Klein River Estuary: Estuarine Management Plan

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Date:

January 2023

I, Anton Bredell, Minister of Local Government, Environmental Affairs and Development Planning hereby approve the Klein River Estuary Estuarine Management Plan for implementation.

Anton Bredell

Digitally signed by Anton Bredell
Date: 2023.06.23 10:50:47 +02'00'

Disclaimer:

The Estuarine Functional Zone depicted in this estuarine management plan will be subject to change based on new data published from time to time.

DOCUMENT USE

Estuaries are recognised as particularly sensitive and dynamic ecosystems, and therefore require above-average care in the planning and control of activities related to their use and management. For this reason, the National Environmental Management: Integrated Coastal Management Act (No. 24 of 2008, as amended by Act 36 of 2014) (ICMA), via the prescriptions of the 2021 National Estuarine Management Protocol (NEMP), requires Estuarine Management Plans (EMPs)to be prepared for estuaries in order to create informed platforms for efficient and coordinated estuarine management. The NEMP, promulgated in May 2013 and amended in 2021, sets out the minimum requirements for individual EMPs.

In 2014, a review was conducted by the Department of Environmental Affairs: Oceans and Coasts (DEA, 2014a) on the existing management plans to ensure, *inter alia*, the alignment of these plans with the NEMP.

This revision of the Klein River Estuary EMP, including the Situation Assessment Report (SAR) and the management plan itself, is in response to the comments received during the review process only, to ensure compliance with the minimum requirements for EMPs as per the NEMP (2021). It does not reflect the situation as of 2019/2020. In summary, the revision entailed:

- Updating the terminology as per the NEMP (2021);
- Including the results of the Ecological Water Requirement study;
- Providing information relating to opportunities and constraints;
- Refinement of the ecosystem goods and services;
- Providing additional information on the threats to the estuary;
- Updating the legislative review with regards to the requirements of the ICMA and the NEMP (2021);
- Including a summary of the SAR in the EMP;
- Providing a map of the geographical boundaries of the Estuarine Functional Zone;
- Refinement of the Management Objectives and Activities;
- Refinement of the intended spatial zonation of the estuary;
- Including a resource monitoring plan as well as a performance monitoring plan towards achieving the EMP objectives; and
- Updating the description of institutional capacity and arrangements to manage elements of EMP provided as per the NEMP.

The work of the original authors and input received from stakeholders remains largely unchanged. Historical information and data remain relevant and critically important for estuarine management in the long term and must be supplemented by new information when it becomes available. This revision does not represent, or replace, the full 5-year review process required to re-evaluate the applicability of the plan and to provide new information. This full review process is therefore still urgently required and should be part of a future revision.

Nonetheless, this EMP, and supporting SAR, must not be considered a once-off compilation but rather as a "living document" that should be regularly updated and amended as deemed necessary.

In preparation for the final EMP approval process, the draft EMP was published for public comment from 28 January to 04 March 2022 (see appendix C : stakeholder consultation report). This was followed by a formal "Comment and Response" process which reviewed and addressed all comments submitted. Minor edits were made to the EMP where appropriate. This document is the final Klein River Estuary Estuarine Management Plan.

EXECUTIVE SUMMARY

Introduction

This document is a Management Plan for the Klein River estuarine system. It was initially developed under the auspices of the Cape Action Plan for the Environment (C.A.P.E.) Estuaries Programme, and was revised in 2018/19 to fulfil requirements of the National Environmental Management: Integrated Coastal Management Act (Act 24 of 2008, as amended) (ICMA) and the National Estuary Management Protocol (NEMP), published under the Act.

The EMP is an integrated management plan that aims to co-ordinate the efforts and resources of a number of government departments, across sectors and tiers, to address key issues in a way that is consistent with the national estuarine management objectives, but also taking into account the views of the local stakeholder group.

Situation Assessment

A summary of the situation assessment is included and details fundamental concepts for estuarine management, the policy and planning environment, characteristics of the catchment, the biophysical environment, ecosystem goods and services provided by the estuary, the socio-economic context as at 2011, and an overall integrated assessment which identifies key issues that need to be addressed and also includes an assessment of the opportunities and constraints for consideration in the EMP.

Vision and Objectives

The vision statement for the Klein River estuary, as adopted by the Klein River Estuary Forum (KREF), is as follows,

> "***The Klein River, its estuary, banks and associated wetlands shall be a successful environment where all of nature may prosper and where there is sustainable use of it by people***".

The vision for the Klein River estuary can be achieved through four key objectives described as outcomes statements, representing different 'issue packages' that need to be addressed.

1.	**Institutional Arrangements:**	Participants are engaged in an organisational structure for implementation of the Klein Estuary EMP. They have the necessary institutional capacity for effective delivery.
2.	**Water Quantity and Quality:**	The ecological health and functioning of the Klein River estuary is improved and the water is safe for human contact.

3.	**User Value:**	There is greater appreciation of the social and economic value of the Klein River estuary by users and managers of estuarine resources and amenities
4.	**Land Use Management:**	The Overstrand Municipality and land owners in the study area have introduced measures in their land use management practices to safeguard the health of the estuarine ecosystem.

Management Objectives and Priorities

The Plan's more detailed 13 Management Objectives are grouped into one of four key objectives and are accompanied by a specific action plan containing applicable management actions, supporting regulations, responsible institution(s), and required resources, if such information is available. These objectives are summarised as follows:

1. Institutional Arrangements		
1.1	**Institutional Roles and Responsibilities**	***Who does what***
	Institutional roles and responsibilities for planning, management and enforcement are agreed	
1.2	**Sustainable Organisational Structure**	***Someone to hold it all together***
	An effective and sustainable organizational structure is facilitating and coordinating implementation of the EMP	
1.3	**Estuarine Management Capacity Building**	***Knowing what's important***
	Institutions and individual role players have the necessary capacity and resources to engage in estuary management	
1.4	**Enforcement Capacity Building**	***Understanding and respecting the law***
	There is improved compliance from citizens and officials through improved capacity for enforcement of the legislation relating to resource use in and around the estuary	
2. Water Quantity & Quality		
2.1	**Resource Directed Measures**	***Setting the limits***
	District and Local Municipalities and the Breede-Gouritz Catchment Management Agency co-operate to implement Resource Directed Measures	
2.2	**Clean-up Campaign**	***Rehabilitation***
	Water quality is improved, and flow is maintained or improved, through prioritized riparian restoration initiatives and an intensive local municipality-driven campaign to 'clean up' polluting activities installations	
2.3	**Mouth Management Plan**	
	Mouth management is carried out in accordance with an approved plan (MMP) that has been adopted by the Responsible Management Authority	
3. User Value		
3.1	**Sustainable Recreational Infrastructure**	***Amenity***
	The social value of the estuary has been enhanced by the improvement of facilities for recreational users	
3.2	**Research contributing to Sustainable Resource Use**	***Economy***
	Research is undertaken in order to ensure sustainable utilization of estuary resources	
3.3	**Safety and Security**	***Confidence***
	Measures have been introduced to improve the safety and security of people and infrastructure at agreed public recreation areas, launch sites and on the water body	

4. Land Use Management		
4.1	**Spatial Zonation**	***Managing change***
	The spatial implications of the EMP have been integrated into the Overstrand Municipality's Spatial Development Framework	
4.2	**Coastal Protection Environmental Management Overlay Zone**	***Making it enforceable***
	A Coastal Protection EMOZ incorporating the Coastal Management Line relating to the Klein River estuary has been adopted and implemented by the Overstrand Municipality as provided for in the ICMA.	
4.3	**Biodiversity Management Plans**	***Promoting stewardship***
	Public and privately owned land, and portions of the estuary water body, are made available for management which prioritizes biodiversity conservation	
4.3	**Estuarine Habitat Rehabilitation**	***Restoring habitat***
	Estuarine habitat that has been degraded is rehabilitated and continues to perform critical ecosystem functions and contribute to the biodiversity value of the estuary	

Priority actions are identified and must be taken during the first year of the 5-year period of the ongoing cyclical planning, implementation, monitoring and review process.

The target groups of this First Generation EMP document are the government departments responsible for carrying out the actions described in the EMP. Much of the focus therefore is on establishing the organisational arrangements and institutional capacity to support its own implementation and continue, beyond the first 5-year period, as a sustainable vehicle for estuarine management.

Spatial Zonation

Three distinct zones are identified in the Klein River estuary, which are based on previous zonation of the system (CapeNature Ordinance) to regulate recreational use:

Sanctuary Zones: Two no-take sanctuary areas in the lagoon are proposed, to support the important nursery function of this estuary. These areas, which contain the greatest diversity of habitats, are located towards the mouth (west) and at the head of the lagoon (east). Only low impact recreational activities are permitted in these zones.

Restricted Zone: The Restricted Zone is in the vicinity of the Western Sanctuary Zone north of the main channel and closest to the town of Hermanus. This area provides for livelihood strategies dependent on bait collection and fishing.

Recreational Zone: Between the Western and Eastern Sanctuary Zones lies the Recreational Zone, characterised by the great expanse of open water, to support the existing established use of this estuary for water sport, angling, and other water-based recreational activities that provide amenity for residents and tourists. This area is also the intended focus area for nodal development and use of water-related shoreside facilities, and also allows for sustainable use of estuary resources for livelihood strategies and job creation purposes.

More recently, a Recreational Zones and Activities Map for the Klein River estuary was developed in 2015 through an intensive stakeholder process. The map provides a limited description of the regulations for the demarcated sections of the estuary, which correspond to the existing land beacons. Further regulations are provided for the upper reaches of the

estuary, namely section 16 F. The final draft was developed in 2015, which now needs to be formally approved.

However, the newly developed recreational activities map does not incorporate or illustrate the previously recommended zones (e.g. sanctuary and restricted zones) of the initial spatial zonation plan of the First Generation EMP, nor does it indicate the recently established coastal boundaries. It is not certain therefore, to what extent the sanctuary areas and associated regulations are enforced (CapeNature Ordinance). It is imperative that the Klein River estuary zonation plan be revised by the Responsible Management Authority (RMA)to create a consolidated map and regulations, and enter into further public engagement, if deliberations or amendments are required.

Institutional Arrangements

The NEMP identifies CapeNature as the RMA, responsible for the development of the Klein River Estuary EMP, as well as being responsible for the co-ordination of its implementation, because the estuary is identified as part of the Western Cape Protected Area Expansion Strategy. In addition, the Walker Bay State Forest / Nature Reserve, located on the eastern shores, is administered by CapeNature which plays a significant role in management of the estuary portion within the protected area. Nonetheless, the Overstrand Local Municipality (OSM), may play a co-management role in assisting with estuarine management functions. This arrangement will need to be formalised through a signed co-management agreement between these two entities.

