vegetation type	Extent of vegetation within the reserve (ha)	Threat status	Provincial endemism	Conservation status
Humansdorp Shale Renosterveld	349 ha	Endangered	100% Endemic to EC	Not Protected
Sundays Mesic Thicket	181 ha	* Least Threatened	100% Endemic to EC	Well Protected
St Francis Dune Thicket	50 ha	* Least Threatened	100% Endemic to EC	Poorly protected
Cape Seashore Vegetation	40 ha	* Least Threatened	80% Endemic to EC	Well Protected
Non-Terrestrial (Estuary Functional Zone)	61 ha	N/A	Not Endemic to EC	N/A
TOTAL	681 ha	-	-	-

*Note – Although these vegetation types are currently listed as Least Threatened, their threat statuses are expected to change once the results of the latest SANBI National Biodiversity Assessment is released towards the end of 2019.

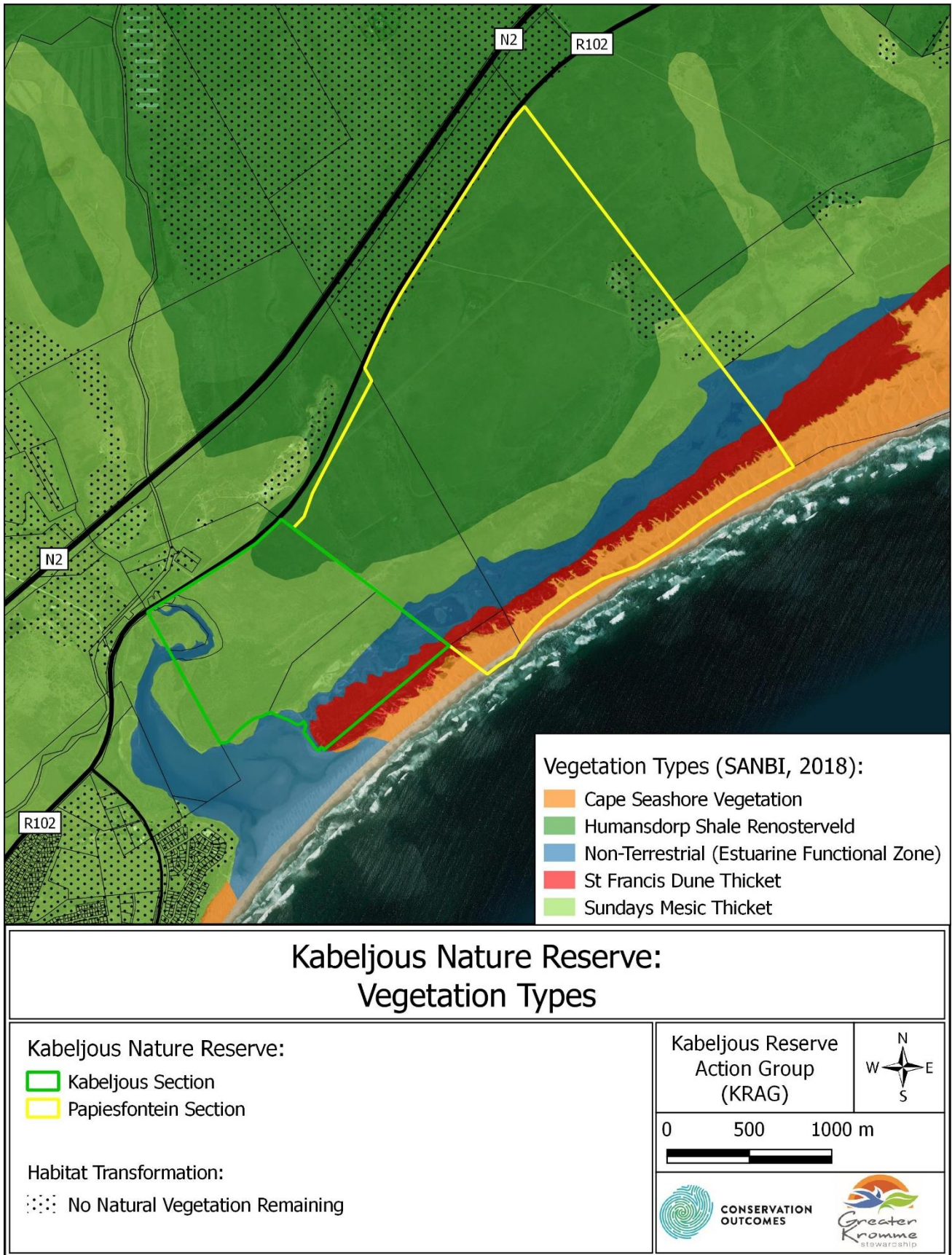


Figure 2.13 Vegetation of the Kabeljous Nature Reserve (South African National Biodiversity Institute, 2018).

It is notable that the Humansdorp Shale Renosterveld in the Kabeljous Nature Reserve largely occurs on the clays and loams derived from the Bokkeveld Group shales (Mucina & Rutherford, 2006). The Sundays Mesic Thicket on the Kabeljous Nature Reserve is typically found on the rocky, sandy-loamy soils derived from shale and sandstone of the Enon Formation of the Uitenhage Group and the deposits of the Bokkeveld Group (Grobler *et al.* (2018). St Francis Dune Thicket on the Kabeljous Nature Reserve is largely restricted to the Aeolian dune sands of the Schelm Hoek Formation of the Uitenhage Group (Grobler *et al.* (2018). Cape Seashore Vegetation, on the other hand, is characterised by young coastal sandy sediments forming beaches and dunes, exposed to reworking by relentless winds and frequent sea storms (Mucina & Rutherford, 2006). Remnants of extensive dune fields occur along the coast between the Kabeljous and the Gamtoos river mouths and the transverse dune ridges within these systems are aligned at right angles to the prevalent winds.

The main characteristics and taxa of each of the five vegetation types found on Kabeljous Nature Reserve, as described by Mucina and Rutherford (2006) and by Grobler *et al.* (2018) are summarized in the paragraphs that follow below.

Humansdorp Shale Renosterveld is endemic to the Eastern Cape Province and occurs in three swathes, namely from Jeffrey's Bay and Marina Glades near the coast and inland past Humansdorp to the lower reaches of the Dieprivier near Two Streams; the Mondplaas area near the mouth of the Gamtoos River stretching inland in a series of patches south of the Gamtoos River to west of Patensie; and between thicket and fynbos types from Burghley Hills to Rocklands and the Dell to Nooitgedacht southwest of Uitenhage. This vegetation type is largely confined to altitudes ranging from 20 – 360 meters and typically occurs on moderately undulating plains and undulating hills. This vegetation type is typically composed of low, medium-dense graminoid and dense cupressoid-leaved shrubland, dominated by *Elytropappus rhinocerotis* (renosterbush). There are both grassland and shrubland forms of this renosterveld present, probably depending on grazing and fire regimes. Thicket patches are common on termitaria and in fire-safe enclaves, especially in the east (Mucina & Rutherford, 2006). It is dominated by *Aspalathus nivea* in the post-fire, early seral stages. Important taxa include Succulent Tree – *Aloe Africana*; Tall Shrubs – *Cliffortia strobilifera*, *Metalasia densa*, *Morella serrata*; Low Shrubs – *Elytropappus rhinocerotis* (renosterbush), *Helichrysum anomalum*, *Oedera genistifolia*, *Anthospermum galioides* subsp. *galioides*, *Barleria pungens*, *Chaetacanthus setiger*, *Clutia rubricaulis*, *Euryops munitus*, *Felicia filifolia* subsp. *filifolia*, *Hermannia flammea*, *Indigofera denudata*, *I. heterophylla*, *Lotononis acuminata*, *Metalasia aurea*, *Muraltia alopecuroides*, *Passerina rubra*, *Pelargonium sidoides*, *Tephrosia capensis*; Herbaceous Climber – *Thunbergia capensis*; Herbs – *Arctotis acaulis*, *Berkheya heterophylla* var. *radiata*, *Centella asiatica*, *Gazania linearis*, *Gerbera piloselloides*, *Helichrysum nudifolium*, *Hibiscus pusillus*, *Senecio othonniflorus*; Geophytic Herbs – *Bobartia orientalis*, *Geissorhiza heterostyla*, *Ledebouria cooperi*, *Oxalis punctata*, *O. smithiana*, *Satyrium membranaceum*; Graminoids – *Eustachys paspaloides*, *Themeda triandra*, *Aristida junciformis* subsp. *galpinii*, *Brachiaria serrata*, *Cymbopogon marginatus*, *Cynodon dactylon*, *Eragrostis capensis*, *E. curvula*, *Ficinia nigrescens*, *F. tristachya*, *Merxmuellera disticha*, *Paspalum dilatatum*, *Pentaschistis pallida*, *Restio tetragonus*, *Sporobolus africanus*, *Tribolium hispidum*, *Tristachya leucothrix*. Endemic taxa include Succulent Shrubs – *Delosperma patersoniae*, *Trichodiadema fourcadei*; Geophytic Herb – *Cyrtanthus wellandii*.



Figure 2.14 Humansdorp Shale Renosterveld in Kabeljous Nature Reserve.

Sundays Mesic Thicket is endemic to the Eastern Cape Province. It occurs most extensively at the southern foot of the Zuurberg Mountains from Skurweberg near Kirkwood in the west to Nuweposkop near Paterson in the east. Smaller areas occur along the south-eastern slopes of the Groot Winterhoek and Elandsberg Mountains around Uitenhage, in incised valleys around Addo Heights, and in the lower reaches of river valleys and adjacent coastal forelands from the Gamtoos River south-eastward to Krom River Mouth. This vegetation type is generally associated with low foothills and mountain slopes and deeply incised valleys. Medium-sized to tall thicket (3 – 5 m) dominated by small trees and woody shrubs, with

Cussonia spicata and *Euphorbia triangularis* emergent above the canopy is characteristic of this vegetation type. Some woody species are shared with the Sundays Valley Thicket, but few spinescent or succulent species occur in the Sundays Mesic Thicket and the tree component is better developed (Grobler *et al.*, 2018). Important taxa associated with this vegetation type include Small trees - *Olea europaea* subsp. *cuspidata*, *Apodytes dimidiata*, *Allophylus decipiens*, *Canthium spinosum*, *Crotalaria capensis*, *Cussonia spicata*, *Hippobromus pauciflorus*, *Maytenus undata*, *Ptaeroxylon obliquum*, *Schotia latifolia*, *Sideroxylon inerme*, *Vepris lanceolata* Succulent tree *Euphorbia triangularis*; Geophytic herbs: *Albuca bracteata*, *Bonatea speciosa*, *Chlorophytum comosum*; Herbs - *Asplenium cordatum*, *Asplenium rutifolium*, *Hypoestes forskoolii*, *Plectranthus verticillatus* ; Graminoids - *Panicum deustum*, *Panicum maximum*; Tall shrubs - *Flueggea verrucosa*, *Scutia myrtina*, *Buddleja saligna*, *Carissa bispinosa*, *Dovyalis rhamnoides*, *Grewia occidentalis*, *Lauridia tetragona*; Herbaceous climbers - *Rhoicissus digitata*, *Rhoicissus tomentosa*, *Senecio deltoideus*. Endemic taxa associated with this vegetation type include Succulent herbs - *Crassula cordata*, *Crassula orbicularis*, *Crassula pellucida* subsp. *marginalis*; Small trees - *Pterocelastrus tricuspidatus*, *Aloe pluridens*; Geophytic herbs - *Chasmanthe aethiopica*; Herbs - *Acalypha ecklonii*; Tall shrubs - *Brachylaena elliptica*, *Rhoiacarpos capensis*, *Scolopia zeyheri*, *Searsia lucida*; Herbaceous climbers - *Senecio angulatus*.

St Francis Dune Thicket is endemic to the Eastern Cape Province and is confined to the narrow coastal strip along the Indian Ocean seaboard from near the Tsitsikamma River Mouth (west of Oyster Bay) eastward to the Sundays River Mouth. It is typically associated with flat to moderately undulating coastal dunes. It is commonly present as a mosaic of low thicket (1 - 3 m), occurring in small bush clumps dominated by small trees and woody shrubs, in a mosaic of low (1 - 2 m) asteraceous fynbos. Thicket clumps are best developed in fire-protected dune slacks, and the fynbos shrubland occurs on upper dune slopes and crests. Relatively tall dense thickets may occur on dunes that are mainly outside the influence of coastal salt spray, although it is otherwise often dominated by stunted trees, shrubs (often armed with spines and thorns), abundant lianas and sparse herbaceous and grassy undergrowth. The fynbos component in the vegetation diminishes from west to east, with *Portulacaria afra* occurring occasionally east of Port Elizabeth (Grobler *et al.*, 2018). Important taxa associated with this vegetation type include Small trees - *Rapanea gilliana*, *Olea capensis*, *Sideroxylon inerme*; Succulent shrubs - *Cotyledon adscendens*, *Crassula nudicaulis*, *Euphorbia mauritanica*, *Zygophyllum morgsana*; Graminoids - *Andropogon eucomus*, *Cymbopogon pospischilii*, *Cynodon dactylon*, *Ehrharta calycina*, *Eustachys paspaloides*, *Digitaria eriantha*, *Pentameris heptameris*, *Pentameris pallida*, *Stenotaphrum secundatum*, *Themeda triandra*, *Tristachya leucothrix*; Tall shrubs - *Azima tetraantha*, *Carissa bispinosa*, *Cassine peragua*, *Euclea racemosa*, *Grewia occidentalis*, *Gymnosporia buxifolia*, *Lycium cinereum*, *Lycium ferocissimum*, *Maytenus procumbens*, *Osteospermum moniliferum*; Woody climber - *Asparagus aethiopicus*. Endemic taxa associated with this vegetation type include Small trees - *Pterocelastrus tricuspidatus*, *Tarchonanthus littoralis*; Succulent shrubs - *Carpobrotus acinaciformis*, *Cotyledon orbiculata*, *Gasteria acinacifolia*; Low shrubs - *Coleonema pulchellum*, *Erica chloroloma*, *Erica zeyheriana*, *Eriocephalus africanus* var. *paniculatus*, *Felicia echinata*, *Morella cordifolia*, *Muraltia spinosa*; Graminoids - *Restio eleocharis*, *Stenotaphrum secundatum*, *Thamnochortus cinereus*; Tall shrubs - *Mystroxyton aethiopicum*, *Cussonia thyrsoflora*, *Gymnosporia capitata*, *Metalasia muricata*, *Olea exasperata*, *Passerina rigida*, *Putterlickia pyracantha*, *Robsonodendron maritimum*, *Searsia crenata*, *Searsia glauca*, *Searsia*

pterota; Geophytic herbs - *Brunsvigia litoralis*, *Cyrtanthus spiralis*; Herbs - *Justicia cuneata* subsp. *cuneata*, *Justicia orchioides* subsp. *orchioides*, *Pelargonium suburbanum* subsp. *suburbanum*; Herbaceous climbers - *Cynanchum natalitium*, *Rhoicissus digitata*, *Solanum africanum*; Woody succulent climbers - *Cynanchum viminalis*.



Figure 2.15 Sundays Mesic Thicket in the Kabeljous Nature Reserve.



Figure 2.16 St Francis Dune Thicket in the Kabeljous Nature Reserve.

Cape Seashore Vegetation is endemic to the Eastern Cape and Western Cape Provinces, with approximately 80% of this vegetation type occurring in the Eastern Cape. It is found along the temperate coastlines of the Atlantic Ocean (from Olifants River mouth to Cape Agulhas) and the Indian Ocean (from Cape Agulhas to East London). This vegetation type is typically found along beaches, coastal dunes, dune slacks and coastal cliffs of open grassy, herbaceous and to some extent also dwarf-shrubby (sometimes succulent) vegetation, often dominated by a single pioneer species. Various plant communities reflect the age of the substrate and natural disturbance regime (e.g., moving dunes), distance from the upper tidal mark, and the exposure of dune slopes (leeward versus seaward). Young coastal sandy sediments forming

beaches and dunes (Strandveld Formation) are exposed to reworking by relentless winds and frequent sea storms (Mucina & Rutherford, 2006). Important taxa associated with dune and beach areas within this vegetation type include: Succulent Shrubs – *Drosanthemum candens*, *Pelargonium capitatum*, *Tetragonia decumbens*, *Didelta carnosa* var. *tomentosa*, *Exomis microphylla* var. *axyrioides*, *Lycium tetrandrum*, *Scaevola plumieri*; Low Shrubs – *Hebenstretia cordata*, *Frankenia repens*, *Oncosiphon sabulosum*; Semiparasitic Shrub – *Thesidium fragile*; Herbaceous Climbers – *Cynanchum ellipticum*, *C. obtusifolium*; Herbs – *Gazania rigens*, *Senecio littoreus*, *Amellus asteroides*, *Dasispermum suffruticosum*, *Manulea tomentosa*, *Polygonum maritimum*, *Senecio elegans*; Geophytic Herb – *Trachyandra divaricate*; Succulent Herbs – *Arctotheca populifolia*, *Carpobrotus acinaciformis*, *C. edulis*; Graminoids – *Cladoraphis cyperoides*, *Ehrharta villosa* var. *maxima*, *Sporobolus virginicus*, *Stipagrostis zeyheri* subsp. *barbata*. Important taxa associated with cliff areas within this vegetation type include: Succulent Shrubs – *Disphyma crassifolium*, *Sarcocornia littorea*; Herb – *Gazania rigens*. Endemic taxa associated with the dune and beach areas within this vegetation type include: Low Shrub – *Psoralea repens*; Succulent Shrub – *Amphibolia laevis*; Herbs – *Amellus capensis*, *Gazania maritima*, *G. rigens* var. *leucolaena*, *Silene crassifolia*; Succulent Herbs – *Senecio litorosus*, *S. maritimus*; Graminoids – *Thinopyrum distichum*, *Eragrostis sabulosa*. Endemic taxa associated with dune slacks within this vegetation type include: Herb – *Vellereophyton vellereum*. Endemic taxa associated with cliffs within this vegetation type include: Succulent Shrubs – *Drosanthemum marinum*, *D. stokoei*, *Erepsia steytlerae*, *Prenia vanrensborgii*; Low Shrub – *Syncarpha sordescens*; Herbs – *Limonium* sp. nov., *Lobelia boivinii*.