Co-management and effective governance have been identified as vital aspects to the efficient and effective management of the Klein River estuarine system. **CapeNature has developed an Estuary Governance Tool to address this**. The role players in the management of the Klein River estuary include the OSM; specific departments from all levels of government, specifically, DEA&DP, DFFE:O&C, DWS, DFFE, Overberg DM and DRDLR; various organs of state, such as BGCMA; and the Klein River Estuary Forum (KREF).

According to the NEMP, the existing estuary forum, the KREF, will continue to serve as an advisory body to the RMA on issues specific to the management and implementation of the action plans in the EMP, as well as being the hub that links all stakeholders, thereby fostering stakeholder engagement. It is imperative that the KREF comprises government representatives of the major management sectors/areas with executive powers in terms of respective legislation, supported by other important institutions (e.g. Catchment Management Agencies, CapeNature, community groups e.g. Rate Payers' Associations) and other interest groups.

Monitoring and Evaluation

An integrated monitoring plan is fundamental to an EMP to continuously assess progress in terms of meeting the objectives and ultimately, achievement of the vision. The EMP provides recommendations for resource monitoring, i.e. monitoring of specific ecological indicators to assess the health of the estuary in line with Resource Directed Measures, and performance monitoring, i.e. gauging progress of the EMP. Elements of compliance monitoring, i.e. monitoring of the intensity and type of uses/activities, are integrated within the various action plans.

Recommendations

Recommendations are made to assist/ improve management of the Klein River estuary. These are detailed below.

- The newly developed recreational activities map for the Klein River estuary, do not incorporate all the recommended and/or indicated zones (e.g. sanctuary and restricted zones) of the initial spatial zonation plan, nor does it indicate the recently established coastal boundaries (in prep). It is imperative that the Klein River estuary zonation plan be revised by the RMA to create a consolidated map, and to enter into additional public engagement if amendments are required.
- Refinement of the spatial zonation is required to include the following aspects:
    - areas of trampling and compaction of the salt marsh, point source inputs for water quality monitoring, and areas identified for rehabilitation;
    - possible demarcation of a recreational area at the mouth; and potentially,
    - peak user days regulations.
- A stringent compliance strategy must be devised in collaboration with South African Maritime Safety Authority (SAMSA) and OSM to enforce compliance with recommended and promulgated recreational boating regulations.
- An estuarine habitats rehabilitation and management programme should be compiled for the subsequent revision of the EMP.

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ACRONYMS & ABBREVIATIONS

BGCMA	Breede-Gouritz Catchment Management Agency
C.A.P.E.	Cape Action for People and the Environment
C.A.P.E. EP	C.A.P.E. Estuaries Programme
CARA	Conservation of Agricultural Resources Act (Act No. 43 of 1983)
CFR	Cape Floristic Region
CMA	Catchment Management Agency
CML	Coastal Management Line
CMP	Coastal Management Programme
CPZ	Coastal Protection Zone
CSIR	Council for Scientific and Industrial Research
DFFE	Department Forestry, Fisheries and Environment
DEA&DP	Western Cape Department of Environmental Affairs and Development Planning
DEA&DP(DP)	Dept of Environmental Affairs and Development Planning (Development Planning section)
DEA&DP(IEM)	Dept of Environmental Affairs and Development Planning (Integrated Environmental Management section)
DEA/ DEAT	Department of Environmental Affairs (formerly Department of Environmental Affairs & Tourism, DEAT)
DEA:O&C	Department of Environmental Affairs: Oceans & Coasts Branch (formerly Marine & Coastal Management, MCM)
DM	District Municipality
DALRRD	Department of Agriculture, Land Reform and Rural Development
DWS / DWAF	Department of Water & Sanitation (formerly Department of Water Affairs and Forestry, DWAF)
KREF	Estuary Advisory Forum
EcoSpecs	Ecological Specifications
EFZ	Estuarine Functional Zone
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
EM	Environmental Management
EMC	Estuarine Management Co-ordinator
EMOZ	Environmental Management Overlay Zone
EMP	Estuarine Management Plan
EWR	Ecological Water Requirements (Resource Directed Measures)
GESAMP	Group of Experts on the Scientific Aspects of Marine Environmental Protection
GIS	Geographic Information Systems
HWM	High Water Mark
IAPs	Invasive Alien Plants
I&APs	Interested and Affected Parties
ICM	Integrated Coastal Management
ICMA	Integrated Coastal Management Act (Act No. 24 of 2008)
IDP	Integrated Development Plan
i.t.o.	In terms of
KREF	Klein River Estuary Forum
LM	Local Municipality
LUMS	Land Use Management System
LUPA	Western Cape Land Use Planning Act (Act No. 3 of 2014)
LUPO	Land Use and Planning Ordinance (1985)
M & E	Monitoring and Evaluation
MMP	Maintenance Management Plan
MEC	Member of the Executive Council
MLR	Marine Living Resources
MLRA	Marine Living Resources Act (Act No.18 of 1998)

MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MPA	Marine Protected Area(s)
MPRDA	Mineral and Petroleum Resources Development Act (Act No. 28 of 2002)
MSA	Municipal Systems Act (Act No. 32 of 2000)
NBA	National Biodiversity Assessment
NEMA	National Environmental Management Act (Act No. 107 of1998)
NEM: BA	National Environmental Management: Biodiversity Act (Act No. 10 of 2004)
NEM: PAA	National Environmental Management: Protected Areas Act (Act No. 57 of 2003)
NEMP	National Estuarine Management Protocol (2013)
NFA	National Forests Act (Act No. 84 of 1998)
NMMU	Nelson Mandela Metropolitan University
NWA	National Water Act (Act No.36 of 1998)
ODM	Overberg District Municipality
ORV	Off Road Vehicles
OSM	Overstrand Local Municipality
PCC	Provincial Coastal Committee
PCM	Project & Construction Management
PES	Present Ecological State
RDA	Rural Development Area
RDF	Rural Development Framework
RDM	Resource Directed Measures
REC	Recommended Ecological Category
Regs.	Regulations
RMA	Responsible Management Authority
RQOs	Resource Quality Objectives
SAEON	South African Environmental Observation Network
SAMSA	South African Maritime Safety Authority
SANBI	South African National Biodiversity Institute
SAR	Situation Assessment Report
SDF	Spatial Development Framework
SPC	Spatial Planning Category
SPLUMA	Spatial Planning and Land Use Management Act (Act 16 of 2013)
TLM	Theewaterskloof Local Municipality
ToR	Terms of Reference
TPCs	Thresholds of Potential Concern
WCG	Western Cape Government
WfW	DEA: Working for Water programme
WMA	Water Management Area
WUA	Water Use Association

1 INTRODUCTION

1.1 Preamble

This document describes the plan for managing the Klein River estuary over a five-year period. This plan, also known as the First-Generation Estuarine Management Plan (EMP) for the Klein River estuary, was initially produced in 2009 under the auspices of the Cape Action Plan for the Environment Estuaries Programme (C.A.P.E. EP), which aimed to ensure the conservation and sustainable utilisation of the estuarine biodiversity in the Cape Floristic Region (CFR). A process of monitoring, evaluation and review, and planning for the next cycle is built into this plan. The five-year cyclical approach is consistent with the approach adopted in South Africa for municipal-level integrated development planning and the National Estuarine Management Protocol (NEMP), and is further supported by international approaches to integrated coastal management (Figure 1).

"...progress towards sustainable forms of coastal development will be achieved by Integrated Coastal Management (ICM) programmes that cycle repeatedly through the stages of the management process. Each cycle may be considered a generation of an ICM programme" (GESAMP, 1996: 4)

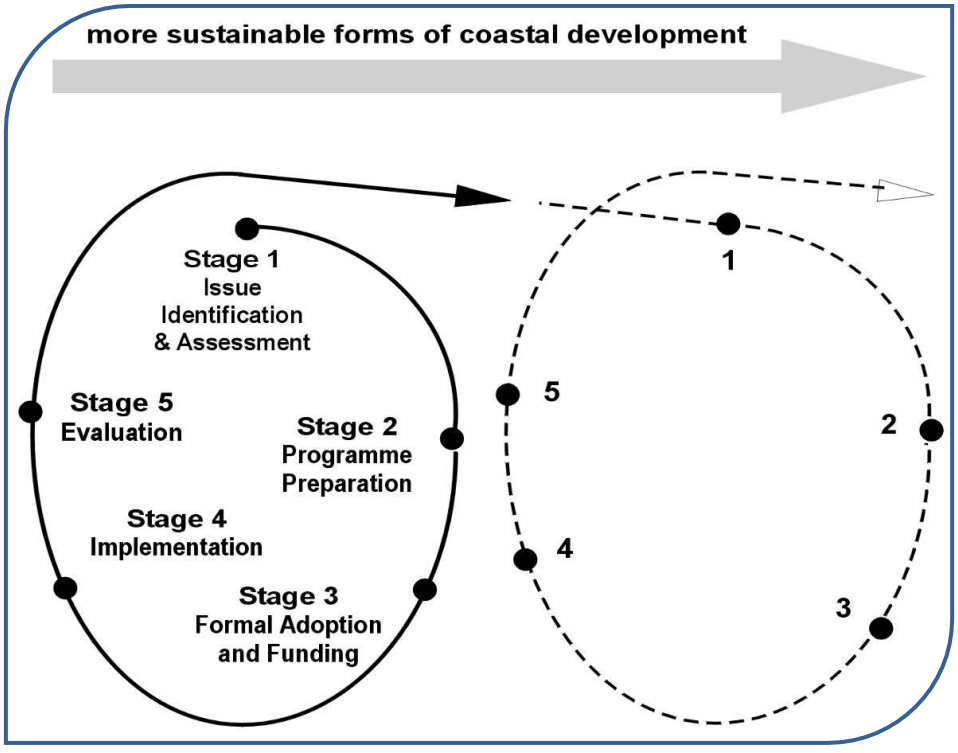

Figure 1: The stages of the Integrated Coastal Management Cycle (after GESAMP, 1996: 10)

The Situation Assessment for the Klein Estuary EMP was initially conducted during November and December 2007, producing a report (iRAP, 2009), which has subsequently been revised (March 2011) to take account of comments of the C.A.P.E. Estuaries Task Team as raised at the Review Workshop in July 2009 and again as part of the DEA EMP review process in 2014

and EMFIS. The Situation Assessment Report (SAR), is an important information resource that underpins this EMP.

The EMP was initially prepared at a time when the promulgation of South Africa's Integrated Coastal Management Act (Act No. 24 of 2008) (ICMA) was imminent. The ICMA called for the establishment of the NEMP. The development of the Klein Estuary EMP was one of six pilot projects in the CFR that contributed to the formulation of the NEMP.

With the promulgation of the ICMA in 2008 (amended in 2014) and the NEMP in 2013 (amended in 2021), the EMP for the Klein River system, and its accompanying SAR have subsequently been revised (this document) in order to meet the minimum requirements of the NEMP as per the 2013/2014 DEA EMP Review (DEA, 2014a). This EMP must be read in conjunction with the SAR.

1.2 Summary of Legal Framework

Chapter 4 of the National Environmental Management: Integrated Coastal Management Act (No. 24 of 2008, as amended by Act 36 of 2014), aims to facilitate the efficient and coordinated management of all estuaries, in accordance with:

a) The NEMP (Section 33) approved by the Ministers responsible for the environment and water affairs; and
b) EMPs for individual estuaries (Section 34).

The NEMP, promulgated in 2013 and amended in 2021, provides a national policy for estuarine management and guides the development of individual EMPs. It must be ensured that the EMPs are aligned with the NEMP and the National Coastal Management Programme (CMP) (DEA, 2014b). The NEMP lays out the following:

a) The strategic vision and objectives for achieving effective integrated management of estuaries in South Africa;
b) The standards for the management of estuaries;
c) The procedures regarding how estuaries must be managed and how the management responsibilities are to be exercised by different organs of state and other parties;
d) The minimum requirements for EMPs;
e) Who must prepare EMPs and the process to be followed in doing so; and
f) The process for reviewing EMPs to ensure that they comply with the requirements of the ICMA.

One of the pillars of successful integrated coastal (including estuarine) management is the establishment of effective institutional arrangements to underpin both cooperative government and cooperative governance. Cooperative governance is a system that allows government and civil society to communicate and contribute to shared responsibility in respect of coastal management objectives and must be well-organized and widely representative of all coastal stakeholders. The ICMA details the institutional arrangements that will contribute to cooperative coastal management in South Africa. These

arrangements are made at national, provincial and municipal government levels, and the embodiment of cooperative coastal governance is vested in what will be known as coastal committees. The ICMA provides for the permissive, i.e. if so required, establishment of municipal coastal committees, but at a national and provincial level however, the Minister and Members of the Executive Council (MECs) of coastal provinces are directed to establish national and provincial coastal committees, respectively. Provincial coastal committees must be established within one year of the commencement of the ICMA.

The National Coastal Committee (the MINTEC Working Group 7) is established by the Minister, and its powers determined by notice in the Government Gazette. It is supported administratively by the National Department of Environmental Affairs. The Premier of each coastal province must identify a lead agency (organ of state) that is responsible for the coordination, monitoring and implementation of the provincial coastal management programme, monitoring the state of the environment in the coastal zone, and identifying relevant trends and priority issues. The lead agency for coastal management is directly responsible to the MEC. Each metropolitan, district or local municipality which has jurisdiction over the coastal zone may establish a municipal coastal committee. The establishment of Municipal Coastal Committees is discretionary.

The lowest tier of institutional arrangements for estuarine management comprises the Responsible Management Authority (RMA) and the estuary advisory forums. The role of the estuary advisory forum is to act as the hub which links all stakeholders, including both organs of state and civil society, to facilitate cooperative management and effective governance in terms of the EMPs, as well as facilitate and monitor implementation of an EMP. The role of RMA is for developing and co-ordinating implementation of EMPs.

1.3 Mandate and Responsibilities of the Responsible Management Authority

The NEMP identifies CapeNature as the RMA, responsible for the development of the Klein River Estuary EMP, as well as being responsible for the co-ordination of its implementation, because the estuary is identified as part of the Western Cape Protected Area Expansion Strategy. In addition, the Walker Bay State Forest / Nature Reserve, located on the eastern shores, is administered by CapeNature which plays a significant role in management of the estuary portion within the protected area. Nonetheless, the Overstrand Local Municipality (OSM) within which the estuary is located (Figure 2), may play a co-management role in assisting with estuarine management functions. This arrangement will need to be formalised through a signed co-management agreement between these two entities.

The RMA is responsible for overall co-ordination of the actions of other implementing agencies, and not necessarily the implementation actions themselves. Section 7.3 of the NEMP indicates that:

"…management actions…shall be translated into project plans by the responsible government department that is responsible for certain aspects of estuary management (as per legislative mandates)…"

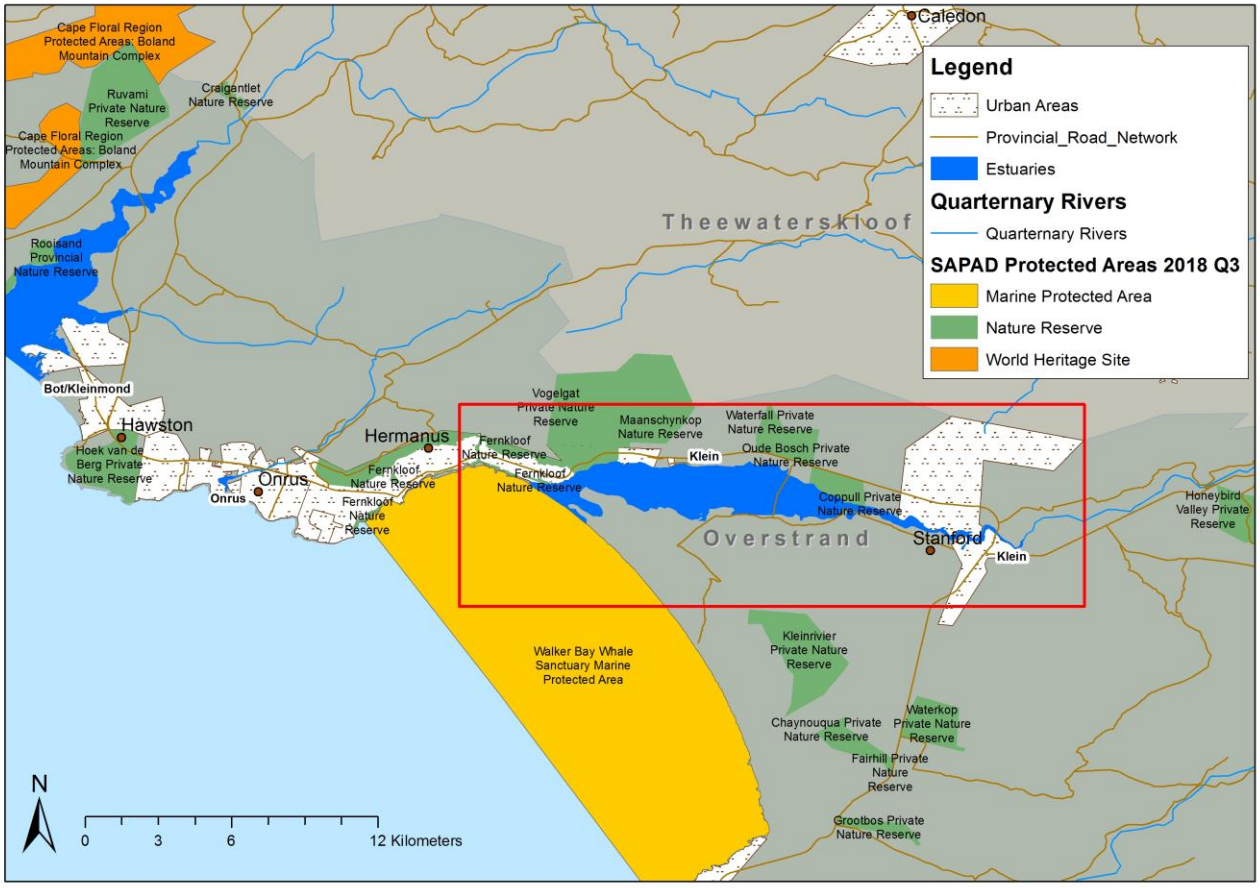

Figure 2: Location of the Klein River estuarine system within Overstrand Local Municipality

Specifically, the RMA responsibilities are described by the Protocol as:

Section 5: *"…authorities are **responsible for the development of EMPs** and **coordination of the implementation process**…"*

Section 5(e): *"The identified responsible management authority to development the EMP needs to **budget accordingly for the development of these plans**."*

Section 8(1): *"The responsible management authority developing an EMP must **actively engage all the relevant stakeholders** including government departments, non-government organisations and civil society in the development and implementation of the EMP."*

Section 9.1(1) and 9.2: *"…it **must obtain formal approval** for the EMP…" and "Once approved…the EMP shall be… **Integrated**.." and "**incorporated** into into that protected area's management plan as contemplated in section 39 of NEMPAA."*

The responsible body contemplated in Section 33(3)(e) of the ICMA who develops an EMP must:

a) follow a public participation process in accordance with Part 5 of Chapter 6 of the ICMA; and
b) ensure that the EMP and the process by which it is developed are consistent with:

   (i) the NEMP; and

   (ii) the National CMP and with the applicable provincial CMP and CMP referred to in Parts 1, 2 and 3 of Chapter 6 of the ICMA;

c) If applicable, ensure that relevant legislation is enacted to implement the EMP; and
d) Submit an annual report to the Minister on the implementation of the EMP, the legislation and any other matter.

Coordination of the implementation actions by the RMA (CapeNature/OSM) and its strategic partners (e.g. Overberg District Municipality (ODM), Western Cape Provincial Government, Department of Water and Sanitation (DWS), Department of Environment, Forestry and Fisheries (DFFE) Department of Agriculture, Land Reform and Rural Development (DALRRD), will be supported by the existing forum, the Klein River Estuary Forum (KREF), representing all key stakeholder groups on the estuary.

1.4 Estuarine Management Plan Structure

The structure of this EMP is detailed as follows:

- **Section 2** provides a **summary of the SAR** – thereby providing context to the Vision and Objectives.
- **Section 3** sets out the **Vision and Key Objectives** for the EMP. They collectively describe the desired future state at the end of the five-year period and provide the overarching logical framework for the action plans;
- **Section 4** provides a description of the **Management Objectives**;
- **Section 5** provides the recommended **Management Priorities**, i.e. the required actions and activities to be undertaken in terms of implementing the EMP, captured as individual **action plans**.
- **Section 6** presents the proposed **Spatial Zonation** of the estuary. A detailed spatial zonation plan, in the context of a broader spatial development framework, is provided in Appendix 3.
- **Section 7** provides a guideline for implementation of the EMP and includes a description of the **key role players** and participating institutions and **institutional arrangements**.
- **Section 8** sets out the types of **Monitoring and Evaluation** required in respect to the biophysical components of the estuary as well as assessing the performance of the EMP in respect to achieving the stipulated objectives, through a process of reviewing and evaluation. The monitoring plans are provided in Appendix 1 and 2.

- **Sections 09** provides the **Recommendations** for addressing specific shortfalls or knowledge gaps in the EMP, and the **Conclusion** to the document.