Figure 2.17 Cape Seashore Vegetation in the Kabeljous Nature Reserve.

The Vegetation Map of South Africa, Lesotho and Swaziland (South African National Biodiversity Institute, 2006 – 2018) recognizes a number of non-terrestrial habitats that are primarily associated with the functional zone of the Kabeljous estuary, which includes mainly estuarine salt marches and floodplains. Mucina and Rutherford (2006) have previously classified and described these areas as being **Cape Estuarine Salt Marsh** vegetation. This type of vegetation is confined to estuaries and coastal salt-marsh plains of temperate coasts of the Atlantic Ocean from Lambert’s Bay on the West Coast as far as the mouth of the Great Kei River (Eastern Cape) on the Indian Ocean coast. Estuarine flats and systems of low riverine terraces supporting complexes of low herblands and shrublands dominated by succulent chenopods and other flood-tolerant halophytes (especially on supratidal terraces and in middle and lower tidal zones), salt-marsh meadows dominated by rushes and sedges (often indicating freshwater seeps), *Spartina* swards and (temporary) submerged *Zostera* sea meadows at the lower boundary of the tidal zone. The intertidal salt marshes associated with the Kabeljous estuary are, however, not clearly defined and are bordered by a floodplain comprised of grassland. Floodplains are flooded only during river floods and during high rainfall events. A large pan is found on the eastern shore of the Kabeljous estuary which is mostly covered by species such as *Sporobolus virginicus*, *Stenotaphrum secundatum*, *Cynodon dactylon*, *Sarcocornia natalensis*, *Sarcocornia pillansii*, *Triglochin striata*, *Disphyma crassifolia*, *Limonium scabrum*, and *Scirpus nodosus*.



Figure 2.18 Estuary functional zone (e.g., floodplains, estuarine salt marshes) associated with the Kabeljous estuary.

2.7.6 Flora

The Kabeljous Nature Reserve contains an extraordinary diversity of flora species, many of which are highly threatened and endemic to the area. The reserve's exceptional species diversity and high levels of species endemism could possibly be attributed to the fact that the reserve is located within the eastern extent of the Cape Floristic Region, which is one of only six Floral Kingdoms in the world. The Cape Floral Kingdom is home to about 9 000 plant species, 70% of which are endemic to the region and are thus not found anywhere else in the world. Furthermore, despite its relatively small size, the reserve has exceptional habitat heterogeneity with five different vegetation types present. The vegetation types found in the reserve also have a high level of endemism to the Eastern Cape Province (refer to section 2.7.5 of the management plan). As a result, the reserve contains an exceptionally large diversity of floral species, many of which are highly threatened and endemic to the area. This includes, but is not limited to, *Gasteria armstrongii* (critically endangered; EC endemic), *Agathosma gonaquensis* (critically endangered; EC endemic), *Rapanea gilliana* (endangered; EC endemic), *Brunsvigia litoralis* (endangered; EC and WC endemic), *Apodolirion macowanii* (vulnerable; EC endemic), *Trichodiadema aureum* (vulnerable; EC endemic), *Tulbaghia maritima* (vulnerable; EC endemic), *Agathosma stenopetala* (vulnerable; EC endemic), *Dioscorea sylvatica* (vulnerable; not endemic to SA), *Cyrtanthus obliquus* (declining; SA endemic), *Haworthiopsis fasciata* (near threatened, EC endemic). The Kabeljous Nature Reserve has a comprehensive flora species list that can be viewed on the Krag website: www.6330krag.wordpress.com.

2.7.7 Fauna

Although the Kabeljous Nature Reserve does not support large numbers of wildlife, a great variety of different mammalian, reptile, amphibian, invertebrate, and bird species are found in the reserve. Bushbuck (*Tragelaphus scriptus*), common duiker (*Sylvicapra grimmia*), bushpig (*Potamochoerus larvatus*) and cape grysbuck (*Raphicerus melanotis*) are amongst the most common mammal species found on the reserve. A variety of other smaller mammal species are also found in the reserve, including large grey mongoose (*Herpestes ichneumon*), porcupine (*Hystrix africaeaustralis*), antbear (*Orycteropus afer*), large-spotted genet (*Genetta tigrina*), caracal (*Caracal caracal*), blue duiker (*Philantomba monticola*) and cape clawless otter (*Aonyx capensis*). Because of the social and territorial behaviour of the wildlife species found in the reserve, they would only occur at fairly low densities and are likely to regulate their own populations as their natural population densities are reached or when resources become scarce. Furthermore, the reserve's boundary fences do not obstruct the natural movement of wildlife and, consequently, wildlife are able to move freely in and out of the reserve. For these reasons, the densities at which wildlife species occur on the Kabeljous Nature Reserve would, most likely, remain well below the ecological capacity of the reserve and should therefore not have any negative impact on the natural vegetation. Wildlife management interventions should thus be kept to a minimum and should be focused primarily on wildlife monitoring activities to inform management decisions and interventions, where required. It is also worth noting that a number of threatened or rare mammal species are likely to occur on the reserve, including species such as Duthie's golden mole (*Chlorotalpa duthieae*) and least dwarf shrew (*Suncus infinitesimus*). Where possible, efforts should be made to verify the presence of these mammal species.

The reserve is also home to a large number of bird species and over 150 bird species have been recorded on the Kabeljous Nature Reserve over the years. The reserve is well known for its rich and varied birdlife. The relatively undisturbed environment makes the reserve particularly attractive to water birds, especially during the dry months when the estuary mouth is closed. The reserve's wetland areas with their associated drainage channels also offer important habitats for water birds. A list of bird species found on the reserve is available on the KRAG website: www.6330krag.wordpress.com. It is also worth noting that due to the geographical situation of the reserve (e.g., being close to the Cape St Francis area, which is the second southernmost point in Africa), many vagrants, rare visitors and out of range species often land up on this stretch of coast and have been recorded in the reserve, including species such as the Green Sandpiper (*Tringa ochropus*), Eurasian Oystercatcher (*Haematopus ostralegus*), Pacific Golden Plover (*Pluvialis fulva*), etc.

Relatively little information is available about the reptile and amphibian species found on the Kabeljous Nature Reserve. Water monitor (*Varanus niloticus*), leopard tortoise (*Stigmochelys pardalis*) and a variety of frog species have been recorded. It is possible that a number of rare reptile species might also be found on the reserve, including species such as FitzSimons' long-tailed seps (*Tetradactylus fitzsimonsi*), the salt marsh gecko (*Cryptactites peringueyi*), Smith's dwarf chameleon (*Bradypodion taeniabronchum*), and the yellow-bellied house snake (*Lamprophis fuscus*). Efforts should be made to verify whether or not these species are, in fact, present in the reserve.

2.7.8 Alien and invasive species

The principal alien invasive plant species found in the Kabeljous Nature Reserve are rooikrans (*Acacia cyclops*), prickly pears (*Opuntia ficus-indica*) and jointed cactus (*Opuntia aurantiaca*). Concerted and sustained efforts are currently under way to eradicate alien invasive plants on the reserve in a controlled and phased manner. While *Acacia cyclops* are currently being eradicated from the reserve by mechanical means, a combination of mechanical, chemical and biological means are being used to eradicate *Opuntia ficus-indica* and *Opuntia aurantiaca* from the reserve. The aim is to eradicate or reduce the populations of all alien invasive plant species in the reserve to maintenance levels.

Rooikrans (*Acacia cyclops*) can be eradicated effectively through mechanical means by chopping it out manually and stacking it to avoid further spreading of seeds and to minimise soil erosion. Rooikrans does not coppice if cut close to the ground, and therefore the use of herbicides is not necessary. Rooikrans seeds can, however, remain dormant in the soil for many years and germinate easily under suitable conditions. It is therefore imperative to conduct periodic follow-up operations on previously cleared areas. Rooikrans seedlings can easily be removed manually when still small by simply pulling them out of the ground.

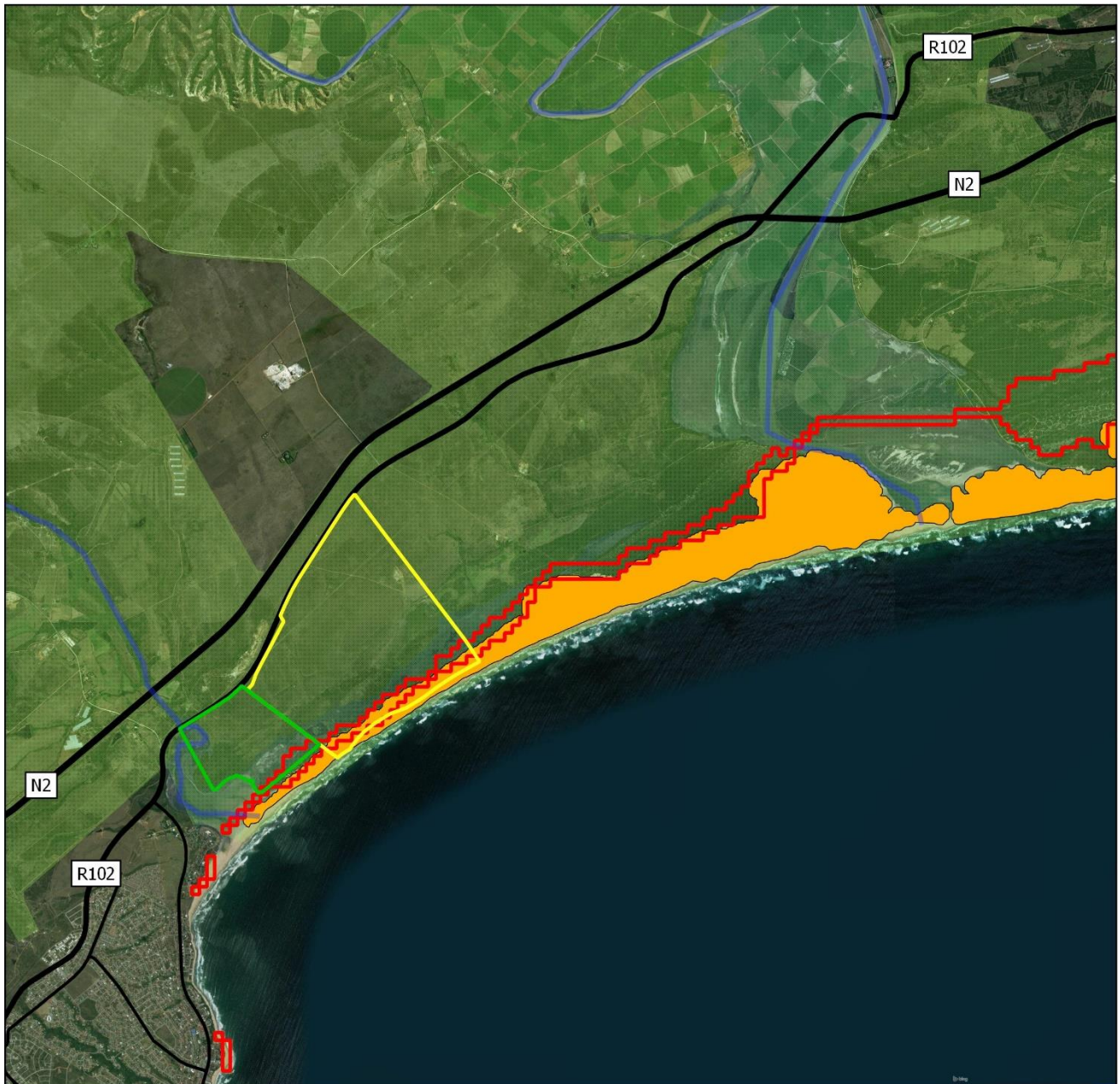
Prickly pears (*Opuntia ficus-indica*) can be eradicated effectively through a combination of mechanical, biological and chemical control. Two stem-injected chemicals are registered for use as herbicides against prickly pears in South Africa. However, mechanical and biological control are more economical and environmentally-friendly options. Three species of biological control agents for prickly pear are present in South Africa. These are a host-specific cochineal species (*Dactylopius opuntiae*), the cactus moth (*Cactoblastis cactorum*), and a stem-boring weevil (*Metamasius spinolae*) (Agricultural Research Council, 2014).

Jointed cactus (*Opuntia aurantiaca*) is difficult to eradicate completely, but can be effectively controlled through concerted and sustained efforts, primarily through a combination of mechanical, biological and chemical controls. Biological control of jointed cactus relies mainly on a cochineal insect (*Dactylopius austrinus*). The cochineal exerts satisfactory control on jointed cactus, except in regions where it is too moist and cold for the insects to build up their populations sufficiently. In such areas, registered or recommended herbicides will have to be applied. Cycles of apparent inefficacy of cochineal might be caused by the delay in the recovery of cochineal numbers after having depleted their target weed locally, while the cactus regrows from underground tubers and increases in abundance temporarily. Land owners should, however, allow the cochineal numbers to recover naturally, instead of intervening, because experience has taught us that biological control eventually manages to restore the equilibrium. The cactus moth (*Cactoblastis cactorum*) is of lesser importance in the control of jointed cactus (Agricultural Research Council, 2014).

2.7.9 Ecological corridors and process areas

The Kabeljous Nature Reserve falls within an area that is recognised by the Subtropical Thicket Ecosystem Programme (STEP) as an important coastal corridor that forms a system of natural pathways for plants and animals which is essential for the current and future survival of species. This coastal corridor area also plays an essential role in maintaining critical coastal processes. The Kabeljous Nature Reserve also falls within an area that is recognised by STEP as an important Natural Process Area where critical natural ecological processes function. More specifically, the Kabeljous Nature Reserve forms part of an important Sand Process Area, which plays an essential role in maintaining critical coastal processes (e.g., regulation of sand movement along the coastline, replenishment of the sandy beaches of the region, etc.).

The Kabeljous Nature Reserve also falls within an area that is recognised by both the Eastern Cape Biodiversity Conservation Plan (Berliner & Desmet, 2007) and the Baviaanskloof Mega-Reserve project (Skowno, 2007) as part of a macro-ecological corridor (namely the Baviaans Corridor), which promotes the persistence of large-scale ecological processes (gradient and fixed processes) in the region. The Baviaans Corridor represents an important link in the landscape which connects the Baviaanskloof Mega-Reserve complex with important coastal habitats (Skowno, 2007). The Kabeljous Nature Reserve thus plays a particularly important role in this regard by preserving the coastal-interior transition zone. The Kabeljous Nature Reserve therefore forms part of a much larger landscape-level biodiversity conservation initiative.



Kabeljous Nature Reserve: Ecological Corridors and Process Areas

Kabeljous Nature Reserve:

- ▭ Kabeljous Section
- ▭ Papiessfontein Section

Ecological Corridors & Process Areas:

- ▭ Baviaans - Macro-Ecological Corridor
- ▭ Coastal Sand Process Areas
- ▭ Coastal Corridor

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0 1 2 3 km



Figure 2.19 Location of the Kabeljous Nature Reserve in relation to important ecological corridors and process areas.