2 SUMMARY OF SITUATION ASSESSMENT

2.1 Introduction

The Klein River estuary is located in the Overberg District and Overstrand Local Municipal area just south of the coastal town of Hermanus. The development of an Estuarine Management Plan (EMP) for the Klein River estuary is one of six pilots originally commissioned by the C.A.P.E. Estuaries Programme through the Western Cape Nature Conservation Board in 2007. Fundamental concepts and principles underpinning this plan include: Sustainable development; Integrated development planning; Systematic conservation planning; Co-operative governance and co-management; and Monitoring and adaptive management. The limited data available at present results in the inability to provide a spatial definition for the estuary that matches the legal definitions.

2.2 Policy and Planning Environment

This section elaborates on the policy and planning environment relevant to the Klein River estuary and includes a review of the most important informants for, and tools that can be employed in estuarine management as provided by policy, legislation and planning frameworks and strategies, and identifies the related planning instruments applicable to the particular area. The following areas are further discussed: Integrated Environmental Management, Integrated coastal management, Catchment management, Biodiversity Conservation, Estuary classification and prioritisation, Land care and municipality-wide spatial planning and land use management.

2.3 Catchment Characteristics

The assessment identifies issues emanating in the catchment that have implications for the Klein River EMP and is supplemented by information from the 2015 Reserve Determination Study for the Klein River estuary. It was conducted using desktop research and field trips and the analysis of associated data as well as that generated by GIS and showed that most of the coastal towns within this water management area were experiencing potable water shortages and were looking for augmentation of supplies.

There are three quaternary catchments that constitute the catchment area of the Klein River, namely G40J, G40K and G40L, draining a total area of 98,281 ha. To the north the catchment is bounded by the Swartberg Mountains near Caledon. The area between the Swartberg in the north and the centrally situated Klein River range is known as the Rûens and consists mostly of rolling hills landscape which is largely cultivated with wheat, barley and canola. The Klein has its source on the northern slopes of the Kleinrivier Mountain range, only 5 km from the mouth, although the entire river length is approximately 80 km. The two primary tributaries of the Klein River are the Hartebees and Steenbok rivers. The natural MAR flowing into the estuary is estimated at 53.41 $x10^6m^3$, and the present day MAR was estimated at 40.88 $x10^6m^3$, or 77% of the natural MAR. The Klein River has been identified as a possible source for the transfer of water to the water-stressed Onrus River catchment.

In terms of catchment water quality, the Table Mountain Group soils produce highly acid water (a minimum pH of 3,5 has been measured), while highly saline water leaches into the river from the Bokkeveld shales. Sediment yield is low, being of the order of 100-150 t per km^2 per year. Almost the whole river, including its tributaries, is heavily infested with alien wattle species such as *Acasia saligna*, *A. longifolia* and *A. mearnsii*.

In respect to land use and development in the catchment and estuary surrounds, density of development around the estuary is generally low, with the exception of the nodal urban areas of Hermanus and Stanford and some resorts, and is generally visually unobstrusive. The land is predominantly zoned Agriculture, with 17% of the sub-catchment G40L included in designated protected areas. There are two intensive feed farming agricultural sites located on the east bank at near Stanford, which have the potential to cause negative environmental impacts, particularly in respect to water quality.

2.4 Catchment-wide Terrestrial Conservation Assessment

This section looks at the catchment of the Kleinriviersvlei and the direct terrestrial linkages to protected areas and natural habitats and then to understand the terrestrial systems in the catchment of the Klein River. The land capability and extent of cultivation within each catchment was assessed and results showed that there are potentially marginal lands being used for cultivation. From an assessment of historic vegetation distribution and ecosystem threat status, it was determined that 49.6% (48,699.82 ha) of the Klein River Catchment was considered to represent habitats that are endangered or critically endangered, with Greyton Shale Fynbos now considered Endangered, and Elim Ferricrete Fynbos considered Critically Endangered vegetation types. Approximately 44% of the total catchment area, is transformed, with sub-catchment G40L bearing a significant area of critically endangered types. However, only 7.3% of the Klein River catchment is under protection. Estuarine management recommendations indicated that that half of the Klein River estuary margin should remain undeveloped. Within a 1 km wide buffer around the estuary, 51.60% is natural; 17.93% is near natural; 9.37% is uncertain – probably natural; 1.21% is uncertain – probably transformed and 19.88% is transformed. Limitations and gaps in data and areas needing priority attention were identified.

2.5 Biodiversity Assessment

The purpose of this desktop assessment is to mobilise stakeholders around targets for conservation of estuarine, freshwater and terrestrial biodiversity processes. The targets for the Klein River estuary are that 33% of the estuary water body is under protection, and 50% of the terrestrial margin remains untransformed/undeveloped. Existing spatial biodiversity data was used to derive an overall terrestrial biodiversity value-sensitivity and hydrological sensitivity. Two classes were identified for the former, namely "low" and "moderate to high". A biodiversity map was produced illustrating these sensitivities together key biodiversity features. The biodiversity assessment can be used to inform the development of a SDF specific to the Klein estuarine catchment, through the Overstrand Environmental Management Overlay Zone(s).

2.6 Land Use and Recreational Activity Assessment

This section recounts the main issues relating to land use in the immediate environment and the recreational use of the estuarine water body, as well as the infrastructure available to support both. Primarily desktop-research was used with the help of issues raised by I&APs to evaluate the opportunities and constraints that face the estuary and surrounding areas. The estuary is a relatively untransformed natural attraction that could support low impact non-consumptive recreational and tourism activities and that would benefit local residents as well as the local eco- tourism industry. Protection of the area would contribute to provincial and national biodiversity conservation targets. The constraints arising include the quality of the water and the possibility of the social and / or ecological carrying capacities being exceeded. A major constraint is the large amount of adjacent land in private ownership. This results in limited public access, high property rates, private boat houses, alien vegetation and potential seepage and run- off having implications for estuarine management and other implications resulting from private ownership. Issues arising are also due to the two-feed farming agricultural sites which have a negative impact on the environment.

The various recreational use zones in existence on the Klein River estuary, in accordance with a local by-law (PG 6147, 9 July 2004), are illustrated. Basic service infrastructure is discussed relating to the urban areas of Hermanus and Stanford on the north and south sides of the river. Though some information remains unknown and further information is required, the overall result is that there is a lack of basic service infrastructure which includes roads, storm water solutions, water supply, sewage and solid waste disposal. In terms of access, there is some debate over riparian rights as a number of properties on the river either extend across or to the midline of the Klein River in the Stanford area. Though, in general, all users of the river, that being residents and visitors must have the appropriate paperwork to access the river or estuary on a boat. All boat launching sites within the coastal zone including estuaries are required to be licenced and along rivers, all jetties and slipways must have permits with CapeNature. Plans for future development in close proximity to the estuary, include growth in the Hermanus area is to be directed to the west and into densification; limited growth is provided for at Stanford and, in both instances, an urban edge has been introduced to define the limit of the area that is allocated for urban development; new nodes and settlement areas are to be prevented and Rural Development Areas (RDAs), one of which is planned for the estuarine area, are to act as an intermediate zone between urban and agricultural uses

2.7 Biophysical Environment

The nature and functioning of estuaries is the result of the complex interaction of a range of physical, chemical and biological processes which are described with reference to the Klein River estuary, using supplementary information from the Ecological Reserve Determination study. The recommended ecological condition (REC) for the Klein Estuary is a C. The Klein River estuary, as delineated by the 5 m topographical contour, is 17 km long with a floodplain area of 1 777.6 ha and open water area 1 153ha. The biophysical environment is further discussed in terms of abiotic attributes (that being hydrodynamics,

water quality, and sediments and bathymetry), and biotic attributes (microalgae, macrophytes, invertebrates, fish and birds).

Abiotic attributes

According to recent assessments, the Klein River estuary is a temporary open /closed estuary, within the warm temperate biogeographic coastal region of South Africa. Considerable development exists below the 1:50 year flood line along the banks of the estuary, some of which is threatened by high water levels (back flooding) when the mouth is closed. Artificial breaching of the system dates back to at least the 1860s. A detailed account of estuary water levels and the artificial breaching activities and former policy is provided. A new and updated Mouth Management Plan is attached in Appendix 1. By and large, the Klein River estuary exhibits four main abiotic states, ranging from "open, marine" to "closed, brackish" based on the degree of marine connectivity (dependent on the open or closed state of the mouth) and prevailing salinity regime throughout the system.

The water quality of the system in terms of salinity, temperature, pH turbidity, dissolved oxygen concentrations and inorganic nutrients is detailed. The Klein River estuary ranges from strongly marine dominated, with salinity between 30 and 38 to brackish. There is very little stratification (except in the upper reaches) attributed to very effective wind mixing under both mouth conditions. Temperatures in the Klein River estuary exhibit a strong seasonal signal with highest temperatures in summer (23-28°C) and lowest during winter (12-17°C). pH levels typically range between 7.7 and 8.5, with lower pH levels mostly associated with the fresher, upper reaches of the estuary draining humic-rich areas. Inflow to the Klein River estuary has the characteristic "brown" colour associated with catchment draining such areas. While this affects visibility (especially in the fresher areas), turbidity levels (typically associated with suspended particles in the water column) are generally very low (<10 NTU), possibly slightly elevated during higher flows (~NTU 20). The estuary is well-oxygenated (>6 mg/ℓ) in the open, tidal state (high flow). However, during closed periods when the system is brackish (i.e. long residence times with significant amounts of enriched freshwater still entering the estuary), dissolved oxygen concentrations can to drop to 4 mg/ℓ, and periodically below 2 mg/ℓ, especially in the upper estuary and in the deeper bottom waters of the lower estuary.

Inorganics nutrients levels in the Klein River estuary are elevated. This is due to extensive agricultural activities in the catchment which have increased inorganic nutrient loading in river inflow, as well effluent discharged from the Stanford WWTW. Large variability in effluent nutrient concentrations was evident between 2010 and 2013, averaging at ~18 000 µg/ℓ and ~6 400 µg/ℓ, for DIN (NOx-N and NH4-N) and DIP, respectively. The daily volume discharged to the estuary was assumed as 500 m^3 (or 0.006 m^3/s). Recent data on inorganic nutrient concentration in the Klein River estuary is very limited. At the time of sampling, DIN concentrations throughout the estuary were depleted (<50 µg/ℓ), however, DIP concentrations increased moving upstream into less saline water – presumably linked to inflow of WWTW effluent. Overall, key factors influencing the quality (and quantity) of flows into the estuary were identified as water use for irrigation, agricultural and pastoral run-off containing fertilisers, pesticides and herbicides, effluent from the Stanford WWTW (organic

and inorganic nutrient loading), septic and conservancy tank seepage from developments on the banks of the estuary, and litter.

Biotic attributes

Very little data is available for microalgae on the Klein River estuary. Chlorophyll data from 2012 shows that phytoplankton blooms (chlorophyll-a concentration >20 µg/l) do occur. Phytoplankton and benthic microalgae biomass, particularly in the upper reaches, is likely to have increased as a result of high nutrient inputs (including septic tank leakage and effluent discharge from the Stanford WWTW, reduced base flows and an increase in closed mouth conditions. Ten different macrophytes habitats were previously identified, each supporting is own assemblage of plant and animal species. An updated and more detailed map of the different habitats within the estuarine functional zone was recently produced. The Klein River estuary is characterised by a large open water channel comprising roughly half of the estuarine functional zone, with various reeds, sedges and salt marsh communities on the periphery and extending up the river channel. Overall, macrophyte species richness in the estuary has declined due to a reduction in baseflows reaching the estuary and the concomitant increase in salinity, as well as due to encroachment by development, disturbance and invasive species. Nonetheless, the relative importance of the Klein River estuary is high in respect to achieving the conservation targets of the various habitats present.

The distribution of the most common invertebrate species within the Klein River estuary remains relatively unchanged from historical records, whereby the tanaid, *Leptochelia savignyi*; isopod, *Cyathura estuaria*; and amphipod, *Melita zeylanica* were ubiquitous throughout the estuary. While invertebrate diversity appears to have remained high with little change in community composition over time, the confidence of this conclusion is low. Additional sampling is required.

The Reserve Determination study for the Klein River estuary emphasised the importance of estuaries as a habitat for fish. Fish are reported to have been extensively sampled between 2000 and 2015. A total of 51 fish species from 27 families were recorded, of which nearly half (45% or 23 species) were entirely dependent on estuaries to complete their lifecycles (termed estuarine dependent). Ten of these breed in estuaries. Overall, fish fauna were judged to be broadly similar to the natural, undeveloped estuary condition (and almost identical to the Bot River estuary. In the fish surveys from 2000-2015, estuarine resident breeders, *Atherina breviceps* (46%) and *Gilchristella. aestuaria* (28%) were numerically dominant. The numbers of large estuary-dependent fish e.g. *Lithognathus lithognathus* were very low or absent. Overall, reduced recruitment, alien fish and high levels of illegal netting have reduced abundance to about 60% of natural reference state. In terms of the fish importance score, the Klein River estuary has a biodiversity and overall importance score of 95.3%, placing it in the top 20 of the country's estuaries.

A total of 71 waterbird species has been recorded in Klein River estuary. Between 2001 and 2012, the avifauna of the Klein River estuary was dominated by piscivorous gulls and terns (40%) and herbivorous waterfowl (22%) in summer. In winter, the bird community was heavily dominated by herbivorous waterfowl (76%). Overall, the present health of the water bird community of the Klein estuary was judged to be poor, and related to reduction in flows,

prolonged mouth closure, and habitat loss and human disturbance, and regional/global changes in bird populations.

In terms of estuarine health and importance the Present Ecological State of the Klein River estuary receives a score of 65 and is rated as "C", moderately modified. The estuary is considered as "Highly important", and it is a designated as a desired protected area in the Biodiversity Plan for the National Biodiversity Assessment. Thus, the Recommended Ecological Category for the estuary is an "A" or its "Best Attainable State".

2.8 Ecosystems Goods and Services

Estuaries are recognised as some of the most productive types of ecosystems worldwide. They provide a wide range of opportunities and benefits, contributing both indirectly to the economy as well as providing social benefit. Estuarine habitats and the species they support provide a host of important ecosystem goods and services. An assessment of the Klein River estuary's contribution to the local economy was undertaken and considered the overall economic valuation of ecosystem goods and services, extraction of natural resources, the recreational amenity offered by the estuary, and the aesthetic value of the estuarine catchment landscape relative to the tourism and real estate sectors. The value of the nursery function is significant, approximately R81.3 million per annum, with the Bot/Kleinmond and Klein estuaries collectively providing 40 to 50% of the estuarine nursery habitat from Cape Point to the Breede River mouth. The value of the Klein River estuarine system to the community, taking into account ecosystem functions, natural resource values and contribution to the local economy, is calculated to be R 540 million. The Klein River estuary is used for subsistence fishing by fishers from Standford and Hermanus, as well as for commercial purposes, namely riverboat cruises that are operated from Stanford. Poaching of fish through the use of illegal gill nets has been highlighted as an ongoing problem for years by researchers, local landowners and authorities. There are numerous recreational activities that take place in and around the estuary, but it is particularly favoured for boating and other watercraft-based activities, with numerous riparian owners utilising boats. Overall, the tourism value of the Klein River, including recreational aspects is high, and a high premium is paid for water front property. The scenic value and existence value for the Klein is rated "medium".

2.9 Socioeconomic Context

Social sustainability addresses the human aspects of the activity and relates to the well-being or quality of life of people. At the time of the 2001 Census, the total population living within the Overberg District was estimated at 203 520, and in the Overstrand Local Municipality, in which the Klein River catchment is located, 55 738. The population was expected to double by 2010. Almost half of jobs created in the Overberg District, between 2001 and 2006, were created in the Overstrand municipal area. The well-diversified economic base was credited for the high proportion of highly skilled individuals residing in Overstrand. Nonetheless, a large percentage of households in the Overstrand Municipality (almost 11%) earn no income. According to the 2011 Census, the population has increased to 80 358, with 4267 in Ward 3 west of the Klein River estuary and 9086 people in Ward 11, to the east, including the Stanford.

The broad interest groups and stakeholders for the Klein River estuary are numerous, and include non-government and community based organisations, users and other interest groups, private nature reserves and conservancies, government organisations and global stakeholders (e.g. Birdlife International).

2.10 Integrated Assessment

Key issues affecting the Klein River are discussed in five themes: conservation, water quantity and quality (ecosystem health), social and cultural issues, land use and infrastructure, and an exploitation of living resources. In each theme, key indicators of issues requiring attention are brought forward along with the implications arising from the earlier sections. These include: Why is it important? What are the implications and what are the mechanisms that can be brought to bear? And how will it be achieved and what tools can be enlisted to support the process?

The following priority issues were identified as requiring attention:

- Lack of clarity around roles and responsibilities for planning, management and enforcement relating to estuary resources and environment;
- The absence of any existing organisational structures to support integrated estuary management;
- The diverse range of governmental, non-governmental and community-based organisations, and citizens, who have an interest or a mandate to participate in integrated estuary management;
- The absence of existing capacity for estuary management, in terms of numbers as well as skills;
- Poaching, low levels of compliance with legislation relating to use of water resources, land and marine living resources;
- The absence of established and agreed limits for fresh water abstraction, and reduction in freshwater flow entering the estuary;
- A controversial mouth management plan involving artificial and often illegal breaching on an annual basis, which is impacting on the nursery function and health of the estuary;
- Alien vegetation infestation in the catchment, sedimentation at the head of the lagoon, very poor water quality as a result of *E. coli*, pollution and nutrient enrichment in the lagoon;
- Limited and low visibility infrastructure to support sustainable estuary-based recreational activities, underexploited opportunities for development of related infrastructure;
- Very limited data on marine living resources and levels of exploitation, reports of illegal activities and poaching;
- Peak time overcrowding on the water, lack of surveillance and vandalism of shoreside infrastructure;
- Absence of a spatial planning framework for conservation and development in the estuarine environment, undefined proposal for a Rural Development Area; and

- Existing conservation areas lacking proper linkages for effective biological corridors in the estuary environment, Klein River estuary rated highly for conservation-worthiness.

2.11 Summary of Threats, Opportunities and Recommended Management Tools

Environmental impacts present themselves either as threats that need to be mitigated, improved or prevented through management interventions, or as future constraints for management efforts in terms of implementation of the EMP. Pollution of the estuary is a major threat has this impacts both the ecological health of the system as well as the human use potential. Similarly, artificial and sometimes illegal opening of the mouth has critical implications for the ecology. The lack of clarity around roles and responsibilities, and inadequate capacity in local government institutions and agencies for estuary management and enforcement of environmental legislation are major constraints in terms of implementation of the EMP and achievement of objectives identified going forward. Illegal harvesting of marine living resources in the estuary, municipal plans for development in and around the estuary, amongst others, are additional threats or constraints that were identified.

The desirability and potential for proclaiming a protected area for the Klein River is very high, given the biodiversity and conservation importance and in order to preserve the ecosystem health and ensure managed use of this sensitive area. Other main opportunities include restoring water quality and base flows to the estuary, supporting low impact non-consumptive recreational and tourism activities that would benefit the local eco-tourism industry, and increasing conservation stewardship over the system – given the large number of stakeholders.

2.12 Research Recommendations

Through the various assessments that make up this Situation Assessment Report, numerous data gaps were illuminated. While information gaps are identified throughout the report, a list of specific research recommendations is provided in this section covering a range of aspects.

2.13 Conclusion

In conclusion, the Klein River estuary plays an important role in terms on the environment, tourism, recreation and local livelihoods. The EMP for the Klein River estuary will: ensure the integrity of the estuarine ecosystem and its natural environs; promote the optimal long-term utilisation of the estuary in a sustainable way; address all impacts on the built environment and natural, cultural, social and economic systems; and be integrated with the Klein Rural Development Framework.

3 VISION & OBJECTIVES

3.1 Vision Statement

The vision for an estuary must be aligned with the vision and strategic objectives of the NEMP and the greater CFR. The National Vision and Vision of the Estuaries of the CFR, respectively, are as follows:

"***The estuaries of South Africa are managed in a sustainable way that benefits the current and future generations***".

"***The estuaries of the CFR will continue to function as viable systems which are beautiful, rich in plants and animals, attract visitors, sustain our livelihoods and uplift our spirits***".

The vision statement for the Klein River estuary, as formulated and adopted by the Klein River Estuary Forum (KREF), is as follows,

"***The Klein River, its estuary, banks and associated wetlands shall be a successful environment where all of nature may prosper and where there is sustainable use of it by people***".

3.2 Key Objectives

While the vision is an inspirational, higher-level statement of strategic intent, strategic or overarching objectives answer the question: "*How will you know when you have achieved the Vision and by when?*"

The vision for the Klein River estuary can be achieved through four key or main objectives, representing different 'issue packages' that need to be addressed (Table 1).

Table 1: Four key objectives (outcomes) of the Klein EMP

KEY OBJECTIVES	
Institutional Arrangements	Participants are engaged in an organisational structure for implementation of the Klein EMP. They have the necessary institutional capacity for effective delivery.
Water Quantity & Quality	The ecological health and functioning of the Klein River estuary is improved and the water is safe for human contact.
User Value	There is greater appreciation of the social and economic value of the Klein River estuary by users and managers of estuarine resources and amenities
Land Use Management	The Overstrand Municipality and landowners in the study area have introduced measures in their land use management practices to safeguard the health of the estuarine ecosystem.