2.7.10 Fire regime

Fire is a key driver of ecological dynamics in many of the southern African ecosystems. Fire serves a number of particularly important ecological functions within the Kabeljous Nature Reserve. A variety of different fire-prone vegetation types and fire-avoiding vegetation types are found on the Kabeljous Nature Reserve. Fire plays an essential role in maintaining the vegetation structure, species diversity and vigour of the major fire-driven fynbos type found on the Kabeljous Nature Reserve, namely Humansdorp Shale Renosterveld (refer to Figure 2.20). Furthermore, significant areas of dune fynbos-thicket mosaic can be found on the reserve's calcareous soils near the coast. In this vegetation unit, thicket clumps typically develop in fire-protected dune slacks, while the fynbos shrubland generally occurs on upper dune slopes and crests. According to Vlok *et al.* (2008), the dune fynbos-thicket mosaic is also adapted to burn periodically, but is not as dependent on fire as most other fynbos vegetation types (like Humansdorp Shale Renosterveld) and it seems to be able to tolerate relatively long inter-fire periods without this altering its mosaic structure or diversity. Vlok *et al.* (2008) also state that periodic fires and physical soil disturbance by mole rats and large herbivores were, historically, important disturbance regimes associated with this dune fynbos-thicket mosaic vegetation unit. It is also important to note that significant stands of Sundays Mesic Thicket occur on the reserve where the absence of fire has allowed thicket species to fully develop. Scattered thicket clumps are also present in fire-protected sites, such as dune slacks and rocky outcrops, throughout many parts of the reserve (Vlok *et al.*, 2008). In light of the brief discussion above, it is evident that fire plays an integral part of the ecological dynamics of the Kabeljous Nature Reserve. Consequently, simulating a natural fire regime on the Kabeljous Nature Reserve, primarily through the implementation of controlled burns, should thus form an essential part of the ecological management of the reserve. It is also evident from the brief discussion above that periodic fires are not only directly essential to maintaining the structure, species diversity and vigour of the major fire-driven fynbos units (e.g., Humansdorp Shale Renosterveld) found on the reserve, but periodic fires also help to maintain the natural balance between fire-prone vegetation units (e.g., fynbos) and fire-avoiding vegetation units (e.g., thicket and thicket clumps). This suggests that a holistic approach to fire management should be adopted for the Kabeljous Nature Reserve, where fires are recognised as an integral part of the ecological dynamics of the reserve as a whole and across the different vegetation types. This means that fires in the reserve should not be artificially confined to the fire-prone vegetation units (e.g., fynbos) only but, instead, be allowed to periodically extend throughout the reserve as would have occurred historically under natural circumstances (Cowling, *personal communication*, 2019).

Humansdorp Shale Renosterveld is by far the largest and most threatened (nationally listed as endangered) vegetation unit found on the Kabeljous Nature Reserve (refer to Table 2.3). Since Humansdorp Shale Renosterveld is a fire-driven fynbos type, it is vital to form a deeper understanding of the role of fire in fynbos ecosystems and to consider the management implications it holds for the sound ecological management of the fynbos habitats on the Kabeljous Nature Reserve. Fire plays a role in the germination of many fynbos species. Some fynbos species die during fire and regenerate from seed stored in the plant canopies or seed stores that were built up in the soil. The seed can be stored in shallow soil or it can be stored deep in the soil. Germination of the seed is stimulated directly through the heat or smoke produced by fires, or indirectly through changed environmental conditions after a fire. Other species can re-establish themselves by sprouting from a woody root-stock after fire,

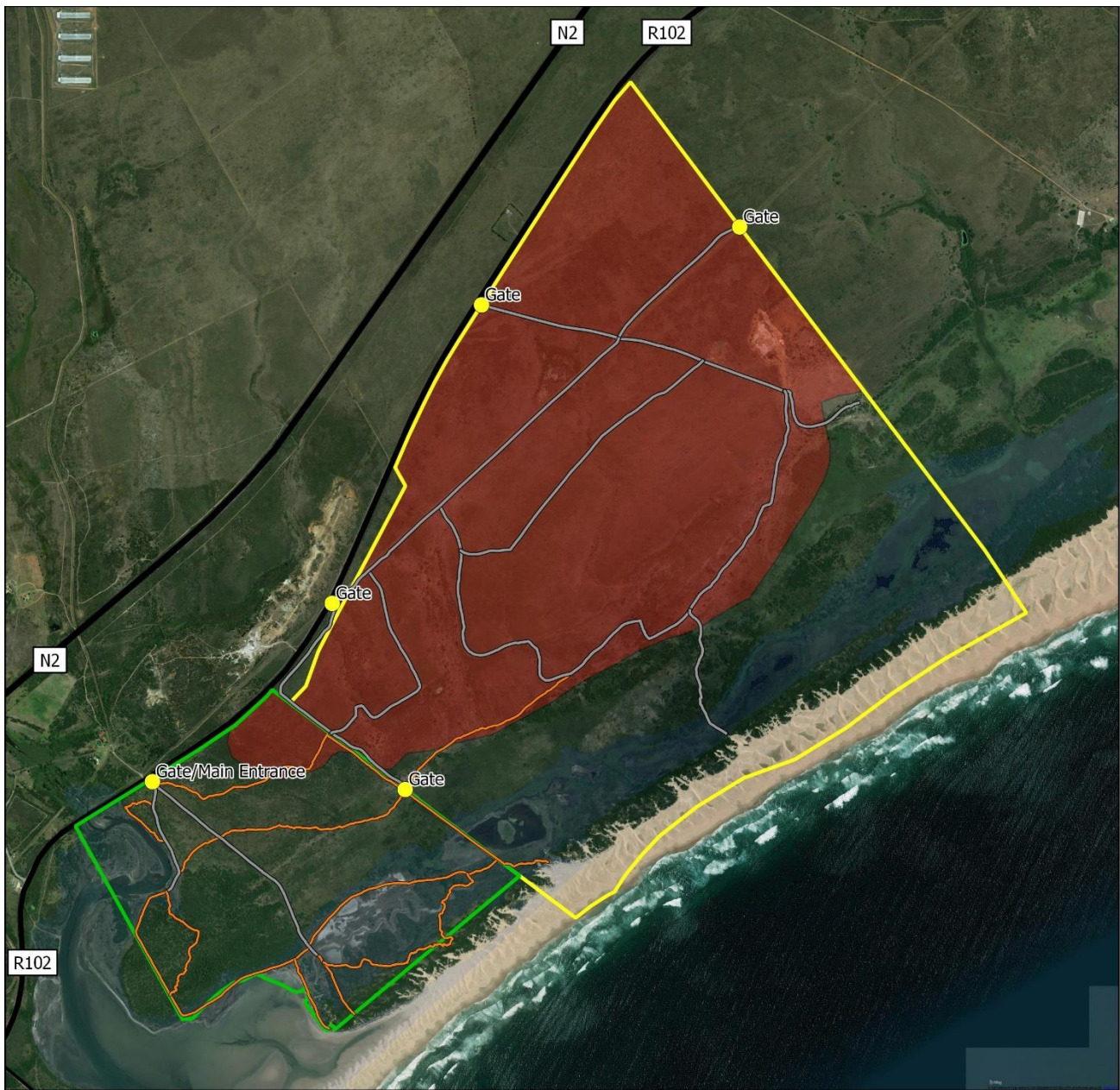
stimulating new growth to occur. Some sprouting species protect their trunks from fire with a thick, insulating layer of corky bark and re-sprout from buds buried in the trunk following fire. Unlike sprouting species, seeding species have a complete turnover in generations after each fire and are therefore subjected to a greater frequency of natural selection and higher speciation. The high diversity of species in fynbos can, at least in part, be ascribed to population fragmentation and regular turnover in generations as a result of fire. Fire also plays an important role in maintaining the successional dynamics of fynbos ecosystems in a healthy state. The disturbance that fire causes also makes water, nutrients and light more available for a certain period after the fire. Certain bulbous species, as well as smaller perennials and shrubs, struggle to compete with larger shrubs, and have the opportunity to germinate and flower after fire has removed some of the competition. Fire thus provides the stimulus for dormant seeds to germinate and the opportunity for many annuals, short-lived perennials and bulbs to grow, flower and seed during times of abundant nutrients and sunlight. They complete their short life cycles, returning to the soil as the larger shrubs overwhelm them, and remain dormant until the next fire. Thus, fire enhances the diversity of fynbos by maintaining a dynamic and healthy successional state. Fire also plays a role in fynbos ecosystems by acting as a mineralizing agent which recycles precious nutrients from old moribund growth back into the soil. The ash left after the fire returns mineral elements that were held above ground by the plants back to the soil. Based on the latter, it is clear that the relationship between fynbos and fire is a strong but complex relationship, which depends on many factors, including the frequency of fires, where the fynbos is situated, the time of year of the fire and the intensity of the fire. It is essential that these factors be duly considered in deciding on an appropriate and ecologically sound fire regime for the Humansdorp Shale Renosterveld on the Kabeljous Nature Reserve. Inappropriate fire regimes in fynbos will ultimately result in decreased species diversity and irreparable changes in the species composition and vegetation structure of the fynbos habitats. The following general guiding principles (Cape Nature, 2019) should thus be considered in devising an ecologically sound fire regime for the Humansdorp Shale Renosterveld on the Kabeljous Nature Reserve:

- Frequency of fires – It is known that frequency of fires generally has a big impact on fynbos. Fires that occur too often can in fact destroy seed banks as some species take 5 to 6 years to mature and shed seeds. Fires that occur too frequently can thus reduce biodiversity, cause erosion and the death or migration of important pollinators and predators. Generally speaking, fires in fynbos vegetation should occur at 10 – 25 year intervals to ensure species richness. The best way to describe an optimum time between fires is a time when 50% of the population of the slowest maturing species in a given area has flowered for at least 3 successive seasons.
- Prevailing climatic conditions – Another factor that plays a significant role in the relationship between fynbos and fire is where fynbos grows and the climatic and rainfall cycles of the areas of growth. Generally speaking, fynbos in moist areas should burn every 12 – 20 years. However, fynbos in arid mountain areas should only burn about every 25 years.
- Time of year – Furthermore, fires at different times of the year have different impacts on fynbos species. Historically, most fires occurred in summer and during the driest seasons of the year. Many species show maximum seedling recruitment after late summer and early autumn fires. However, intense summer fires can destroy seed

banks stored in shallow soil, whereas cooler fires during late summer, early autumn or winter is generally better to stimulate germination.

- Intensity of fires – The intensity of fires is generally associated with the season when the fire occurs. Summer fires tend to be higher in intensity, while winter fires have a lower intensity. The presence of alien vegetation can also affect the intensity of a fire, as the flammable oils in alien vegetation and the large biomass can increase the intensity of a fire. Intense summer fires can destroy seed banks stored in shallow soil, whereas cooler fires during late summer, early autumn or winter are generally better to stimulate germination.
- On large properties (>1000 ha), it is advisable to maintain a mosaic of different vegetation ages. It is generally recommended that fire management blocks be at least 300 – 500 hectares, if possible. However, on smaller properties that are less than 300 hectares in size, the fire management blocks should be made as large as possible – preferably more than 100 hectares each. Very small properties that are less than 50 hectares in extent should be burnt in one fire event without subdividing the area into smaller blocks. Small fires tend to have a significantly negative impact on seed eaters (e.g. rodents) after the fire. Another problem of small fires pertains to the fire intensity – fires take time to build up adequate energy and gain momentum to create a clean and effective burn. When dealing with a small property, it is always best to consider its consolidation into larger management units with neighbouring properties, where possible.
- Although not much research has been conducted on the role of fire in renosterveld types, it is likely that the above guidelines are a good starting point. Regional variances in renosterveld habitats preclude a ‘recipe’ approach. It is worth noting that there are often individual species present in renosterveld that are good indicators for determining appropriate fire intervals. However, it should be noted that renosterveld is less dependent on fire than fynbos and too frequent fires could be detrimental for the ecosystem. Fires are nevertheless very important for many renosterveld species to stimulate seed germination, especially those species that are dependent on ants for seed dispersal. While fire will promote grass regeneration and can temporarily improve grazing, regular burning in renosterveld to promote a ‘green flush’ can result in the disappearance of a number of plant species that require longer fire cycles (e.g. the legumes that fix nitrogen into the soil).

An important consideration for fire management on any reserve is the placement and location of infrastructure, as well as the accessibility of the reserve for fire management purposes (e.g. the ability to access different parts of the reserve by vehicle and by foot to implement a controlled burn or to fight wildfires). Figure 2.20 shows the location of the major fire-driven vegetation found in the Kabeljous Nature Reserve in relation to the reserve’s vehicle access points (e.g., gates), vehicle tracks and trails network. It should be noted that no fire-breaks currently exists on the Kabeljous Nature Reserve, mainly because the reserve is bound by the coastline, the Kabeljous estuary, and the R102 public road along its south-eastern, south-western and north-western boundaries, respectively. The reserve is, however, adjacent to privately-owned land along its north-western boundary. Attempts should therefore be made to collaborate with neighbouring landowners to adopt a joint fire management approach for the larger area between the Kabeljous and Gamtoos estuaries.



Kabeljous Nature Reserve: Fire Management

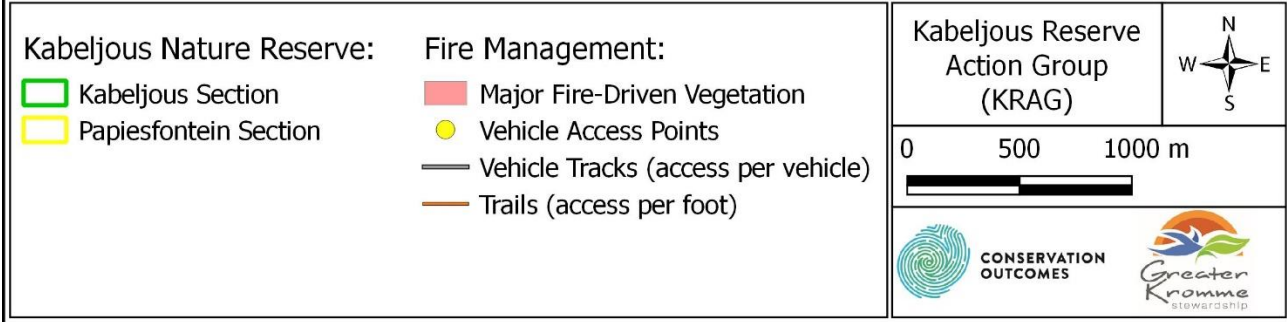


Figure 2.20 Location of fire-driven vegetation and fire management support infrastructure in the Kabeljous Nature Reserve.

2.8 Infrastructure and development

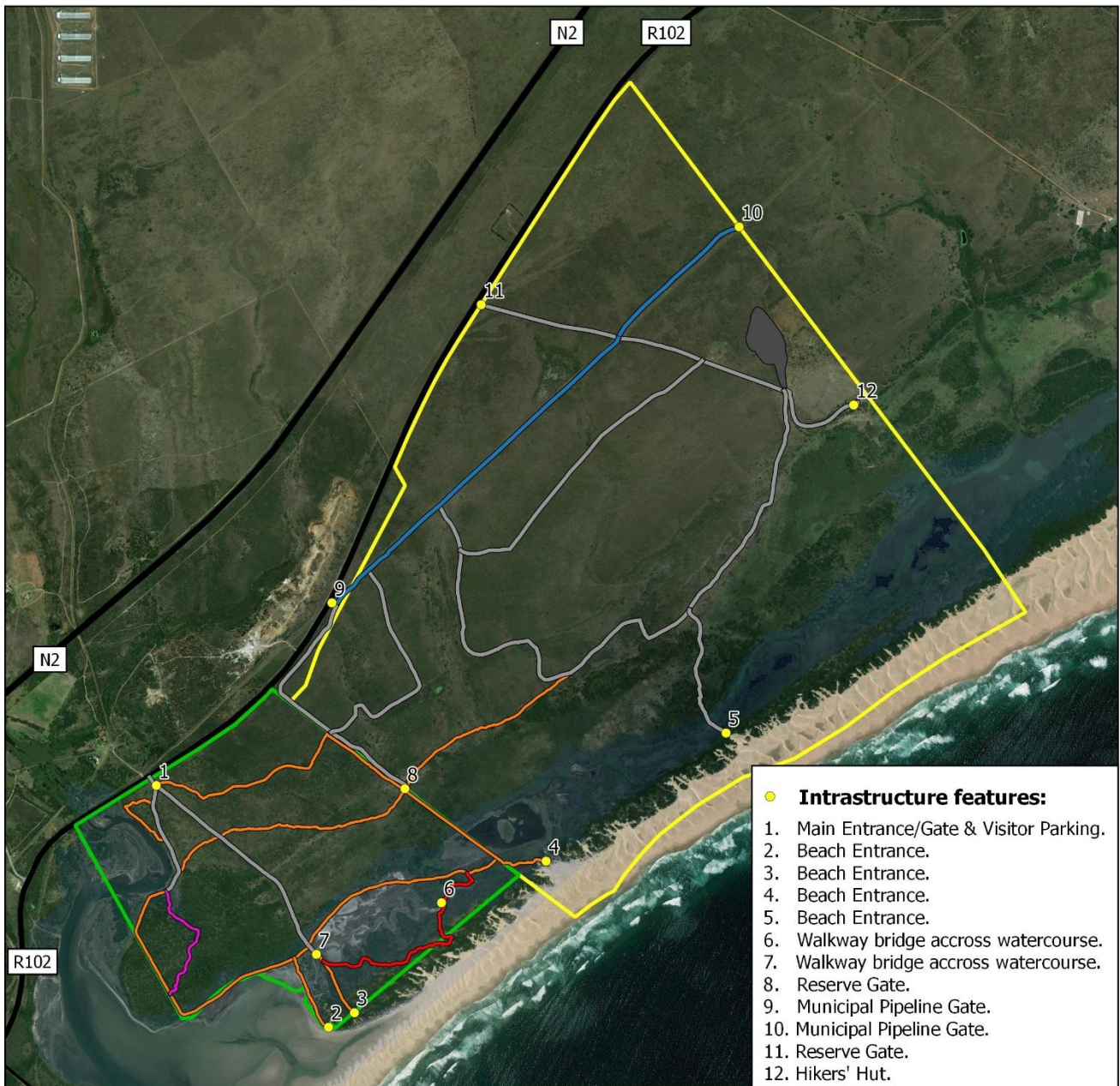
The infrastructure found within the Kabeljous Nature Reserve is primarily related to the management of the reserve and to support nature-based recreation activities. The location of the reserve's main infrastructure is shown in Figure 2.22. The reserve's main infrastructure is listed and briefly described below:

- Main entrance and visitor parking area – The main entrance and visitor parking area of the reserve is located next to the R102. No visitor vehicles are allowed onto the reserve beyond this point.
- Beach entrances – A total of 4 beach entrances provides access to the reserve from the coastline and may be used for all permissible nature-based recreation activities (hiking, trail running, horse riding mountain biking). No vehicles are allowed to access the reserve via the beach entrances under any circumstances.
- Signage and visitor information – Appropriate informative signage is placed at all of the entrances to the reserve, as well as within the reserve.
- Perimeter fence – The reserve is delineated by a perimeter fence along its north-eastern and north-western boundaries, while the south-eastern and south-western boundaries of the reserve do not contain a perimeter fence but are instead delineated by the coastline and the Kabeljous estuary, respective. A low domestic livestock fence is located on the reserve between the Kabeljous section and the Papiessfontein section of the reserve.
- Access gates – A total of 4 access gates are located on the perimeter fence of the reserve and provide vehicle access for reserve management and maintenance purposes. Two of these access gates also provide vehicle access to the Nelson Mandela Bay Municipality along the municipal water pipeline servitude. A fifth access gate is located in the reserve and provides vehicle access between the Kabeljous section and the Papiessfontein section of the reserve.
- Vehicle tracks –
 - ✓ Vehicle tracks for reserve maintenance – A number of small vehicle tracks provide access to the reserve for management and maintenance purposes. Vehicular access to the reserve is restricted to the Management Authority. All vehicle tracks may, however, be used by visitors for permissible nature-based recreation activities (hiking, trail running, horse riding mountain biking).
 - ✓ Vehicle track of the municipal water pipeline – A vehicle track running along the servitude of the municipal water pipeline. The vehicle track is a service road which provides the Nelson Mandela Bay Municipality with vehicle access to the municipal water pipeline for maintenance purposes.
- Trails –
 - ✓ Trails (general use) – The reserve has a network of general trails that makes the reserve accessible for visitors to enjoy. These trails may be used for a number of permissible low-impact nature-based recreation activities (hiking, trail running, mountain biking, horse riding, fishing, etc.). The network of trails also makes the reserve accessible for reserve management purposes.