4 MANAGEMENT OBJECTIVES

The four main objectives are separated into 13 detailed Management Objectives aligned with existing institutional structures, functional management areas and programmes. These Management Objectives are described as specific outcomes in Table 2 and summarised in Figure 3. The process to achieving these objectives requires specific activities, accompanied by indicators, that are captured as multi-year indicative action plans provided in Section 0.

Table 2: Management Objectives

1. Institutional Arrangements		
1.1	**Institutional Roles and Responsibilities**	***Who does what***
	Institutional roles and responsibilities for planning, management and enforcement are agreed	
1.2	**Sustainable Organisational Structure**	***Someone to hold it all together***
	An effective and sustainable organizational structure is facilitating and coordinating implementation of the EMP	
1.3	**Estuarine Management Capacity Building**	***Knowing what's important***
	Institutions and individual role players have the necessary capacity and resources to engage in estuary management	
1.4	**Enforcement Capacity Building**	***Understanding and respecting the law***
	There is improved compliance from citizens and officials through improved capacity for enforcement of the legislation relating to resource use in and around the estuary	
2. Water Quantity & Quality		
2.1	**Resource Directed Measures**	***Setting the limits***
	District and Local Municipalities and the Breede-Gouritz Catchment Management Agency co-operate to implement Resource Directed Measures	
2.2	**Clean-up Campaign**	***Rehabilitation & Safety***
	Water quality is improved, and flow is maintained or improved, through prioritized riparian restoration initiatives and an intensive local municipality-driven campaign to 'clean up' polluting activities and installations	
2.3	**Mouth Management Plan**	
	Mouth management is carried out in accordance with an approved mouth management plan that has been adopted by the Responsible Management Authority	
3. User Value		
3.1	**Sustainable Recreational Infrastructure**	***Amenity***
	The social value of the estuary has been enhanced by the improvement of facilities for recreational users	
3.2	**Research contributing to Sustainable Resource Use**	***Economy***
	Research is being undertaken in order to ensure sustainable utilization of estuary resources	
3.3	**Safety and Security**	***Confidence***
	Measures have been introduced to improve the safety and security of people and infrastructure at agreed public recreation areas, launch sites and on the water body	
4. Land Use Management		
4.1	**Spatial Zonation**	***Managing change***

	The spatial implications of the EMP have been integrated into the Overstrand Municipality's Spatial Development Framework	
4.2	**Coastal Protection Environmental Management Overlay Zone**	***Making it enforceable***
	A Coastal Protection Environment Management Overlay Zone (EMOZ) incorporating the Coastal Management Line relating to the Klein River estuary has been adopted and implemented by the Overstrand Municipality as provided for in the ICMA	
4.3	**Biodiversity Management Plans**	***Promoting stewardship***
	Public and privately owned land, and portions of the estuary water body, are made available for management which prioritizes biodiversity conservation	
4.4	**Estuarine Habitat Rehabilitation**	***Restoring habitat***
	Estuarine habitat that has been degraded is rehabilitated and continues to perform critical ecosystem functions and contribute to the biodiversity value of the estuary	

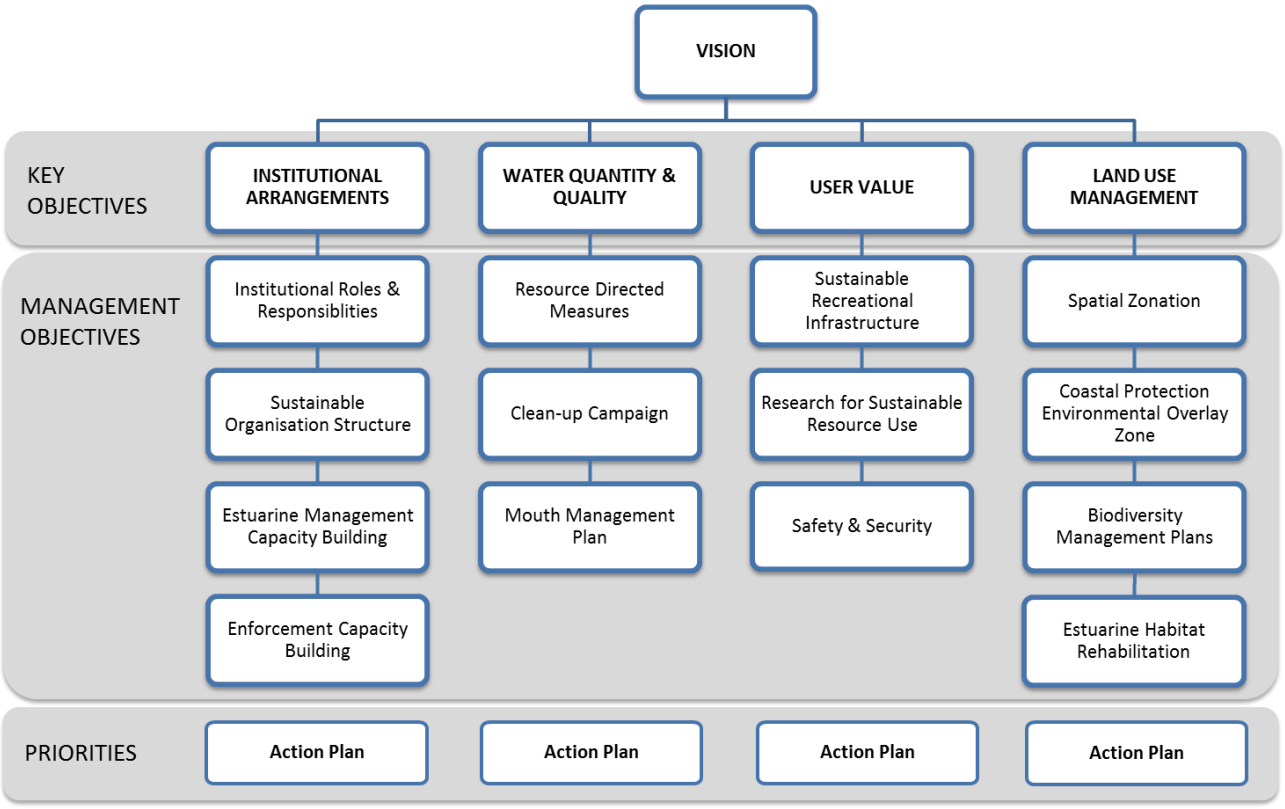

Figure 3: Structure of the Klein Estuary EMP indicating detailed Management Objectives packaged within Key Objectives

5 MANAGEMENT PRIORITIES

The action plans discussed hereunder, give effect to the 13 management objectives introduced in Section 4 and the spatial zonation of the system detailed in Section 6, by identifying the priority management interventions, or actions, that are required to ensure their realisation. The action plans also provide information on who is responsible for the action. These will inform the internal project plans to be compiled by the respective participating institutions. The necessary resource allocations are to be determined by the applicable /participating institutions. **CapeNature has developed a Estuary Governance Tool to monitor, track and report on the implementation of management objectives.**

5.1 Institutional Arrangements

5.1.1 Management Objective 1.1: Institutional Roles and Responsibilities

CapeNature is the designated RMA, responsible for the EMP development and implementation given the inclusion of the Klein Estuary in the Provincial Protected Area Expansion Strategy. However, estuarine management functions should be embedded within the appropriate mandates of existing institutions. The estuarine quaternary catchment of the Klein River estuary is centrally located within the boundaries of the OSM near the main municipal offices in Hermanus and the area management office in Stanford. While the OSM may not be the designated RMA as per the NEMP, it holds the mandates for many of the functions, which are central to the management objectives and actions: pollution control, infrastructure and recreational facilities, enforcement of by-laws, spatial planning and land use management. It may thus play a co-management role alongside CapeNature in terms of the role of RMA. It is recommended that, a co-ordinating official, i.e. an Estuary Management Co-ordinator (EMC), be appointed to address, manage, co-ordinate and report on estuarine-related matters.

The catchment management authority for the Breede-Gouritz Catchment Management Agency (BGCMA), and DWS, have a significant role in the rehabilitation of water quantity and quality, through the development of Resource Directed Measures (RDM) for the Klein River (See Section 5.2). The role of implementing agent for this aspect of the EMP, as well as regular attendance at meetings relating to other aspects of the EMP, will be significant enough to require the BGCMA's employment of a part-time staff-member or contract worker. On an ongoing basis, this will provide the necessary capacity for water use authorisations and addressing non-compliance or inappropriate uses.

The Cape Town based Department of Environment, Forestry and Fisheries (DFFE) office is a national tier of government and, like the CapeNature and Department of Environmental Affairs: Oceans & Coasts (DEA: O&C), will play an important role in the implementation of aspects of the Klein Estuary EMP and will guide the work of the EMC through its membership within the KREF.

Implementation of the Coastal Protection Environmental Management Overlay Zone (EMOZ) will require the support of all tiers of government, particularly relating to legal

interpretation of the ICMA and the implications of the recently developed Coastal Management Line (CML) for the Overberg District (Section 5.4.2). DFFE will provide funding for the research required in order to ensure sustainable resource use (Section 5.3.2) and the facilitation of estuarine management training (Section 5.1.3). Funding for para-legal training for additional enforcement officials and members of the KREF (Section 5.1.4) and compliance interventions is still being sought.

The DEA (Working for Water as well as the Working for the Coast programmes), DoA (i.t.o. Conservation of Agricultural Resources Act), CapeNature, the OSM and private land owners all have responsibilities in terms of invasive alien plant management, and fire management, and have a role in the Clean-up Campaign in respect of the control of alien vegetation and run-off from farmlands (Section 5.2.2).

Planning and assembling a network of conservation areas within the estuarine management area (Section 5.4.3) is driven initially by CapeNature. Because a lot of the priority areas are on privately owned land, the landowners, CapeNature and the DFFE through their area-based planning approach, will all have a role in assembling the network. The key to integrating the EMP's conservation areas into a regional network is the proposed Bioregional Plan for the Overberg district and the Environmental Overlay of OSM. At a local level, CapeNature will identify specific habitats that are threatened, identify processes to protect and rehabilitate these as part of an estuarine habitats rehabilitation and management programme to be included in the subsequent EMP.

The OSM's role in the EMP is important, both in terms of what they need to contribute and with regards the benefits that could be derived from the many opportunities that the estuary presents. One of the most urgent tasks for the Municipality is a clean-up campaign (Section 5.2.2) – to locate and rehabilitate the point sources of pollution that are the cause of the currently hazardous levels of pollutants and nutrients in the lagoon. This must be carried out in association with Western Cape Department of Environmental Affairs and Development Planning (DEA&DP) who are developing a provincial plan of action to address land-based pollutants that are impacting on the ocean. This process has been initiated within selected estuaries in the Western cape, including the Klein River estuary. They also have a significant role in enhancing the way that users value the estuary, through the development and maintenance of recreational infrastructure and facilities (Sections 5.3.1 and 5.3.3) – requiring some capital works budget allocations – and potentially reaping some benefits in the longer term from the Sustainable Resource Use initiative (Section 5.3.2). Finally, all of the Land Use Management interventions will involve the OSM (Section 5.4) and the assistance of DEA&DP will be required at certain stages.

In terms of the ICMA, the District Municipality (Overberg) is responsible for Coastal Management functions, while DEA&DP are responsible for the delineation of the Coastal Protection Zone (CPZ) and the Coastal Management Line (CML) with appropriate controls. These areas and controls inform the Overstrand EMOZ, which in turn forms part of the OSM's Land Use Management System (LUMS). At present, the Overberg District Municipality (DM), chairing the Overberg Municipal Coastal Committee, is required to report on estuary related issues for the District at the Provincial Coastal Committee (PCC)chaired by DEA&DP.

5.1.2 Management Objective 1.2: Sustainable Organisational Structure

Implementation of the Klein Estuary EMP is to be co-ordinated the RMA (CapeNature). CapeNature will maintain the EMP's monitoring, evaluation and reporting system as well as providing a co-ordination function and administrative support to the estuary forum. CapeNature will report on progress made with regards to estuarine management issues to the Overberg District Coastal Committee. These reports will be tabled at the Provincial Coastal Committee during quarterly meetings.

The existing KREF will function as an *advisory* body to the RMA (i.e. an estuary advisory forum, KREF), comprising representatives of I&APs that will meet twice a year (or as often as is required) to adequately attend to the business of estuarine management with regards to facilitating the implementation of the project plans.

5.1.3 Management Objective 1.3: Estuarine Management Capacity Building

The institutions participating in the implementation of the Klein Estuary EMP will need to build capacity within their institution in order to fulfil their responsibilities as agreed in the Klein Estuary EMP. Where necessary, this may entail re-deployment of existing human resources to estuary management or filling of new posts. Funding will need to be solicited for officials and staff members to attend applicable estuarine management training courses, as provided by the Nelson Mandela University (NMU)and partners.

5.1.4 Management Objective 1.4: Enforcement Capacity Building

Illegal exploitation of marine resources, general lack of compliance and an almost complete lack of law enforcement are among the key threats facing the sustainable use of the Klein River estuary. Illegal exploitation of living resources includes lack of fishing or bait collection permits, exceeding of bag limits for fish and bait, and illegal gill netting of fish. In addition, vandalism is a regular occurrence, and is allegedly carried out by poachers under nightfall. Boat houses are most often targets for vandalism.

To combat these social ills, co-operative governance is required between participating institutions to develop an integrated approach to enforcement within the estuarine environment. Greater knowledge is required of the para-legal aspects of estuarine management (i.e. application of the ICMA, MLRA, NWA, EIA regulations and CARA etc.) and to this end, training of staff from participating institutions, should be undertaken but should also be open to interested and affected parties, or member of the general public.

A Compliance Campaign will be initiated to address:

- Illegal harvesting of marine living resources, listing of public launch sites;
- Possession of appropriate permits by fishers and all users of the launch sites;
- Improved enforcement of water use permit system (supporting attainment of Resource Quality Objectives [RQOs]);
- Control over illegal structures and development activities in the estuarine functional zone (EFZ) that are having a negative impact on the estuary (contraventions are being followed up);

- Enforcement of the provisions of the ICMA relating to structures in the coastal public property zone;
- General good housekeeping relating to vandalism, dumping and littering, and other sources of water pollution; and
- Education and awareness programme targeting improved compliance.

Table 3: Management Actions for Institutional Arrangements

Management Actions	Legislation	Deliverables / Indicators	Timing	Responsible Agent(s)
Management Objective 1.1: Institutional roles and responsibilities for planning, management and enforcement are agreed				
a) Designation/agreement of RMA role and/or co-management agreement	ICMA, NEMP	Signed agreement clarifying areas of operation, and roles and responsibilities	2023	CapeNature
b) All participating institutions sign the MOA confirming that they accept the responsibilities identified in the EMP document, and signing of additional MOUs/MOAs to confirm any delegation of mandates and/or responsibilities **(Estuary Governance Tool)**		EMP Implementation MOA Signed MOUs/MOAs for delegations	2023	RMA, OSM, CapeNature participating institutions
c) Activate linkages between EMP activities and aligned programmes and projects, through awareness raising in the course of all job description activities, and through direct interventions where such opportunities arise		Alignment achieved, linkages with supporting programmes activated	On-going	Klein river estuary forum (KREF), members of participating institutions
d) Respective institutions to gather and submit information required for monitoring of any actions plans identified to the EMC for the purpose of compiling Quarterly and Annual Reports		Feedback received from participating agencies Monitoring and Evaluation information made available to EMC Quarterly and annual reporting to DEA and KREF, undertaken by EMC Action plans updated as and when required		KREF members of participating institutions
e) KREF to participate in the 5-year EMP evaluation		Integrated evaluation of EMP Authorities to provide formal feedback on mandated activities	2028	RMA, KREF members of participating institutions
Management Objective 1.2: An effective and sustainable organisational structure is facilitating and coordinating implementation of the EMP				
a) RMA to secure authorisation and budget for any new posts and/or redeploy and/or revise job descriptions of existing posts, to create EMC position to support the work of the RMA and communication with KREF	ICMA, NEMP	Estuarine management function established within RMA EMC appointed	2023	RMA
b) The Klein River Estuary Forum to i. resolve to act as an advisory body to the RMA to facilitate co-operative management of the		Estuary Forum re-established as advisory body to RMA Regional KREF meets at least twice a year (quarterly)		RMA, KREF

Management Actions	Legislation	Deliverables / Indicators	Timing	Responsible Agent(s)
estuary, representing governmental and non-governmental organisations and civil society interest groups; ii. endorse the EMP; iii. elect office-bearers.		Meetings and minutes		
c) Establish systems for facilitating communication between the RMA, KREF and various role-players		Communication network established Contacts database compiled Regular email correspondence	2023-2024	RMA
d) Establish systems for assembling and storing monitoring information gathered through the various action plans associated with the EMP		Monitoring information and storage system established		RMA
e) Establish systems for monitoring progress and efficiency of the various action plans and their associated projects and compiling progress/performance report		Outputs monitoring system established Reporting system established Quarterly and annual interim progress /performance reports produced		RMA, OSM, CapeNature
f) RMA to chair and provide secretariat services for meetings of the KREF (twice/four times a year)		Meetings of KREF convened, held and recorded	Ongoing	RMA
g) Undertake formal 5-year review of the EMP as prescribed by the NEMP		Motivation for updated drafted and approved Funding secured ToR drafted, Consultants appointed. EMP and SAR evaluated and updated	2028	RMA, OSM, DEA&DP, KREF
Management Objective 1.3: Institutions and individual roleplayers have the necessary capacity and resources to engage in estuarine management				
a) Participating institutions to fill new posts and/or redeploy and/or revise job descriptions of existing posts to build capacity that is needed within their institution in order to fulfill their mandate/responsibilities as agreed in the Klein EMP.	ICMA, NEMP	Human resources available Project champion(s) for allocated management actions Staff appraisals ito management actions and projects	2023	Participating institutions
b) Participating institutions to identify and address training needs, with possible secondment to address training and capacity shortfalls		Training needs identified and conveyed these to NMMU Motivation for training drafted and approved Staff attend relevant accredited training courses MOU to be developed for secondments	2023	

Management Actions	Legislation	Deliverables / Indicators	Timing	Responsible Agent(s)
		Staff in participating institutions trained in estuary management		
c) Participating institutions to allocate resources, and acquire necessary infrastructure, resources and equipment of fulfil their mandate/ responsibilities		Need and Desirability investigation undertaken Motivation for acquisition drafted and approved Equipment purchased and maintained	2023	
d) Mandated authorities and participating institutions to confirm budget allocations for mandated activities/actions		Formal feedback from authorities on mandated activities Motivation for budget drafted and approved Funding secured for 5-year cycle	2023	
Management Objective 1.4: There is improved compliance from citizens and officials through improved capacity for enforcement of the legislation relating to resource use in and around the estuary				
a) Convene a workshop of participating institutions to develop an integrated approach to compliance & enforcement (e.g. MLRA, recreational activities, land use & building contraventions in the estuarine margins, pollution from land-based activities, ORVs, launch sites etc.). Address the need for identifying funds	Relevant legislation for participating institutions	Workshop convened Agreement reached on management action plan – activities, responsibilities and time frames Inter-governmental MOU	2023	RMA, participating institutions including Phakisa
b) Participating institutions identify the individuals within their organisation responsible for enforcement (create new posts if necessary) and establish a rapid response network for all types of targeted contraventions.		Enforcement officers identified Rapid response network established with key authorities Communication protocol established Standard Operating Procedures/ Protocol established	2023	RMA, Participating institutions implement Warning Orders
c) Develop capacity for estuarine management by attending a paralegal training programme specifically covering aspects of Estuary management - framing legislation relevant to resource use (including land use) – ICMA, MLRA, NWA, EIA regulations, CARA		KREF, CN and OSM attendance at training courses Training materials	2023	RMA, DEA&DP, OSM, KREF, CapeNature, other enforcement agencies
d) Set up and maintain a hotline and an incident record for public reporting of non-compliant behavior.		Hotline established Number of contraventions Number of successful prosecutions	2023	RMA, OSM and ODM DFFE O&C DFFE, CapeNature BGCMA

Management Actions	Legislation	Deliverables / Indicators	Timing	Responsible Agent(s)
				DEA&DP IEM
e) Secure funds and procure services required for Implementation of any outsourced aspects of the Compliance Campaign, e.g. signboards, posters, pamphlets, equipment, demolition, waste removal, etc.		Contracted service providers / contractors	2024	RMA, OSM, CapeNature

5.2 Water Quantity & Quality

The EMP provides an immediate intervention to address the pollution crisis that has forced the Municipality to prohibit bathing in the lagoon, a second strategy to secure estuarine health in the long-term in line with Ecological Water Requirements ('Ecological Reserve' or 'Reserve'), and a third strategy to address the issue of mouth management and artificial breaching.

The measure of success of these interventions will be judged by whether the health of the Klein River estuary is improved, it functions as a nursery area for estuary-dependant marine species and the water in the estuary is safe for human contact all year round.