- ✓ Trail (limited use) – This trail is located along the primary coastal dunes, which is a particularly sensitive part of the reserve due the propensity of the primary coastal dunes to easily become destabilised when disturbed (which, in turn, is likely to result in erosion and degradation). A very important archaeological site is also located along this trail, and is under threat of potential erosion by the hiking trail (CEN Integrated Environmental Management Unit, 2007). Consequently, the use of this particular trail is strictly limited to hiking and trail running activities only, while activities with a relatively higher impact – such as horse riding and mountain biking – are not permitted on this particular trail. It is advisable that appropriate signage be installed at the entrances of this particular trail to inform visitors of the limited use policy that applies to this trail.
- ✓ Trail (restricted use) – This trail is located in the dense thicket vegetation on the reserve, and it provides access to a remote part of the reserve for reserve management purposes (e.g., for the eradication of alien invasive plant species). The use of this trail is restricted to the Management Authority of the reserve and is out of bounds to visitors. The restricted use of this trail is imposed in order to maintain a wilderness element to this part of the reserve in order to minimize impacts on wildlife. It is advisable that appropriate signage be installed at the entrances of this particular trail to inform visitors of the restricted use policy that applies to this trail.
- Footbridges across watercourses – Two footbridges are located along some of the trails within the reserve to allow the safe crossing of watercourses, thereby making the reserve more accessible for visitors to enjoy (refer to Figure 2.21 below).
- Hikers’ hut – An old hikers’ hut was previously constructed on the far north-eastern boundary of the reserve. Although the hikers’ hut still exists, it is currently not in use.



Figure 2.21 Low-impact walkways across watercourses to support nature-based recreation in the Kabeljous Nature Reserve.



- Infrastructure features:**
1. Main Entrance/Gate & Visitor Parking.
 2. Beach Entrance.
 3. Beach Entrance.
 4. Beach Entrance.
 5. Beach Entrance.
 6. Walkway bridge across watercourse.
 7. Walkway bridge across watercourse.
 8. Reserve Gate.
 9. Municipal Pipeline Gate.
 10. Municipal Pipeline Gate.
 11. Reserve Gate.
 12. Hikers' Hut.

Kabeljous Nature Reserve: Infrastructure

Kabeljous Nature Reserve:

- █ Kabeljous Section
- █ Papiessfontein Section

█ Old landfill site

Infrastructure:

- Infrastructure features
- Vehicle Tracks - Reserve
- Vehicle Tracks - Municipal Pipeline
- Trails (General Use)
- Trails (Limited Use)
- Trails (Restricted Use)

Kabeljous Reserve
Action Group
(KRAG)



0 500 1000 m



Figure 2.22 Infrastructure located within the Kabeljous Nature Reserve.

2.9 Cultural heritage context of Kabeljous Nature Reserve

The Kabeljous Nature Reserve is exceptionally valuable from a cultural and heritage perspective and numerous Khoisan shell middens, shell scatters and stone-age artefacts (including stone-age stone tools) are preserved on the reserve. Khoisan human remains (skeletons) were also discovered on two separate occasions (in 1997 and 2005) on the private land adjoining the Papiessfontein section of the reserve (Binneman, 2008). The most common archaeological sites found on the reserve are shell middens (Binneman, 2008). These shell middens are relatively large piles of marine shells which date back from the past 6000 years and represent the campsites of San hunter-gatherers, Khoi pastoralists and Khoisan (dating from the past 1800 years), peoples who lived along the immediate coast and collected marine foods on a daily basis. Archaeological research and observations made in the region indicate that the Kabeljous river estuary was a popular area for hunter-gatherers and pastoralists to live due to the wide variety of food resources within easy walking distance (e.g., shellfish along the coast, fish in the estuary, and game in the nearby hills and inland areas). A total of 37 archaeological sites have to date been found in the area between the Kabeljous River and Papiessfontein (Binneman, 2008). The Khoi people were the first food producers in South Africa and introduced domesticated animals (sheep, goats and cattle) and ceramic vessels to the region as early as 2000 years ago. The oldest sheep remains recovered from the middens at the Kabeljous River mouth were dated back 1560 years, which is the oldest archaeological specimen of a sheep in the Eastern Cape (Binneman, 1996, 2001).

The most archaeologically sensitive areas in the Kabeljous Nature Reserve are found along the bank of the Kabeljous River and out to at least 100 meters from the river, along the northern side of the coastal dune belt, and along the fringes of the coastal dunes to just above the high water mark. The coastal dune area is particularly rich in small shell middens and midden scatters (Binneman, 2008; CEN Integrated Environmental Management Unit, 2007). It is important to note that the most significant archaeological and paleontological sites are included in the limited use zone of the reserve, where the aim is to minimise impacts on the natural environment and archaeologically sensitive sites (refer to the zonation plan of the Kabeljous Nature Reserve in section 4 of the management plan).

2.10 Socio-economic context

The Kabeljous Nature Reserve is located in a region that is characterised largely by intensive agriculture. The region's business and industrial elements are limited to and dependent on Humansdorp and Jeffrey's Bay as regional service centres. The biodiversity associated with the coastal areas in this region is mainly threatened by expanding upmarket residential developments, housing developments, and agricultural expansions. Tourism is a strong socio-economic driver in the Jeffrey's Bay area. Large numbers of local and international tourists visit the region, particularly during holiday seasons. Jeffrey's Bay is also internationally renowned for hosting a number of surfing competitions (e.g., Corona Open / Jeffrey's Bay Open) and other events like the Jeffrey's Bay Winterfest. The Kabeljous Nature Reserve offers further nature-based recreation activities and tourism opportunities to Jeffrey's Bay and the surrounding Kouga region. A number of local businesses also utilise the reserve by offering horse-riding opportunities on some of the reserve's trails and pristine beaches.

3) STRATEGIC MANAGEMENT FRAMEWORK

The strategic framework is aimed at providing the basis for the long-term protection, development and operation of Kabeljous Nature Reserve. The vision describes the long-term goal for the operation and management of the reserve. The objectives and strategic outcomes that follow are intended to provide the basis for the achievement of the vision.

3.1 Vision for the Kabeljous Nature Reserve

The NEMP: Protected Areas Act (No. 57 of 2003) requires that the reserve be managed in accordance with the purpose for which it was declared. The main purpose of the Kabeljous Nature Reserve is reflected through its vision:

***VISION** – To develop an expanded reserve, managed for conservation of biodiversity and sustainable use, which provides a scenic and diverse environment that is accessible and safe for all to enjoy.*

The immense natural beauty, ecological value, unique habitats and presence of several flagship species, underpin the Protected Area status of the Kabeljous Nature Reserve. The success of the reserve relies on the protection of its natural resource base, the management of the reserve and its infrastructure, and the support of the local communities who value and enjoy the reserve. The following key guiding principles inform the achievement of the reserve's vision:

- The highest degree of protection should be given to the sensitive ecological and biophysical features of the reserve, in particular those that underlie the functioning of its ecosystems and the protection of its rare and threatened species.
- The cultural and archaeological resources of the reserve should be well protected.
- The reserve should be accessible and safe for all to enjoy.
- Collaboration between relevant government authorities, private organisations and community-based initiatives is essential to support the ongoing protection and management of the reserve.

3.2 Management issues and challenges, management objectives and strategic outcomes

The following section summarises the key management issues and challenges outlined in the descriptive sections (namely section 2 of the management plan), which must be addressed through the management plan. The issues and challenges have been grouped under key performance areas, which flow through the strategic and operational management frameworks of the management plan. Management objectives have been identified for each of the Kabeljous Nature Reserve's key performance areas, and relate to the important management functions and activities necessary to protect, develop and manage the reserve effectively. The management objectives, in turn, have been translated into strategic outcomes, which form the basis for the management activities and targets set out in the operational management framework, described in section 6 of the management plan. Table 3.1 below sets out the key performance areas with the respective issues and challenges that were identified, the objective for each key performance area, and the desired strategic outcomes required to realise the objectives.

Table 3.1 Key performance areas, management issues and challenges, management objectives and the desired strategic outcomes for the Kabeljous Nature Reserve.

Key performance areas to achieve vision and mission	Issues and challenges that must be addressed	Management objectives for key performance areas	Desired strategic outcomes
Legal compliance.	<ul style="list-style-type: none"> • The need to ensure the legal protection of the reserve through formal declaration as a Nature Reserve. • Threats of increasing development pressures on coastal areas. • Resource constraints of provincial conservation authorities that are hindering the formal declaration process and conservation management of the reserve. • The need to maintaining an ongoing management programme for the reserve. 	<ul style="list-style-type: none"> • Objective 1 – Comply with legislative requirements pertaining to the protection and management of the Kabeljous Nature Reserve. 	<ul style="list-style-type: none"> • The entire extent of the reserve is legally protected through formal declaration as a Nature Reserve in terms of the NEM: Protected Areas Act (No. 57 of 2003). • Achieve the effective management of the reserve through appropriate management structures, agreements (e.g., co-management agreements) and innovative partnerships between provincial conservation authorities and the NGO partners (e.g., KRAG). • Effective management programme that meets the management needs and legislative requirements of the reserve.
Resourcing and capacitating reserve management.	<ul style="list-style-type: none"> • Resourcing and capacitating needs for the ongoing management of the reserve. 	<ul style="list-style-type: none"> • Objective 2 – Generate resources and capacity to support the sustainable management of the reserve. 	<ul style="list-style-type: none"> • Adequate resources and capacity available to meet the management needs for the reserve.
Regional management and buffer zone protection.	<ul style="list-style-type: none"> • External threats (e.g., incompatible land use activities) in the reserve’s buffer zone that may impact on the ecological integrity of the reserve. • The risk of becoming ecologically isolated from the surrounding landscape. • Increasing development pressures on coastal areas. 	<ul style="list-style-type: none"> • Objective 3.1 – Ensure that the Kabeljous Nature Reserve is recognised in the region, and that the reserve is well protected from any potential external threats that could impact on its ecological integrity. • Objective 3.2 – Work towards the expansion of the conservation footprint between the Kabeljous and Gamtoos estuaries by promoting cooperation and involvement of surrounding landowners in conservation initiatives. 	<ul style="list-style-type: none"> • The reserve and its buffer zone considerations are adequately recognised and captured in local and regional plans (IDPs and SDFs). • The impact of all external threats on the ecological integrity of the reserve minimised. • Prevent the ecological isolation of the reserve and compatible land uses and management practices around the reserve.

Table 3.1 (Continued from previous page).

Key performance areas to achieve vision and mission	Issues and challenges that must be addressed	Management objectives for key performance areas	Desired strategic outcomes
Ecosystems, habitats and species management.	<ul style="list-style-type: none"> External threats (e.g., incompatible land use activities) in the reserve’s buffer zone that may impact on the ecological integrity of the reserve. A number of particularly sensitive habitats occur within the reserve. A number of threatened and rare species occur within the reserve. 	<ul style="list-style-type: none"> Objective 4.1 – Protect the ecosystem functioning, ecological integrity, and sensitive habitats in Kabeljous Nature Reserve through active interventions based on principles of adaptive management. Objective 4.2 – Develop a species database for the Kabeljous Nature Reserve to inform management decisions and the protection of particularly sensitive / vulnerable fauna and flora species. 	<ul style="list-style-type: none"> Critical ecological processes and functions are maintained within the reserve. Where necessary, specific management interventions are implemented to improve the protection of unique and sensitive habitat types. Maintenance of unique and sensitive habitat types in an optimal condition. Species database and relevant biodiversity information is available for the reserve to inform management decisions. The management of sensitive/vulnerable species on the reserve is undertaken using the best available information.
Alien invasive plant control.	<ul style="list-style-type: none"> Alien invasive plants pose a threat to the biodiversity of the reserve. 	<ul style="list-style-type: none"> Objective 5 – Eradicate infestations of alien invasive plant species in Kabeljous Nature Reserve in a systematic and controlled manner. 	<ul style="list-style-type: none"> Populations of alien invasive plants on the reserve reduced to maintenance levels. Minimize the impacts of alien invasive plants on the reserve’s biodiversity.
Fire management.	<ul style="list-style-type: none"> The need to implement / simulate a natural fire regime (based on ecological principles) in the Humansdorp Shale Renosterveld habitats on the reserve. Fire safety and risk of wildfires. 	<ul style="list-style-type: none"> Objective 6.1 – Ensure adequate fire safety in the Kabeljous Nature Reserve and compliance to the National Veld and Forest Fire Act (No. 101 of 1998). Objective 6.2 – Fire management in Kabeljous Nature Reserve is undertaken based on sound ecological principles and best practice guidelines. 	<ul style="list-style-type: none"> Adequate fire safety within the reserve is ensured. Fire management on the reserve is undertaken based on ecological principles and best practice guidelines. The species diversity and vigour of the Humansdorp Shale Renosterveld habitats on the reserve is maintained through the simulation of a natural fire regime.
Rehabilitation and restoration of disturbed and degraded areas.	<ul style="list-style-type: none"> The potential for degradation of natural areas, particularly on areas surrounding the reserve’s infrastructure (e.g., trails, vehicle tracks, etc.). 	<ul style="list-style-type: none"> Objective 7 – Rehabilitate and restore degraded or disturbed areas in the Kabeljous Nature Reserve to a natural or near-natural state. 	<ul style="list-style-type: none"> Environmental degradation in Kabeljous Nature Reserve is prevented and the natural environment is maintained in a healthy and natural state.

Table 3.1 (Continued from previous page).

Key performance areas to achieve vision and mission	Issues and challenges that must be addressed	Management objectives for key performance areas	Desired strategic outcomes
Litter and pollution.	<ul style="list-style-type: none"> Littering by users of the reserve and litter that washes up on the beaches. Impact of litter and coastal pollution (e.g., plastics) on the environment, marine life and coastal ecosystems. Impact of litter and coastal pollution on the aesthetics appeal of the reserve. 	<ul style="list-style-type: none"> Objective 8 – Harness volunteer energy to maintain a clean and litter-free environment in the Kabeljous Nature Reserve and surrounding coastal areas. 	<ul style="list-style-type: none"> Minimise the impact of litter pollution on the natural environment, marine life and coastal ecosystems of the reserve. Minimise the impact of litter pollution on the aesthetic appeal of the reserve.
Safety, security and enforcement.	<ul style="list-style-type: none"> Safety risks to visitors (e.g., crime). Illegal and undesirable activities on the reserve (e.g., poaching, snaring, and illegal plant harvesting). Non-compliance to the internal rules of the reserve. People accessing the reserve with their vehicles without authorisation. Vandalism to reserve infrastructure. 	<ul style="list-style-type: none"> Objective 9.1 – Maintain adequate safety and security in the Kabeljous Nature Reserve, and enforce the reserve’s internal rules. Objective 9.2 – Manage visitor impacts, activities and usage of the different areas within the reserve. 	<ul style="list-style-type: none"> Establishment of an honorary rangers initiative for the reserve. Adequate security, enforcement and compliance to the reserve’s internal rules. Safety risks to visitors and users of the reserve are minimised. All biodiversity on the reserve is well protected and preserved.
Management of visitor impacts, activities and reserve usage.	<ul style="list-style-type: none"> The need to manage and control visitor impacts and activities on the different areas within the reserve. Unawareness of visitors of the rules of the reserve. 		<ul style="list-style-type: none"> Increased awareness of the rules of the reserve. Visitor compliance to the internal rules and zonation plan of the reserve to minimise visitor impacts on sensitive areas, limited use and restricted areas.
Cultural heritage.	<ul style="list-style-type: none"> The reserve contains significant archaeological and paleontological sites, many of which are yet to be identified and evaluated in terms of their sensitivity to human impacts. 	<ul style="list-style-type: none"> Objective 10 – Protect and preserve the cultural heritage resources (e.g., archaeological sites) of the Kabeljous Nature Reserve. 	<ul style="list-style-type: none"> Archaeological sites in the reserve identified and adequately protected.

Table 3.1 (Continued from previous page).

Key performance areas to achieve vision and mission	Issues and challenges that must be addressed	Management objectives for key performance areas	Desired strategic outcomes
Infrastructure management and development.	<ul style="list-style-type: none"> • The need to develop and maintain appropriate infrastructure to make the reserve accessible for visitors to enjoy. • Balancing the need for appropriate infrastructure with the impacts on the natural environment and the sense of place (e.g., original character and aesthetic appeal) of the reserve. 	<ul style="list-style-type: none"> • Objective 11.1 – Maintain all existing infrastructure in the Kabeljous Nature Reserve. • Objective 11.2 – Develop appropriate infrastructure that is consistent with the conservation objectives, purpose and values of the Kabeljous Nature Reserve. 	<ul style="list-style-type: none"> • Adequate infrastructure that is well maintained to make the reserve accessible for visitors to enjoy. • Impacts on the natural environment and sense of place are minimised and the original character and aesthetic appeal of the reserve is preserved.

4) PROTECTED AREA ZONATION PLAN

4.1 Conceptual framework for the Kabeljous Nature Reserve zonation plan

The purpose of the zonation plan for the Kabeljous Nature Reserve is to identify and manage the types and levels of usage that are acceptable based on the sensitivity and resilience of the different areas within the reserve; to manage the placement and development of infrastructure within the reserve; to manage the impacts of visitors' and users' activities within the reserve; and to manage visitor experience and inter-user conflict. Zoning enables a Protected Area to be zoned along a continuum ranging from highly sensitive areas where only low levels of use with minimum impacts may be permitted, to less sensitive areas that may be subject to higher intensity nature-based uses. The zonation plan for the Kabeljous Nature Reserve is depicted in Figure 4.1 below. The zonation system applied to the Kabeljous Nature Reserve includes the following zonation categories:

- Special protection overlay
- Limited use zone
- Moderate use zone

4.1.1 Special protection overlay

This special protection zone overlays other zones by instituting site-specific rules and regulations in addition to the restrictions of the underlying zone. Thus, the special protection overlay provides a higher level of protection than the underlying zone. Although the special protection overlay is not depicted in the reserve's zonation map, this zone may be imposed by the Management Authority on any area within the Kabeljous Nature Reserve where specific additional controls may be required to prevent undesirable impacts on sensitive, vulnerable or scientifically important areas within the Kabeljous Nature Reserve. This could, for example, include areas with sensitive habitats, important ecological features, archaeological sites, sites with sensitive or threatened species, important nesting or breeding sites, habitats that may be particularly sensitive at specific times of the year, etc. The following guiding principles apply to the use and implementation of the key feature protection overlay by the Management Authority:

- The particular purpose, nature and extent of special protection overlays should be clearly defined and depicted.
- The special protection overlay may be permanent, temporary or seasonal, depending on the context and purpose of the particular special protection overlay.
- Changes to the special protection overlay may be imposed by the Management Authority by resolution of a general management meeting and recorded as such.
- Decisions to implement a special protection overlay with additional site-specific control measures should, as far as possible, be based on the best available scientific knowledge (or expert knowledge) and best practice guidelines.
- The protection overlay may allow for access, developments, and activities to take place under site-specific constraints, if and where appropriate.
- Permissible and non-permissible activities, as well as the rules and regulations within a special protection overlay will be determined by the Management Authority on a

case-by-case basis, according to the management imperatives and sensitivity of the area.

4.1.2 Limited use zone

The main purpose of the limited use zone is to protect and minimise impacts on the most sensitive ecological and biophysical features of the Kabeljous Nature Reserve, including its extensive wetland systems, the Kabeljous estuary system with its associated estuarine salt marshes, the threatened vegetation types on the reserve, and the pristine coastline with its associated mobile dunes and primary dunes. The limited use zone also aims to minimise impacts on the most significant archaeological and paleontological sites found in the Kabeljous Nature Reserve. The limited use zone of the Kabeljous Nature Reserve is depicted in Figure 4.1 below.

Although the limited use zone allows access and usage of the reserve for visitors to enjoy, activities within this zone are restricted to low-impact nature-based recreation activities by visitors (e.g., hiking, trail running, mountain biking, horse riding), and to essential reserve management interventions by the Management Authority (e.g., eradication of alien invasive species, maintenance of infrastructure, rehabilitation of disturbed areas, etc.).

The following conditions apply to the development and use of infrastructure within the limited use zone:

- The construction of appropriate basic infrastructure with low-impact footprints is permitted to support nature-based recreation activities that are compatible with the purpose of this zone. This may, for example, include structures like bird hides, picnic areas, footbridges across water courses, etc. Any new infrastructure developments should, however, be compatible with the overriding purpose of this zone and may therefore not impact negatively on sensitive features within the reserve or result in a deviation from a natural pristine state.
- No new trails, vehicle tracks or roads may be developed within this zone, but should be limited to the footprints that currently existing within the reserve.
- Access by vehicle into the reserve is restricted to the Management Authority for reserve management purposes only. Furthermore, vehicle access is restricted to the existing vehicle tracks, and no off-road driving is permitted within this zone.
- It is worth noting that one of the trails found within this limited use zone runs along the primary coastal dunes, which is a particularly sensitive part of the reserve due the propensity of primary coastal dunes to easily become destabilised when disturbed (which, in turn, is likely to result in erosion and degradation). A very important archaeological site is also located along this trail, and is under threat of potential erosion by the hiking trail (CEN Integrated Environmental Management Unit, 2007). Consequently, the use of this particular trail is limited to very low impact activities such as hiking and trail running. Activities with a relatively higher impact, such as horse riding and mountain biking, are not permitted on this particular trail (also refer to section 2.8 of the management plan).

4.1.3 Moderate use zone

The main purpose of the moderate use zone is to conserve biodiversity and to promote the sustainable use of the reserve by providing a scenic and diverse natural environment that is

accessible and safe for all to enjoy. The moderate use zone of the Kabeljous Nature Reserve is depicted in Figure 4.1 below.

The following conditions apply to the development and use of infrastructure within the moderate use zone:

- Appropriate basic infrastructure may be constructed within this zone to support nature-based recreation activities (e.g., hiking, trail running, mountain biking, horse riding). However, deviation from a natural pristine state should be minimised and limited to restricted impact footprints within this zone. Any new infrastructure developments should be compatible with the overriding purpose of this zone, which is to promote the conservation and sustainable use of the reserve.
- No new trails, vehicle tracks or roads may be developed within this zone, but should be limited to the footprints that currently existing within the reserve.
- Access into the reserve by vehicle is restricted to the Management Authority for reserve management purposes only. Furthermore, vehicular access is restricted to the existing vehicle tracks and no off-road driving is permitted within this zone.
- A vehicle track running along the servitude of the municipal water pipeline is a service road which provides the Nelson Mandela Bay Municipality with vehicle access to the municipal water pipeline for maintenance purposes.
- The moderate use zone includes a visitor parking area at the reserve's main entrance next to the R102 road. No visitor vehicles are, however, allowed on the reserve beyond the parking area.
- The trail which are located in the dense thicket vegetation in the reserve is restricted for use by the Management Authority for essential reserve management purposes only (e.g., for the eradication of alien invasive plant species). The restricted use of this trail is imposed to maintain a wilderness element to this part of the reserve in order to minimize the impact of visitors on wildlife. The trail does, however, play an essential role in the management of the reserve by providing the Management Authority access to this remote part of the reserve (refer to section 2.8 of the management plan).

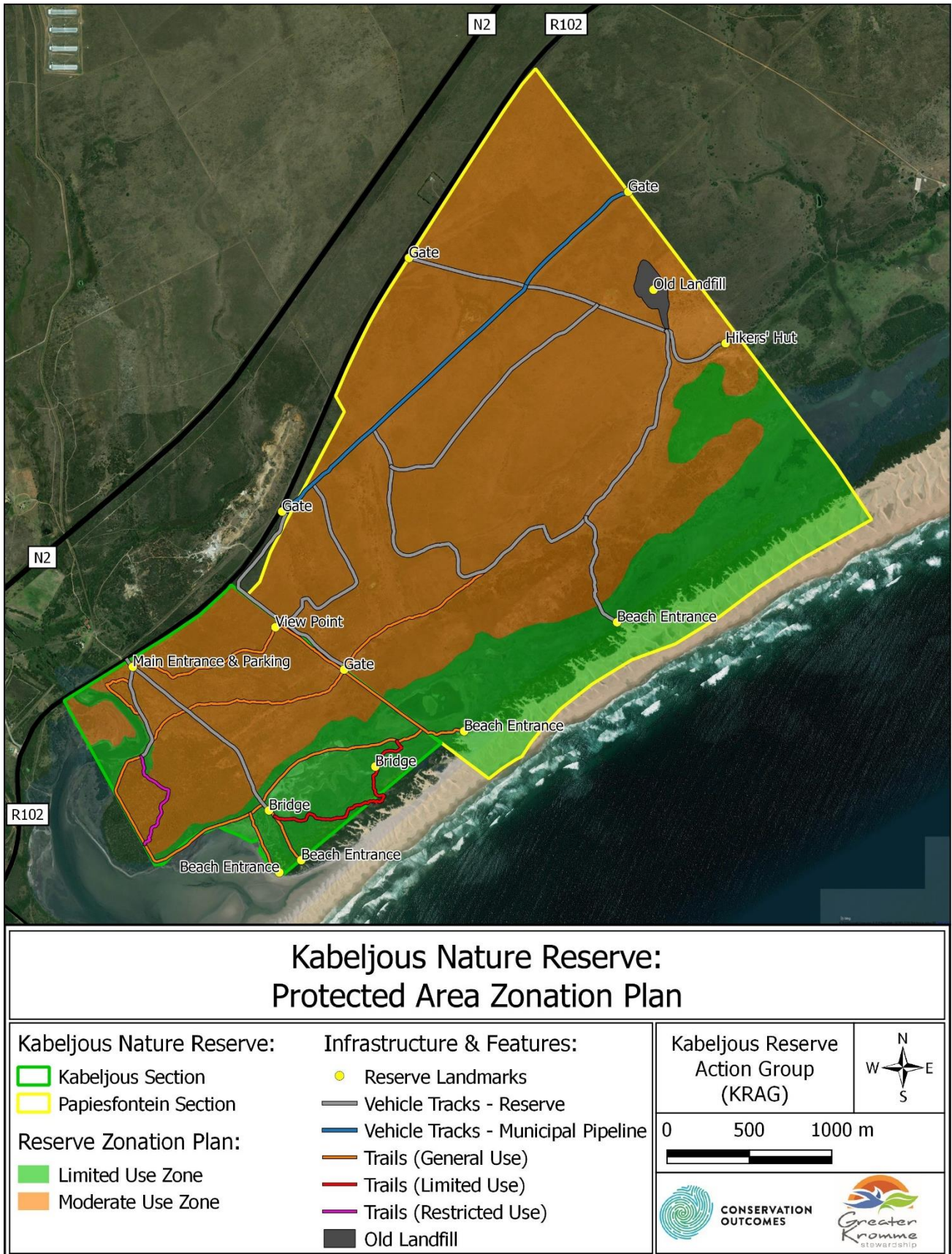


Figure 4.1 Protected Area Zonation Plan for the Kabeljous Nature Reserve.

5) ADMINISTRATIVE STRUCTURE

An indicative organisational structure for the Kabeljous Nature Reserve is set out in Figure 5.1 below. The figure identifies the role of the respective landowners, the relevant conservation authorities, the Management Authority, as well as key partners which support the Kabeljous Nature Reserve.

The Kabeljous section of the reserve is owned by the provincial Department of Roads and Public Works, while the Papiessfontein section of the reserve is currently owned by the provincial Department of Human Settlements. The Kabeljous Nature Reserve is managed by the Krag, under the guidance of DEDEAT who is the custodian and responsible conservation authority of the reserve.

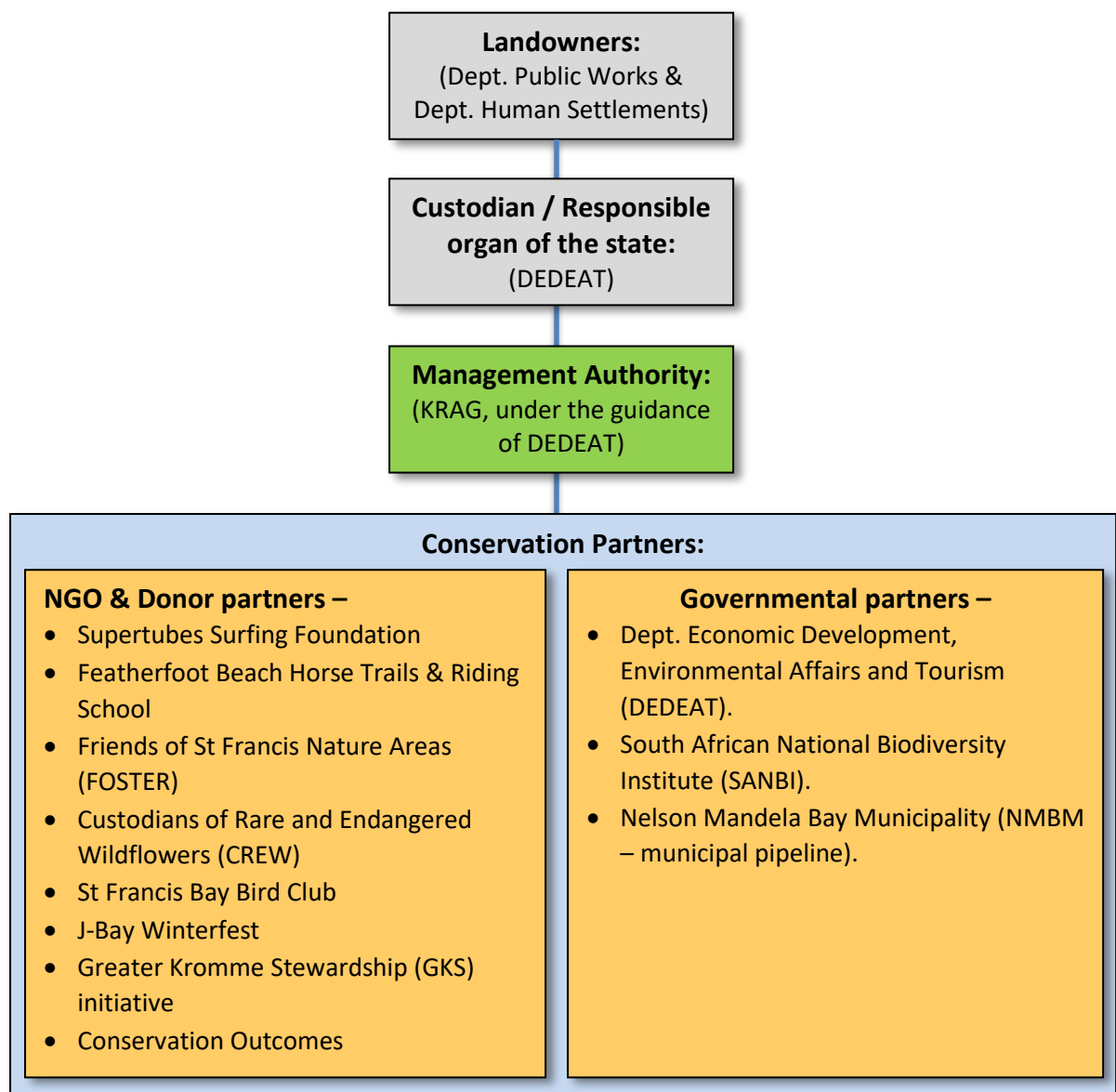


Figure 5.1 Organisational and management structure for the Kabeljous Nature Reserve.

A number of organisations, stakeholders and potential partners which are likely to be future role players have also been identified for the Kabeljous Nature Reserve. This includes, but is not limited to:

- Eastern Cape Parks and Tourism Agency (ECPTA);
- Neighboring landowners;
- Sarah Baartman West Fire Protection Association (SBWFPA);
- Kouga Local Municipality;
- National Sea Rescue Institute (NSRI);
- Research Institutes / Universities;
- SANCCOB;
- GamKab Conservancy;
- 5-Rivers Conservancy;
- Tourism sector;
- Gamtoos Irrigation Board (GIB) – Working-for-Water, Working-for-Wetlands, Working-o-Fire, Working-for-the-Coast);
- Department of Agriculture, Forestry and Fisheries (DAFF); and
- Department of Environmental Affairs (DEA).

6) OPERATIONAL MANAGEMENT FRAMEWORK

This section translates the strategic management framework described in section 3 above into management activities and targets, which will be used to inform annual plans of operation and the resources required to implement them. The management targets will form the basis for monitoring of performance in implementing the plan and are thus material outcomes that lead to tangible results, which, as far as possible, are measurable.

6.1 Legal compliance

Although the Kabeljous Nature Reserve is widely recognised as a *de facto* Nature Reserve, none of the land parcels constituting the reserve currently enjoys formal legal protection as a Nature Reserve in terms of the NEM: Protected Areas Act (No. 57 of 2003) (refer to section 2.2 and section 2.5.1 of the management plan for more information). This places the long-term conservation of the reserve and its biodiversity at great risk. It is therefore imperative to ensure that the entire extent of the reserve is formally declared as a Nature Reserve in terms of the NEM: Protected Areas Act (No. 57 of 2003).

The Kabeljous Nature Reserve is currently managed by KRAG, under the guidance of DEDEAT (refer to section 2.2 and section 2.5.1 of the management plan for more information). Despite this cooperative relationship, no formal agreements are currently in place between KRAG and the provincial conservation authorities (e.g. DEDEAT, ECPTA). This creates uncertainty for all parties involved, which in turn puts the long-term management of the reserve in jeopardy. It is thus imperative to formalise appropriate management structures, partnerships and agreements (e.g. co-management agreements) between KRAG and the provincial conservation authorities to ensure the long-term management continuity of the reserve, in accordance with the relevant legislative requirements. Towards this aim, it is worth noting that Section 42 of the NEM: Protected Areas Act (No. 57 of 2003) explicitly makes provision for a Management Authority of a Protected Area to enter into an agreement with another party for the co-management of the area by the parties. This essentially provides a legal basis for provincial conservation authorities to be assigned as the Management Authority of the Kabeljous Nature Reserve, but to enter into a co-management agreement whereby their management responsibilities are delegated to a credible conservation partner, like KRAG. The reserve would thus essentially be managed by KRAG under the guidance and oversight of the relevant conservation authorities.

The operational management framework to ensure the continued protection, conservation and management of the Kabeljous Nature Reserve in accordance with the relevant legislative requirements is set out in Table 6.1 below.

Table 6.1 Framework to ensure the protection, conservation and management of the Kabeljous Nature Reserve in accordance with the relevant legislative requirements.

Management Objective	Management activities	Management targets	Metrics (measurable)	Responsibility
LEGAL COMPLIANCE				
Objective 1 – Comply with legislative requirements pertaining to the protection and management of the Kabeljous Nature Reserve.	Follow the formal process to get the reserve legally declared and fully protected as a Nature Reserve in terms of the NEM: Protected Areas Act (No. 57 of 2003).	The entire extent of the reserve is legally declared and protected as a Nature Reserve.	Formal declaration process completed.	Provincial conservation authorities (DEDEAT, ECPTA).
	Formalise appropriate management structures, partnerships and agreements (e.g. co-management agreements) between provincial conservation authorities and NGO partners (Krag) to ensure the effective management and long-term management continuity of the reserve.	Appropriate management structures, partnerships, and agreements formalised.	Management structures, partnerships and agreements in place to achieve the long-term conservation management of the reserve.	
	Maintain and implement a relevant management plan and annual plan of operation (APO) which meets the legislative requirements and the management needs of the reserve.	Maintain an effective and relevant management programme for the reserve that is compliant to legislative requirements.	Approved management plan and APO in place.	Management Authority.
	Undertaking annual management meetings to review the implementation of the management plan, to discuss management issues, to enable the effective adaptive management of the reserve, etc.		Annual management meeting held with relevant stakeholders.	
	Report on the management of the reserve to relevant provincial conservation authorities (e.g., DEDEAT, ECPTA) on an annual basis.		Submission of annual management report to provincial conservation authorities.	

6.2 Resourcing and capacitating reserve management

The management of the Kabeljous Nature Reserve is vital to ensure the effective protection and conservation of the reserve and its biodiversity. The ongoing management and maintenance of the reserve does, however, require significant resources and capacity. To overcome resource constraints, personnel of the local DEDEAT office and concerned members of the local community established KRAG as a joint partnership initiative to support the management of the Kabeljous Nature Reserve. KRAG is essentially a non-profit volunteer organisation consisting of members of the community wanting to support the protection and management of the Kabeljous Nature Reserve, under the guidance of DEDEAT (refer to section 2.2 and section 2.5.1 of the management plan for more information). KRAG aims to finance, resource and capacitate the management of the Kabeljous Nature Reserve by establishing a variety of sustainable long-term funding streams (e.g., donor funding, fund raising events, grant funding from private conservation trust funds, etc.); by harnessing volunteer energy from civil society (e.g., support from volunteers and various interest groups); and by forming strategic partnerships with a range of different stakeholders, including provincial conservation authorities (e.g., DEDEAT and ECPTA), government programmes (e.g., Working for Water, Working on Fire, etc.), the local private business and tourism sectors, and other NGO conservation partners in the region.

Local business partners with vested interests in the reserve could be approached to contribute to the management of the reserve (e.g., through donor funding). Furthermore, periodic fund-raising events (e.g., Kabeljous sunset-moonrise walks, fund-runs, etc) are being hosted to generate resources and support for the management of the reserve. Moreover, strategic partnerships are also being formed with existing government programmes such as DEA National Resource Management Programmes (e.g., Working-for-Water, Working-for-Wetlands, Working-on-Fire, Working-for-the-Coast, etc.) to support essential management functions of the reserve. Partnerships are also being formed with interest groups (e.g., bird clubs, botanical groups, and research institutes, etc.) to assist with relevant management functions of the reserve (e.g., biodiversity monitoring, data collection, species identification, etc.). In addition to the latter, initiatives are underway to generate more volunteer support and capacity for reserve management activities by actively promoting the reserve and fostering community involvement. Lastly, it is also important to point out that KRAG, as a non-profit and public benefit organisation, can apply to various conservation trust funds (e.g., Hans Hoheisen Charitable Trust, WWF Table Mountain Fund, etc.) for grant funding to support certain aspects of the reserve's management needs. However, in order for this to be done, is absolutely vital that KRAG be recognised as a formal co-management partner of the provincial conservation authorities. It is thus essential to formalise the management structures, partnerships and agreements (e.g., co-management agreements) between provincial conservation authorities and KRAG. It is also equally important that the Kabeljous Nature Reserve be legally secured as a Nature Reserve in order to offer long-term security for potential funding partners' investments in the management of the reserve.

The framework for generating resources and capacity for the ongoing management of the Kabeljous Nature Reserve are set out in Table 6.2 below.

Table 6.2 Framework for resourcing and capacitating the ongoing management of the Kabeljous Nature Reserve.

Management Objective	Management activities	Management targets	Metrics (measurable)	Responsibility
RESOURCING AND CAPACITATING RESERVE MANAGEMENT				
Objective 2 – Generate resources and capacity to support the sustainable management of the reserve.	Obtain donor funding from local business partners and regular users of the reserve with vested interests in the reserve.	Adequate resources and capacity available to sustain the ongoing management of the reserve.	Available budget and volunteer energy.	Management Authority.
	Receive donations from local business and community members who wish to support the conservation efforts of the reserve and who recognise the public benefits that the reserve provides to local communities.			
	Source grant funding from private conservation trust funds (e.g., Hans Hoheisen Charitable Trust, WWF, etc.) to support the management of the reserve.			
	Obtain support from government programmes (e.g., Working-for-Water, Working-for-Wetlands, Working-on-Fire, Working-for-the-Coast, etc.).			
	Undertake fund raising events (e.g., Kabeljous sunset-moonrise walks, fun-runs, etc.).			
	Foster community partnerships, involvement and support to generate capacity and harness volunteer energy for the management and improvement of the reserve.			
	Form partnerships with interest groups (e.g., bird clubs, botanical groups, and research institutes, etc.) to assist with relevant management functions of the reserve (e.g., biodiversity monitoring, data collection, species identification, etc.).			
	Create strong partnerships with provincial conservation authorities and NGO partners in the region to support to the management of the reserve.			

6.3 Regional management and buffer zone protection

In light of the ecological context of the Kabeljous Nature Reserve described in section 2.7 of the management plan, it is clear that the reserve includes parts of ecological processes which function at a landscape level within the broader region. Since the Kabeljous Nature Reserve is ecologically connected to the surrounding landscape, activities that take place outside of the reserve's boundaries may impact on the ecological functioning and integrity of the reserve. It is therefore important to be mindful of the potential impacts that activities in the surrounding landscape may have on the reserve, to take proactive measures to counter external threats to the reserve, and to encourage appropriate land uses in the reserve's Protected Area buffer zone (the Protected Area buffer zone of Kabeljous Nature Reserve is outlined in section 2.6.2 of the management plan). Furthermore, in order to safeguard the biodiversity within the reserve, to counter edge effects, and to ensure compatible land uses around the reserve, efforts should also be made to expand the reserve.

The following guiding principles should to be considered in this regard:

- The Kabeljous Nature Reserve and its Protected Area buffer zone considerations must be captured on all local and regional planning mechanisms (e.g., municipal SDFs and IDPs, provincial conservation plans, etc.).
- The Kabeljous Nature Reserve should be captured in the national Protected Area Register.
- In addressing potential external threats to the Kabeljous Nature Reserve, the support of the relevant provincial and national conservation authorities should be obtained.
- Partnerships and good relationships should be fostered with the local municipality, relevant conservation authorities, and the landowners in the broader region.
- Partnerships should be fostered with neighbouring landowners to promote cooperation, joint management efforts and, where possible, the expansion of the conservation footprint along the coastline between the Kabeljous and Gamtoos estuaries.

The framework for the regional management and buffer zone protection of the Kabeljous Nature Reserve is outlined in Table 6.3 below.

6.4 Conservation management

6.4.1 Ecosystems, habitats and species management

The conservation of the ecosystems and underlying natural processes within the Kabeljous Nature Reserve, as well as the protection of its diverse range of habitats and species remains one of the greatest management priorities in the Kabeljous Nature Reserve. In light of the regional context and ecological context of the Kabeljous Nature Reserve (see section 2.6 and section 2.7 of the management plan), it is important to recognise that the reserve does not only contribute to the conservation of threatened habitats, vegetation types and species, but the reserve also plays a significant role in conservation at a broader landscape level. The framework for the protection of the ecosystems, habitats and species of the Kabeljous Nature Reserve is outlined in Table 6.4 below.

Table 6.3 Framework for the regional management and buffer zone protection in the Kabeljous Nature Reserve.

Management Objective	Management activities	Management targets	Metrics (measurable)	Responsibility
REGIONAL MANAGEMENT AND BUFFER ZONE PROTECTION				
Objective 3.1 – Ensure that the Kabeljous Nature Reserve is recognised in the region, and that the reserve is well protected from any potential external threats that could impact on its ecological integrity.	Ensure that the Kabeljous Nature Reserve and its Protected Area buffer zone considerations are adequately captured in local and regional planning mechanisms (e.g., municipal IDPs and SDFs) and that it is adequately aligned with the vision, values and purpose of the Kabeljous Nature Reserve.	All local and regional plans (IDPs and SDFs) are aligned with the conservation objectives and purpose of the Kabeljous Nature Reserve.	The reserve and its Protected Area buffer zone considerations are adequately captured in local and regional planning mechanisms (IDPs and SDFs).	Management Authority & provincial conservation authorities (DEDEAT, ECPTA).
	Ensure that the reserve is captured in the national Protected Area Register once the reserve’s declaration as a Nature Reserve has been formalised.	Minimise and mitigate external risks and impacts on the reserve.	The reserve is captured in the national Protected Area Register.	
	Registered as an affected party and comment on relevant EIAs that may adversely impact on the reserve’s ecological integrity.		Record of activities.	
	Foster regional support for the reserve by building relationships and by raising an awareness of the exceptional conservation value of the reserve amongst communities, local government, conservation authorities and other relevant stakeholders.	For the reserve and its contribution to conservation in the region to be recognised and supported by all stakeholders.	Stakeholder recognition and support.	
Objective 3.2 – Work towards the expansion of the conservation footprint between the Kabeljous and Gamtoos estuaries by promoting cooperation and involvement of surrounding landowners in conservation initiatives.	Foster partnerships and relationships with neighbouring landowners to promote cooperation and, where possible, joint management efforts (e.g., joint fire management over a larger area, maintenance of boundary fences between private land and the reserve, etc.).	To have cooperative relationships with neighbouring landowners.	Active cooperation and with neighbouring landowners.	Management Authority.
	Explore opportunities to expand the conservation footprint between the Kabeljous and Gamtoos estuaries by promoting the involvement of surrounding landowners in conservation initiatives (e.g., Biodiversity Stewardship, Conservancy, etc.).	To expand the conservation footprint between the Kabeljous and Gamtoos estuaries.	Hectares under conservation management between the Kabeljous and Gamtoos estuaries.	

Table 6.4 Framework for ecosystems, habitats and species management in the Kabeljous Nature Reserve.

Management Objective	Management activities	Management targets	Metrics (measurable)	Responsibility
ECOSYSTEMS, HABITATS AND SPECIES MANAGEMENT				
Objective 4.1 – Protect the ecosystem functioning, ecological integrity, and sensitive habitats in the Kabeljous Nature Reserve through active interventions based on principles of adaptive management.	Where possible, mitigate threats in and around the reserve that may impact on the reserve’s ecosystem functioning and ecological integrity through engagement with relevant authorities and stakeholders (also see management objective 3.1 and 3.2 under section 6.3 of the management plan).	Potential threats to the ecological integrity of the reserve minimised or mitigated.	Steps taken to address threats.	Management Authority.
	Where necessary, implement special interventions to protect particularly sensitive habitats of concern on the reserve, primarily through the adoption of special protection overlays in the reserve’s zonation plan (refer to section 4.1.1 of the management plan).	Sensitive habitats of concern identified and appropriate special protection overlays developed and adopted into the reserve’s zonation plan	All identified sensitive habitats of concern adequately protected in the reserve.	
Objective 4.2 – Develop a species database for the Kabeljous Nature Reserve to inform management decisions and the protection of particularly sensitive / vulnerable fauna and flora species.	Maintain a database of fauna and flora species found on the reserve.	Species database updated on a regular basis. Continued increase in biodiversity information to inform management decisions.	Management of fauna and flora species are undertaken using the best available biodiversity information.	Management Authority.
	Where possible, seek partnerships with interest groups (e.g., bird clubs, botanical groups, and research institutes, etc.) to assist with data collection, species identification, and biodiversity monitoring.			
	Where necessary, implement special management interventions and monitoring efforts to protect populations of particularly sensitive / vulnerable species of conservation concern (e.g., highly threatened, rare, or endemic species).	Adequate protection of particularly sensitive / vulnerable species on the reserve.	Stable or growing populations of species of conservation concern.	

6.4.2 Alien invasive plant control

A listed invasive species means any species that is listed in terms of the Conservation of Agricultural Resources Act and section 70 of the Biodiversity Act and its regulations, whose establishment and spread occurs outside of its natural distribution range. Such plants are considered to be a serious threat to the ecological functioning of natural systems and must therefore be strictly controlled. The primary alien invasive plant species found in the Kabeljous Nature Reserve are rooikrans (*Acacia cyclops*), prickly pears (*Opuntia ficus-indica*) and jointed cacti (*Opuntia aurantiaca*). The most effective methods to control these alien invasive plant species was discussed earlier in section 2.7.8 of the management plan.

In undertaking alien invasive plant control in the Kabeljous Nature Reserve, the following guiding principles should be adhered to:

- An alien invasive plant control programme should aim to eradicate or at least reduce the populations of alien invasive plant species in the reserve to maintenance levels.
- An ongoing alien invasive plant control programme should prioritise key infestations along water courses, wetland areas and drainage lines.
- Initial clearing efforts should focus on containing infestations that are most likely to spread into new areas.
- All follow-up maintenance requirements should be strictly adhered to; otherwise the problem will simply be exacerbated.
- Where possible, strategic partnerships and poverty relief programmes, such as the Working for Water programme, should be utilised in controlling alien invasive species.

The framework for managing and controlling alien invasive plants in the Kabeljous Nature Reserve is set out in Table 6.5 below.

Table 6.5 Framework for the management and control of alien invasive plant species in the Kabeljous Nature Reserve.

Management Objective	Management activities	Management targets	Metrics (measurable)	Responsibility
ALIEN INVASIVE PLANT CONTROL				
Objective 5 – Eradicate infestations of alien invasive plant species in the Kabeljous Nature Reserve in a systematic and controlled manner.	Prioritise area for alien clearing.	Eradicate / reduce alien invasive plant populations to maintenance levels.	Hectares cleared.	Management Authority.
	Implement concerted and sustained efforts to eradicate alien invasive plants in the reserve in a controlled and phased manner.			
	Where possible, form strategic partnerships with the NRM Working-for-Water programme to support the reserve with eradicating alien invasive species.			
	Conduct periodic follow-up operations on previously cleared areas to maintain the reserve free of all alien invasive plants (maintenance control).	All previously cleared areas maintained through follow-up operations.	Percentage (%) of previously cleared areas maintained.	
	Where possible, maintain a record of photos of the areas that have been cleared of alien invasive vegetation in an effort to monitor the rehabilitation of those areas.	Photo record maintained annually.	Photographic record.	

6.4.3 Fire management

The natural fire regime and main ecological functions of fire within the Kabeljous Nature Reserve were described in section 2.7.10 of the management plan. A number of best-practice guidelines were also considered and some recommendations were made towards devising an ecologically sound fire regime for the reserve. To summarise, it was explained that fire plays a particularly important role in the dynamics of the fynbos habitats in the reserve and it has important effects on primary productivity, nutrient cycling, and vegetation composition (e.g., maintaining the species diversity). In addition to this, periodic fires also serve the purpose of maintaining a natural balance between fire-prone vegetation types (e.g., fynbos) and fire-avoiding vegetation types (e.g., thicket and thicket clumps), which co-exist on the reserve. Section 2.7.10 concluded that a holistic fire management approach would be most appropriate for the Kabeljous Nature Reserve, where fires are recognised as an integral part of the ecological dynamics of the reserve as a whole and across the different vegetation types. This means that fires in the reserve should not be artificially confined to the fire-prone vegetation units (e.g., fynbos) only but, instead, be allowed to periodically extend throughout the reserve as would have occurred historically under natural circumstances (Cowling, *personal communication*, 2019). In addition to the ecological considerations outlined in section 2.7.10 of the management plan, the following guiding principles and existing features should also be considered in developing a fire management strategy for the Kabeljous Nature Reserve:

- Fire management must be undertaken in a safe manner that is legally compliant with the National Veld and Forest Fire Act (No. 101 of 1998). The most important considerations in this regard are summarised under section 2.5.4 of the management plan.
- The size of the reserve and the need to access different areas in the event of a wildfire. This relates to sufficient access, roads and vehicle tracks on the reserve.
- The need to maintain a system of firebreaks to enable the management of controlled burns, as well as to effectively fight wildfires.
- The number of personnel necessary to effectively manage controlled fires and to fight wildfires on the reserve.
- The equipment necessary to effectively fight wildfires on the reserve.
- Any controlled burning should be undertaken in such a way that it maintains spatial and temporal heterogeneity within the landscape.
- A patch mosaic of burnt and un-burnt areas should be maintained. Thus, the controlled burning of areas should be undertaken in a manner that promotes patchy burns (i.e. within the block being burnt, some patches will remain un-burnt rather than aiming for a complete burn).
- Any controlled burning plan should consider the biodiversity of the site and the need to protect rare and endangered species.
- Where possible, strategic partnerships and poverty relief programmes, such as the Working on Fire programme, should be utilised to support fire management in the reserve.

The framework for fire management in the Kabeljous Nature Reserve is set out in Table 6.6 below.

Table 6.6 Framework to ensure adequate fire management and fire safety in the Kabeljous Nature Reserve.

Management Objective	Management activities	Management targets	Metrics (measurable)	Responsibility
FIRE MANAGEMENT				
Objective 6.1 – Ensure adequate fire safety in the Kabeljous Nature Reserve and compliance with the National Veld and Forest Fire Act (No. 101 of 1998).	The owner in respect of the state land constituting the reserve must become a member of a Fire Protection Association (FPA), in accordance with Section 4(8) of the National Veld and Forest Fire Act (No. 101 of 1998).	Compliance with the National Veld and Forest Fire Act (No. 101 of 1998).	Membership to FPA.	DEDEAT
	Consider the need to develop and maintain a system of firebreaks in the reserve, where required.		Firebreaks in place, where needed.	Management Authority.
	Collaborate with adjoining landowners to adopt a joint fire management approach (e.g., common firebreaks, joint controlled burns, etc.) for the area between Kabeljous and Gamtoos estuaries, where possible.		Joint fire management with neighbouring landowners.	
	Acquire adequate firefighting equipment for the reserve.		Inventory of fire-fighting equipment.	
	Develop an appropriate emergency fire response plan to enable effective support from neighbours, the local Fire Protection Association, or the local Fire Department in the event of a wildfire.		Emergency fire response plan in place.	
Objective 6.2 – Fire management in Kabeljous Nature Reserve is undertaken based on sound ecological principles and best practice guidelines.	Implement controlled burns that simulate an ecologically appropriate fire regime to maintain the heterogeneity, species diversity, and ecological functioning of the fynbos habitats in the reserve.	Ecologically appropriate fire regime adopted.	Percentage (%) of fynbos areas in the reserve under an ecologically appropriate fire regime.	Management Authority.
	Where possible, form strategic partnerships with the NRM Working-on-Fire programme to support the reserve with the implementation of controlled burns and fire management requirements.			
	Maintain records of all controlled burns and wildfires that occur in the reserve.	Records/maps of all fire incidents.	Fire records / fire maps maintained.	

6.4.4 Rehabilitation and restoration of disturbed and degraded areas

A key management objective for the Kabeljous Nature Reserve is to make the reserve accessible for visitors to enjoy. It is, however, also essential to ensure that the natural environment of the reserve remains unaltered by human activity. It is therefore important to detect early signs of degradation (e.g., erosion), particularly around the reserve's infrastructure (e.g., trails, vehicle tracks, etc.). Areas showing signs of degradation should be stabilised and restored to avoid further degradation. It is also worth noting that on the Papiessfontein section of the reserve there is an old landfill site, which was never rehabilitated. The feasibility of rehabilitating this old landfill site may need to be explored.

In addressing the rehabilitation and restoration of disturbed and degraded areas in the Kabeljous Nature Reserve, the following guiding principles should be considered:

- Rehabilitation and restoration efforts should, as far as possible, be proactive and aimed at preventing degradation from occurring.
- Areas susceptible to soil erosion or areas showing early signs of degradation (e.g., loss of vegetation cover) must be stabilised and managed to prevent further degradation.
- Degraded or disturbed areas should be stabilised and re-vegetated with indigenous and locally occurring plant species.
- All roads, vehicle tracks, trails and other infrastructure in the reserve should be closely monitored and well maintained in order to prevent them from causing any harm to the natural environment (e.g., erosion).

The framework for managing the rehabilitation and restoration of disturbed and degraded areas in the Kabeljous Nature Reserve is outlined in Table 6.7 below.

6.4.5 Litter and pollution

Due to the coastal setting of the Kabeljous Nature Reserve, the impacts of litter washing up on the shoreline is an ongoing issue which impacts not only on the natural environment and coastal species, but also the aesthetics appeal of the reserve. Furthermore, the coastal setting of the reserve also lends itself to fishing and a variety of other recreational activities which often result in unnecessary littering along the coast (e.g., fishing line, fishing nets, etc.). Although littering in the reserve is generally much less of a problem, it is nevertheless an issue that also requires ongoing management.

Littering and environmental pollution in the reserve and along the adjoining coastline are likely to remain an issue that would require continued management over the long-term. The aim is to create a greater awareness regarding the impact of litter pollution and to promote an ethic amongst visitors of the reserve to play an active role in keeping the Kabeljous Nature Reserve clean. Opportunities should be explored to partner with the Kouga Local Municipality, local businesses and other organisations in the region to promote and support coastal clean-up initiatives (e.g., the International Coastal Clean-up days), particularly along the Kabeljous-Gamtoos coastline and around the Kabeljous estuary system. The framework for managing the rehabilitation and restoration of disturbed and degraded areas in the Kabeljous Nature Reserve is outlined in Table 6.8 below.

Table 6.7 Framework for the rehabilitation and restoration of disturbed and degraded areas in the Kabeljous Nature Reserve.

Management Objective	Management activities	Management targets	Metrics (measurable)	Responsibility
REHABILITATION AND RESTORATION OF DISTURBED AND DEGRADED AREAS				
Objective 7 – Rehabilitate and restore degraded or disturbed areas in the Kabeljous Nature Reserve to a natural or near-natural state.	Monitor all areas in the reserve to detect early signs of degradation / disturbances (e.g., erosion), particularly around the reserve’s infrastructure (e.g., trails, vehicle tracks, etc.).	All sites that shows signs of degradation stabilised and under rehabilitation.	Number / Percentage (%) of identified sites stabilised and under rehabilitation.	Management Authority.
	Where necessary, stabilise areas in the reserve that show signs of degradation/disturbances (e.g., erosion) and undertake appropriate restoration work (e.g., re-vegetate areas with indigenous and local occurring plant species).			
	Monitor the success and effectiveness of rehabilitation efforts.	Photographic record of rehabilitated areas maintained annually.	Annual photographic record.	

Table 6.8 Framework for the management of litter and pollution in the Kabeljous Nature Reserve.

Management Objective	Management activities	Management targets	Metrics (measurable)	Responsibility
LITTER AND POLLUTION				
Objective 8 – Harness volunteer energy to maintain a clean and litter-free environment on the Kabeljous Nature Reserve and surrounding coastal areas.	Strive to promote an ethic amongst visitors and users of the reserve to pick up litter when visiting the reserve.	Reduce the impact of litter-pollution on the environment and aesthetic appeal of the reserve and adjoining coastline.	Visible reduction in litter-pollution on the reserve.	Management Authority.
	Partner with the Kouga Local Municipality, local schools, businesses and organisations to promote and support coastal clean-up initiatives, particularly along the Kabeljous-Gamtoos coastline and around the Kabeljous estuary system.			
	Partner with local schools to combine coastal clean-up initiatives with environmental education campaigns.			

6.5 Security, enforcement and impact management

6.5.1 Safety, security and enforcement

The Management Authority of the Kabeljous Nature Reserve is mandated to enforce the internal rules and laws related to the use of the reserve and the prohibition of particular activities. A critically important management objective of the Kabeljous Nature Reserve is to maintain a safe and secure natural environment for visitors and users of the reserve to enjoy. It is also important to maintain a safe and secure environment to ensure the protection and continued conservation of the reserve's biodiversity. This could be achieved by establishing an initiative to appoint honorary rangers for the reserve. It is noteworthy that the active management and presence of KRAG in the Kabeljous Nature Reserve has virtually eliminated issues that have previously posed serious threats to the reserve's biodiversity (e.g., snares, poaching, illegal harvesting of plants, grazing of livestock, etc.). The framework for maintaining adequate safety and security in the Kabeljous Nature Reserve is outlined in Table 6.9 below. In maintaining a safe and secure environment for the reserve's visitors and biodiversity, the following guiding principles should be considered:

- Safety, security and enforcement at the reserve should be undertaken through ongoing surveillance, monitoring and appropriate reaction in the event of an offence or security related incidents.
- Where possible, safety, security and law enforcement efforts should be coordinated with key stakeholders such as neighbours and relevant authorities (including SAPS and the Compliance and Enforcement division of the DEDEAT).
- Where applicable, appropriate signage must be installed in the reserve to inform visitors of the relevant internal rules and the permissible and non-permissible activities.
- All reasonable efforts must be made to ensure the safety of visitors and the effective conservation of biodiversity within and on the boundaries of the reserve.

6.5.2 Visitor impacts, activities and reserve usage

A key objective of the Kabeljous Nature Reserve is to make the reserve accessible for visitors to enjoy. It is, however, essential to manage visitors' activities and usage of the reserve in order to minimise impacts on the reserve's biodiversity and natural environment. Of particular concern is to minimise the impact of visitors and activities on particularly sensitive areas within the reserve and to ensure that the reserve is used in a manner that is consistent with the overriding principles of its Protected Area zonation plan (refer to section 4 of this management plan). The framework for managing and controlling visitor impacts, activities and usage of the Kabeljous Nature Reserve is outlined in Table 6.9 below.

Table 6.9 Framework to ensure adequate safety, security and enforcement in the Kabeljous Nature Reserve, as well as to manage visitor impacts, activities and usage of the Kabeljous Nature Reserve.

Management Objective	Management activities	Management targets	Metrics (measurable)	Responsibility
SAFETY, SECURITY AND ENFORCEMENT				
Objective 9.1 – Maintain adequate safety and security in the Kabeljous Nature Reserve, and enforce the reserve’s internal rules.	Establish an initiative to appoint honorary rangers for the reserve.	Improved safety and compliance with the reserve’s internal rules, and reduction in security-related incidents.	Number of honorary rangers.	Management Authority.
	Enforce the internal rules of the reserve and strive to prevent undesirable and illegal activities (e.g., poaching, snaring, illegal plant harvesting, unauthorised livestock grazing, etc.).		Record of incidents.	
	Install appropriate signage to inform visitors of the reserve’s internal rules (e.g., permissible and non-permissible activities, restrictions, prohibitions, etc.).			
	Maintain restricted vehicular access onto the reserve.			
	Ongoing monitoring to identify any safety and security related issues in the reserve.			
	All security-related incidents to be reported to the Management Authority of the reserve.			
	Appropriate action taken to address safety and security threats, as needed.			
	Where necessary, collaborate with neighbouring landowners and relevant authorities (e.g., SAPS, DEDEAT, Kouga Local Municipality) to achieve improved safety and security on the reserve.			
MANAGEMENT OF VISITOR IMPACTS, ACTIVITIES AND RESERVE USAGE				
Objective 9.2 – Manage visitor impacts, activities and usage of the different areas within the reserve.	Install appropriate signage at the reserve entrances to raise an increased awareness of the rules of the reserve.	Create an awareness of and compliance to the internal rules amongst visitors and user of the reserve.	Adequate signage at reserve entrances and within the reserve.	Management Authority.
	Ensure that all official reserve trails are clearly marked to prevent visitors from wandering and deviating from official trails.			
	Install appropriate signage to inform visitors of any rules or restrictions that may apply to particular areas within the reserve (e.g., limited use trails, restricted trails, etc.).			

6.6 Cultural heritage

In light of the cultural heritage context of the Kabeljous Nature Reserve (described in section 2.9 of the management plan), it is evident that a number of important historical, archaeological and paleontological sites and artefacts are found within the reserve. It is essential that the reserve's cultural heritage is protected and retained. The following guiding principles apply in this regard:

- The protection and management of the reserve's cultural heritage resources should be undertaken in a manner that is compliant to the National Heritage Resources Act (No. 25 of 1999).
- Important historic, archaeological and paleontological sites and artefacts should be properly documented and preserved as an important component of South Africa's scientific, historical and cultural heritage. All efforts should be made to ensure that these sites remain undisturbed and unaltered by human activity.
- Where necessary, the support of relevant interest groups (e.g., archaeological groups, research institutes, etc.) or relevant authorities (e.g., South African Heritage Resource Agency, Eastern Cape Provincial Heritage Resources Authority, etc.) could be obtained to ensure the preservation of the reserve's cultural heritage resources.

The framework for the management of the cultural heritage resources of the Kabeljous Nature Reserve is outlined in Table 6.10 below.

6.7 Infrastructure management and development

Adequate infrastructure in the Kabeljous Nature Reserve is essential to support the effective management of the reserve and to make the reserve accessible for visitors to enjoy through appropriate nature-based recreation activities. The infrastructure that currently exists within the Kabeljous Nature Reserve is described in section 2.8 of the management plan. Furthermore, section 4 of the management plan establishes the Protected Area zonation plan of the Kabeljous Nature Reserve and stipulates conditions pertaining to the development and use of infrastructure within the reserve's different zones. In addressing the infrastructure needs in the reserve, the following guiding principles should be adhered to:

- Infrastructure developments within the reserve must be sensitive to the reserve's values, character, aesthetic appeal and sense of place. Infrastructure developments should be carefully controlled to ensure that these features of the reserve are not impacted upon.
- The development of infrastructure within the reserve should not impact negatively on the cultural heritage, biodiversity or ecological integrity of the reserve.
- The development of infrastructure within the reserve should be done in a manner that is consistent with the overriding principles of the reserve's Protected Area zonation plan (refer to section 4 of the management plan).
- All infrastructure must be well maintained to ensure the safety of visitors and users of the reserve.

The framework for the management and development of infrastructure on Kabeljous Nature Reserve are set out in Table 6.11 below.

Table 6.10 Framework for the management of the cultural heritage of the Kabeljous Nature Reserve.

Management Objective	Management activities	Management targets	Metrics (measurable)	Responsibility
CULTURAL HERITAGE				
Objective 10 – Protect and preserve the cultural heritage resources (e.g., archaeological sites) of the Kabeljous Nature Reserve.	Where possible, seek partnerships with interest groups (e.g., archaeological groups, research institutes, etc.) to assist with identifying and documenting the archaeological and paleontological sites and artefacts on the reserve.	Identify significant archaeological sites on the reserve.	Number and status of significant archaeological sites identified.	Management Authority.
	Minimise or restrict visitor activities and human impacts on known archaeological sites.	Keep all archaeological sites undisturbed and unaltered by human activity.	Number of incidents where archaeological sites are disturbed.	
	Where necessary, implement special interventions to protect particularly sensitive archaeological sites in the reserve, primarily through the adoption of special protection overlays in the reserve’s zonation plan (see section 4.1.1 of the management plan).	Sensitive archaeological sites identified and adequately protected through the development and adoption of site-specific special protection overlays in the reserve’s zonation plan.	Number / Percentage (%) of identified sites protected.	

Table 6.11 Framework for infrastructure management and development in the Kabeljous Nature Reserve.

Management Objective	Management activities	Management targets	Metrics (measurable)	Responsibility
INFRASTRUCTURE MANAGEMENT AND DEVELOPMENT				
Objective 11.1 – Maintain all existing infrastructure in the Kabeljous Nature Reserve.	Maintain the reserve infrastructure (e.g., trails, vehicle roads and tracks, signage, structures, etc.) in a condition that is safe to use and does not cause environmental degradation (e.g., erosion).	All infrastructure in the reserve well maintained and not causing any environmental degradation.	Infrastructure condition.	Management Authority.
Objective 11.2 – Develop appropriate infrastructure that is consistent with the conservation objectives, purpose and values of the Kabeljous Nature Reserve.	Develop and maintain appropriate infrastructure to support the effective management of the reserve, to make the reserve accessible for visitors to enjoy, and to support appropriate nature-based recreation activities.	Sufficiently infrastructure and facilities to support reserve management and nature-based recreation activities.	Any shortcomings in reserve infrastructure and facilities.	Management Authority.
	Obtain all relevant planning permissions and/or Environmental Authorisations that may be required for new infrastructure developments.	The reserve is developed in accordance with all relevant legislation and the reserve’s conservation objectives.	Required planning permissions and/or Environmental Authorisations obtained, and adherence to the reserve’s Protected Area zonation plan.	
	Develop the reserve in a manner that is consistent with its overriding principles of the reserve’s Protected Area zonation plan.			
	Infrastructure developments and activities must be carefully controlled to ensure that the reserve’s character, aesthetic appeal and sense of place are not impacted upon.	To maintain the reserve’s character, aesthetic appeal and sense of place.		

7) MONITORING AND REPORTING

Monitoring and reporting is a critical component of the adaptive management cycle. It enables the effective assessment of management interventions and, if necessary, can be used to direct modifications of management in an effort to achieve the outcomes required.

7.1 Annual monitoring

The annual monitoring schedule should be designed to monitor the implementation of the different aspects of the Protected Area management plan. It should be designed to be straightforward and relatively easy to implement.

Records should be maintained of key management interventions and of relevant problem events or incidents such as poaching, unauthorised access into the reserve, illegal plant collection, unplanned wildfires, security related incidents, etc. Scientific monitoring programmes may be established to monitor specific management interventions such as measures for the protection of flagship species or particularly sensitive areas in the reserve. Most of the outcomes of the monitoring process will be captured in an annual report, which will be used to inform the following year's annual plan of operation. On this basis, a monitoring schedule for Kabeljous Nature Reserve is set out in Table 7.1.

7.2 Annual review and reporting

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

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

The minutes of the annual management meeting will form the basis of the report on the management plan review. The minutes should include records of recommendations for updates/changes to the five-year plan so that when the five-year plan is revised for the subsequent five years, these recommendations can be assessed and included where necessary.

Table 7.1 Annual monitoring schedule for the Kabeljous Nature Reserve.

Key performance areas	Parameters to be monitored	Monitoring measures	Monitoring frequency	Responsibility	Reporting requirements
Legal compliance.	Compliance with the NEM: Protected Areas Act (No. 57 of 2003).	Written record of non-compliance issues	Annually	Management Authority	Annual Report
	Management structures and partnership agreements in place to ensure effective management and management continuity.	Management structures / partnership agreements in place.	Annually	DEDEAT	Annual Report
Resourcing and capacitating reserve management.	Annual environmental budget allocations.	R	Annually	Management Authority	Annual Report
Regional management and buffer zone protection.	Reserve captured in SDFs and IDPs.	SDFs and IDPs	Biennially	Management Authority	Five-yearly Report
	Reserve recorded in National Protected Area Register.	Protected Area Register	Once-off	Management Authority	Annual Report
	External threats to the reserve's ecological integrity.	Written record.	Per event	Management Authority	Annual Report
	Stakeholder recognition and support.	Stakeholder involvement.	Annually	Management Authority	Annual Report
Ecosystem, habitats and species management.	Expansion of land between Kabeljous and Gamtoos estuaries under conservation.	Ha	Per event	Management Authority	Annual Report
	Undesired impacts on sensitive habitats and species of concern.	Written record / Photographs.	Per event	Management Authority	Annual Report
Alien invasive plant control.	Continued updating of species database.	Number of species recorded.	Per event	Management Authority	Annual report
	New areas cleared of alien invasive plants.	Ha	Annually	Management Authority	Annual Report
	Maintenance control on previously cleared areas.	Ha	Annually	Management Authority	Annual Report
Fire management.	Recovery of areas where invasive plants have been cleared.	Photographic record.	Annually	Management Authority	Annual Report
	Compliance with the National Veld and Forest Fire Act (No 101 of 1998).	Written record of non-compliance issues.	Annually	Management Authority	Annual Report
	Unplanned wildfires.	Written record and map.	Per event	Management Authority	Annual Report
Ecologically appropriate fire regime (e.g., fire frequency, etc.).	Per event		Management Authority	Annual Report	
Rehabilitation and restoration.	Areas subject to rehabilitation / restoration efforts.	Photographic record / Written record	Annually	Management Authority	Annual Report
	Recovery of rehabilitated areas.		Annually	Management Authority	Annual Report

Table 7.1 (Continued from previous page).

Key performance areas	Parameters to be monitored	Monitoring measures	Monitoring frequency	Responsibility	Reporting requirements
Litter and pollution.	Impact of litter-pollution on the environment and aesthetic appeal of the reserve.	Visible reduction in litter pollution on reserve.	Annually	Management Authority	Annual Report
	Pollution events.	Written record / Photographs.	Per event	Management Authority	Annual Report
Safety and security.	Number of honorary rangers appointed for the reserve.	List of honorary rangers.	Annually	Management Authority	Annual Report
	Safety and security related incidents recorded (e.g., criminal acts, unauthorised entry, snares, poaching incidents, criminal acts, etc.).	Written record / Photographs.	Per event	Management Authority	Annual Report
Managing visitor impacts, activities and usage of the reserve.	Contraventions of the reserve's internal rules and/or zonation plan.	Written record / Photographs.	Per event	Management Authority	Annual Report
Cultural heritage.	Record of archaeological sites.	Written record / Photographs.	Per event	Management Authority	Annual Report
	Undesirable impacts on archaeological sites.	Written record / Photographs.	Per event	Management Authority	Annual Report
Infrastructure management and development.	Shortcomings / adequacy of the reserve's infrastructure.	Per event Management Authority Annual Report	Annually	Management Authority	Annual Report
	State of existing infrastructure.	Written record / Photographs.	Annually	Management Authority	Annual Report
	Undesirable impacts of infrastructure (e.g., degradation of natural environment, erosion, impact on sense of character and aesthetic appeal of reserve, etc.).	Written record / Photographs.	Per event	Management Authority	Annual Report
	Compliance to relevant legislation (e.g., planning permissions, Environmental Authorisations) and the reserve's zonation plan.	Written record of non-compliance issues	Per event	Management Authority	Annual Report

8) PROTECTED AREA COSTING PLAN

8.1 Indicative costing plan

In line with the legal requirements of Protected Area management, the resource requirements and costs of implementing the management programmes were considered during the development of this management plan. It is worth noting that KRAG, as a non-profit volunteer organisation, aims to finance, resource and capacitate the management of the Kabeljous Nature Reserve by establishing a variety of sustainable long-term funding streams (e.g., donor funding, fund raising events, grant funding from private conservation trust funds, etc.); by harnessing volunteer energy from civil society (e.g., support from volunteers and various interest groups); and by forming strategic partnerships with a range of different stakeholders, including provincial conservation authorities (e.g., DEDEAT and ECPTA), government programmes (e.g., Working for Water, Working on Fire, etc.), the local private business and tourism sectors, and other NGO conservation partners in the region. Towards this aim, section 6.2 of the management plan outlines the management framework that has been developed for resourcing and capacitating the management of the Kabeljous Nature Reserve.

The costing plan shown in Table 8.1 below is indicative of the financial resources required by KRAG for the ongoing management and maintenance of the Kabeljous Nature Reserve, in accordance with the management programmes outlined in section 6 of the management plan. The reserve's indicative costing plan is based on a blanket cost of R300 per hectare per year for the Kabeljous section of the reserve (which requires more intensive management interventions) and R215 per hectare per year for the Papiessfontein section of the reserve (which requires less intensive management interventions). This amounts to an average blanket cost of R235 per hectare per year for the Kabeljous Nature Reserve in its entirety. These costing estimates correspond to those of similar organisations that are managing other state-owned reserves under somewhat similar circumstances. Furthermore, the reserve's indicative costing plan factors in a 5% annual increase in the management costs of the reserve. In considering the reserve's indicative costing plan, as shown in Table 8.1, the following considerations should be kept in mind:

- Due to the fact that the management of the reserve has been neglected for many years, a number of initial once-off costs would need to be incurred to acquire essential equipment (e.g., chainsaws, brush-cutters, herbicide applicators, etc.), to repair some of the reserve's crucial infrastructure to appropriate standards (e.g., boundary fences, firebreaks, signage, etc.), and to ultimately get the reserve to the state where the management input needs of the reserve are largely reduced to maintenance levels (e.g., alien clearing, trail maintenance, fire break maintenance, controlled burns, infrastructure developments, etc.). It is worth noting that some aspects of these initial costs (e.g., conducting controlled burns, the development of fire breaks, etc.) could, at least in part, be subsidized by government's natural resource management programmes (e.g., Working on Fire, Working for Water). Furthermore, other components of the initial costs may be significantly reduced by cooperating with

neighboring landowners (e.g., repairing shared boundary fences, joint-fire management, etc.).

- In addition to the financial resources required for the implementation of the reserve’s various management programmes, it is also worth noting that KRAG would need approximately 2000 man-hours of volunteer energy per year to generate the necessary capacity to sustain the ongoing management and maintenance activities of the reserve.

Table 8.1 Indicative costing plan for the operational management of the Kabeljous Nature Reserve (indicative for January 2020 to December 2024).

Indicative Costing Plan (2020 – 2024)					
Description	2020	2021	2022	2023	2024
Kabeljous section of the reserve – 153 ha @ R300 per ha / year.	R 45 900	R 48 195	R 50 605	R 53 135	R 55 792
Papiesfontein section of the reserve – 528 ha @ R215 per ha / year.	R 113 520	R 119 196	R 125 156	R 131 414	R 137 984
Total costs per annum.	R 159 420	R 167 391	R 175 761	R 184 549	R 193 776

In administering funds for the management of the Kabeljous Nature Reserve, the following guiding principles should be adhered to:

- Responsibly manage the allocation of budget, fund raising activities and expenditure;
- Ensure transparent and solid financial management to support the achievement of the objectives of this plan.

9) KABELJOUS NATURE RESERVE'S ANNUAL PLAN OF OPERATION

Each year an annual plan of operation will be prepared, based on the objectives, strategic outcomes, management activities and targets contained in the management plan.

9.1 Implementation of the management plan

The process for the implementation of the Kabeljous Nature Reserve management plan is displayed in Figure 9.1 below. Each year an annual management meeting is to be held for Kabeljous Nature Reserve. In terms of the implementation of the management plan, the purpose of the annual management meeting for the Kabeljous Nature Reserve will be to:

- Finalise the annual report, as part of the annual management plan review described in section 7 of the management plan.
- As part of the annual performance review, determine the need to modify or change any of the management plan's objectives, strategic outcomes, management activities or targets.
- Determine management activities for the coming year, set specific goals and determine how budgets will be spent in a manner that will achieve these goals.

The minutes and notes of the annual management meeting will be compiled in an annual plan of operation, which will include all of the information, set out above, and will determine what management activities will be focused on during the coming year, based on the management plan.

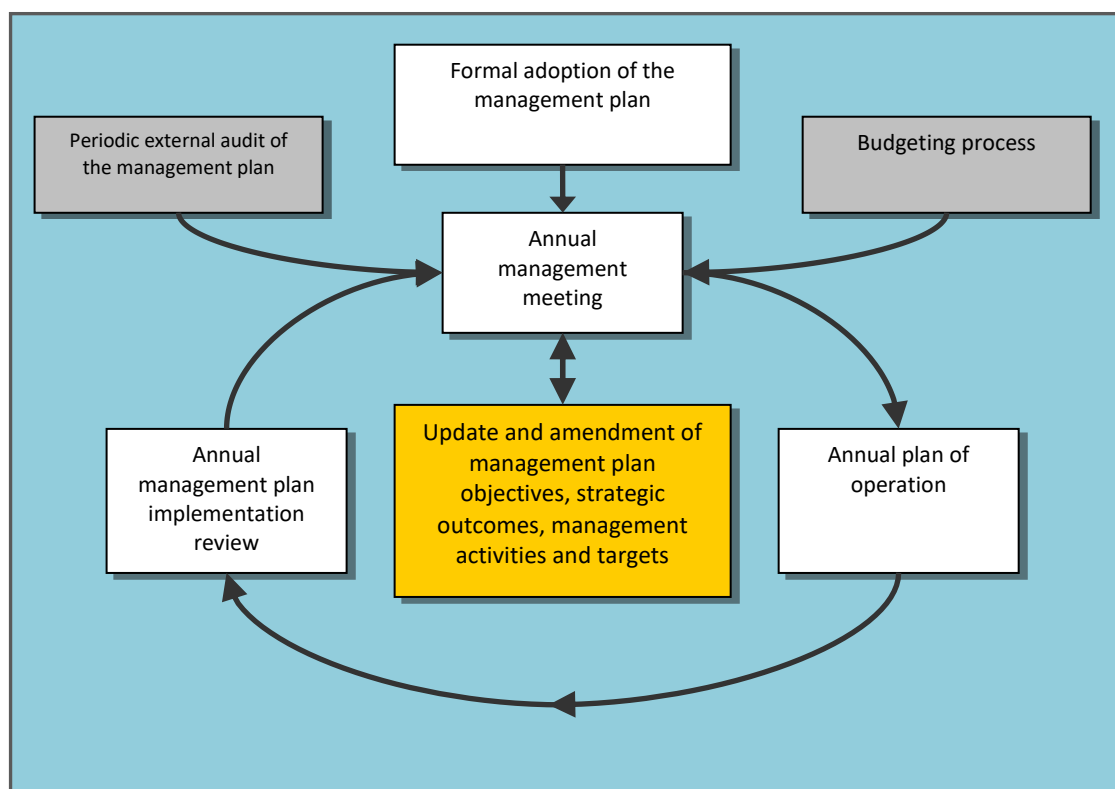


Figure 9.1 Process for the implementation of the Kabeljous Nature Reserve management plan.

9.2 Responsibilities in implementing the management plan

The tables in the operational management framework (refer to section 6 of the management plan) identify the responsibilities for the implementation of management activities. In many cases, the people responsible for implementing the activities will be in attendance at the annual management meeting and the requirements for the achievement of the management activities can be discussed and agreed to at the meeting. In some cases, however, it may be necessary to seek the support of the provincial conservation authorities (e.g., DEDEAT or ECPTA) or another partner to ensure that the management activities are implemented.

9.3 Kabeljous Nature Reserve resource requirements

In developing annual plans of operation for Kabeljous Nature Reserve, the resource requirements, associated with the management activities and targets set out in the operational management framework must be considered and budgeted for. Annual plans of operation must consider the staff, equipment and budgetary needs to undertake the management activities on the reserve, including aspects such as:

- General administration and management of the reserve.
- Community liaison, marketing and arranging of activities / events to create a greater public awareness of the Kabeljous Nature Reserve and raise support (in terms of both funding and volunteer support) for the ongoing management of the reserve.
- Liaison and collaboration with provincial conservation authorities.
- Ongoing management programmes, such as the control of alien invasive plant species, a fire management programme, the rehabilitation and restoration of disturbed and degraded areas on the reserve, maintaining safety and security on the reserve, enforcement of laws and internal rules, infrastructure management and development, preservation of the reserve's cultural heritage, etc.

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ANNEXURE A: INTERNAL RULES OF THE KABELJOUS NATURE RESERVE

The following internal rules have been established for the Kabeljous Nature Reserve. The internal rules may be amended from time-to-time by the Management Authority of the reserve, as needed.

Internal Rules – Non-Permissible Activities:

- No unauthorised vehicular access into the reserve.
- No camping is allowed in the reserve.
- No fires or open flames are allowed in the reserve.
- No quad bikes are allowed in the reserve.
- No motorcycles / motorbikes are allowed in the reserve.
- No dogs are allowed in the reserve.
- No hunting in any form is allowed in the reserve.
- No poaching, removing or harvesting of any indigenous fauna and flora species in the reserve.
- No intentional disturbance of any indigenous fauna and flora within the reserve.
- No livestock is allowed in the reserve.
- No littering or dumping of garbage or waste in the reserve.
- No pollution, in any form, is allowed on the reserve.
- No fireworks, flares, sparklers and crackers on the reserve.
- No unauthorized drones allowed in the reserve.

Internal Rules – Permissible Activities:

- Hiking, jogging and trail running.
- Picnicking.
- Fishing.
- Photography.
- Birding.
- Cycling and mountain biking, except on prohibited routes.
- Horse riding, except on prohibited routes.