5.2.1 Management Objective 2.1: Resource Directed Measures

Resource Directed Measures (RDM) are a requirement introduced through the National Water Act (1998) (NWA) to secure the country's scarce freshwater resources. The DWS is responsible for establishing Catchment Management Agencies (CMAs) to manage the use of freshwater and ensure that polluters and unauthorized users of freshwater sources are apprehended and penalised. The NWA prescribes a method for calculating the amount of water being drawn for human consumption, requiring that all users apply for permits, and balancing this against what is required for the river and estuary to maintain its functional integrity. This is referred to as the 'Ecological Reserve', i.e. the amount of water that must be reserved in order to ensure that ecological systems continue to function. Ensuring adequate flow during all seasons, including the 'flushing' that is required during the high rainfall season, is one of the objectives of the RDM. It also involves the setting of Resource Quality Objectives (RQOs) which, amongst other things, establish targets for acceptable water quality, for example levels of nutrients, in the system.

The Klein River's three quaternary catchments fall within the Breede-Gouritz Water Management Area (WMA). The BGCMA is responsible for implementation of RDM (National Water Act, 1998). The Ecological Water Requirements (EWR) for the Klein River estuary were recently determined under the auspices of the BGCMA (Anchor, 2015), but are yet to be signed off and secured under the water resources Classification process. The results of the rapid EWR study for the estuary are as follows:

- Present Ecological State (PES) – Category C;
- Ecological Importance and Sensitivity (EIS) – Highly Important; and
- Recommended Ecological Category (REC) – Category B as its Best Attainable State as a desired protected area.

The RQOs or Ecological Specifications (EcoSpecs) and associated Thresholds of Potential Concern (TPCs), identified as representative of a Category B, are provided in Appendix 1.

The action plan for RDM describes activities for supporting and implementing the requirements. The process will involve all major water users in the Klein River catchment, e.g. the municipalities of Overstrand and Theewaterskloof (TLM), local farmers and other riparian property owners, and requires the participation of the DFFE.

5.2.2 Management Objective 2.2: Clean-up campaign

A two-pronged approach is required to rehabilitate, or 'Clean up', the river and estuary:

- An Overstrand Municipality-driven initiative in association with DEA&DP (provincial plan of action) and landowners to locate and eliminate point and diffuse sources of pollution and nutrient enrichment in the estuarine management area. The co-ordination of water quality monitoring and trend analysis will be done by the EMC. Water quality monitoring must be done taking the RQOs/EcoSpecs into account; and
- A co-ordinated effort to manage alien vegetation in the riparian reserve with the objective of improving flow rate, mitigating flood time impacts and reducing the amount of soil being carried down river from farmlands and being deposited in the estuary.

This is cross-cutting with rehabilitation of degraded habitats (Management Objective 4.4) which is closely linked to land-use management (Section 5.4) and could possibly be viewed as third aspect of the clean-up campaign.

5.2.3 Management Objective 2.3: Mouth Management Plan

This objective makes provision for the formulation and adoption of a Mouth Maintenance Management Plan (MMP) that provides biophysical criteria for artificial breaching interventions, and a governance framework within which those decisions are made and the plan reviewed and adapted over time.

The reference for the mouth management approach is included in Appendix 4. The MMP was approved and adopted in December 2022 for the 2023 to 2027 period.

Table 4: Management Actions for Water Quantity & Quality

Management Actions	Legislation	Deliverables / Indicators	Timing	Responsible Agent(s)
Management Objective 2.1: District and Local Municipalities and the Breede-Gouritz Catchment Management Agency co-operate to implement Resource Directed Measures				
a) Lobby for sign off / approval of the Klein River Estuary Ecological Reserve	NWA	Reserve approved by Minister DWS Ecological reserve and Resource quality objectives gazetted Baseflow is restored and protected	2023	RMA, BGCMA, OSM
b) Implement Reserve including: • Issuing of water use licenses based on Reserve; • Assemble a team for ecological monitoring for RQOs, build capacity for reliable monitoring, liaise with Overstrand EM Office regarding reporting systems; • Monitoring and enforcement of license conditions; • Evaluation of Reserve in 5 years' time	NWA	All water use is licensed and according to Reserve No new licenses for surface water abstraction in the catchment Ecological monitoring is in place Number of illegal operations and prosecutions Baseflow is restored	Ongoing after the Reserve sign off	RMA, BGCMA, OSM, TLM, ODM, DFFE, DWS
c) Determine the 1:100 and 1:50 year floodline in the Klein River Rural Development Area and integrate data into OSM's LUMS	ICMA, NWA	GIS dataset of 1:100 and 1:50 floodlines	2024	BGCMA, OSM
d) Design a Monitoring & Evaluation (M&E) framework to support strategic adaptive management in the implementation of the RDM	NWA	M&E plan developed MOUs for implementation	2023	RMA, BGCMA
e) Ongoing management and administration of M&E activities, water use licensing and enforcement		Implementation and enforcement of RDM	Ongoing	BGCMA, implementation partners
Management Objective 2.2: Water quality is improved, and flow is improved, through prioritised riparian restoration initiatives and an intensive local municipality-driven campaign to 'clean up' polluting activities and installations				
a) Conduct field-study investigation (including baseline survey) and assessment of riparian invasive alien plants (IAPs) and sediment transportation	CARA NWA	Detailed maps of invasive vegetation produced Priority areas identified Damaging/contributing land-use activities identified Erosion hotspots identified	2023/4	BGCMA, DFFE, OSM, CapeNature

Management Actions	Legislation	Deliverables / Indicators	Timing	Responsible Agent(s)
b) Conduct field-study investigation (including baseline sampling) and prepare assessment report on point and diffuse sources of pollution	NWA	Location, types of pollution identified, extend and contributing sources/origins identified Detailed map of pollution sources		RMA, OSM, BGCMA
c) Develop an integrated plan for managing IAPs, riparian rehabilitation, and erosion and sediment transportation in the catchment	CARA, NWA, NEM:BA	Appropriate methods of IAP control determined Appropriate erosion mitigation measures determined Integrated plan implemented Ongoing maintenance Engagement with landowners Increased area of IAPs removed Recovery of eroded areas		RMA, BGCMA, DWS, DEA:WfW, DFFE
d) Develop a pollution rehabilitation management plan for eradicating point and diffuse sources of pollution in the estuarine quaternary catchment (including surface water run-off, liquid waste disposal, leachate from solid waste sites)	NWA	Appropriate mitigation/remedial measures identified Pollution rehabilitation management plan developed and implemented Reduced pollution incidents and/or related impacts Improved water quality		OSM, BGCMA DEA&DP, DFFE
e) Secure funding commitment for Clean-Up Campaign interventions, conduct negotiations with land owners and/or procure contractors for implementation.	NEMA, NWA	Signed agreements, contracts for implementation	2023	RMA, BGCMA, OSM, DWS, Dept. Public Works, DEA:WfW, DFFE,
f) Establish a water quality monitoring programme, according to RDM methods and taking RQOs into account, to monitor pollutants, nutrients and salinity levels	NWA	Water quality monitoring programme established Database of water quality variables maintained Problem areas identified and monitored Water quality reports	On-going	RMA, DWS, BGCMA, OSM, ODM, CapeNature
Management Objective 2.3: Mouth management is carried out in accordance with an approved plan that has been adopted by the RMA				
a) Adopt and obtain necessary approvals for the MMP and MaintMP		MMP and MaintMP adopted Approvals obtained Plans implemented	2023	RMA
b) Implement the MMP and MaintMP for the artificial maintenance of the estuary mouth				RMA

Management Actions	Legislation	Deliverables / Indicators	Timing	Responsible Agent(s)
c) Monitoring of mouth, mouth management and breaching events		Quarterly reporting	On-going	RMA, OSM,
d) Evaluation of plan efficiency and implementation, and update if necessary		External Evaluation Updated as required	2026/7	RMA

5.3 User Value

Estuaries are high value environments that support a range of sometimes conflicting activities and biological processes. Estuarine ecosystems are among the most productive, in biological terms, and are economically important nursery environments for fish species that underpin the country's commercial fisheries. In South Africa, estuaries are traditionally the site of a range of recreational activities such as boating, skiing, and angling, and support a range of subsistence users whose activities include fish trapping, bait collection and the harvesting of reeds and sedges.

One of the roles of estuary managers is to identify and manage conflicting activities and those that threaten the long-term sustainability of estuary value. Pollution, vandalism, poaching of juvenile fish and breeding stock, and other forms of environmental degradation are a symptom that users of an environment do not place a high value on it. The value that society awards to an estuary can be enhanced through development which supports existing livelihood strategies, creates new opportunities for subsistence or income generation, and which contributes generally to the developmental mandate of the municipality. Such development should enhance, not undermine, the value of the estuary, i.e. it should be sustainable.

The health of the estuary and the persistence of the living resources that it supports are of national importance because they make a significant contribution to the sustainability South Africa's commercial fisheries. Enforcement and sustainable economic development need to be matched with social interventions that build a community of proud managers and lawful users who, by virtue of their stake in the resource, contribute to its policing and conservation. Thus, the outcome of this key objective is to do with perceived value rather than just the sum of goods and services that they deliver.

Realising the key objective of User Value – *There is greater appreciation of the social and economic value of the Klein River estuary by users and managers of estuarine resources and amenities* – is to be achieved through a three-pronged approach to sustainable development and utilisation of the estuary's abundant resources and attractions:

- improving the physical infrastructure that supports and gives access to residents' and tourists' enjoyment of the estuary environment;
- undertaking baseline studies that are key to investigating and optimising the potential of the estuary to contribute to livelihood security and benefits for subsistence users and underemployed residents; and
- improving perceptions of the value of the resource (Safety & Security).

5.3.1 Management Objective 3.1: Sustainable Recreational Infrastructure

The EMP provides mechanisms for the OSM to investigate alternatives and initiate projects which support sustainable development and usage of the estuary's abundant resources and attractions. The activities described in the action plan build on work already done (e.g. Kleinriviersvlei Structure Plan, unpublished data on fish populations) in order to arrive at

agreement on what needs to be done. The proposed activities are dependent on availability of funds.

5.3.2 Management Objective 3.2: Research for Sustainable Resource Use

More information is needed about existing exploitation of resources. This includes knowledge of the thresholds of concern regarding potential collapse of systems resulting from overexploitation of keystone species. This will help to demonstrate future resource potential and inform sustainable off-take/harvesting levels. In addition, research is needed on the impact of mouth management on the nursery function of the estuary (Section 5.2.1 above).

Illegal exploitation of resources (poaching) includes the lack of fishing or bait collection permits, exceeding of bag limits for fish and bait and illegal gill-netting of fish. Information on poaching and its impact on the system is urgently required. This is a critical issue that needs to be addressed and will require increased enforcement capacity and policing (See Section 5.1.4).

5.3.3 Management Objective 3.3: Safety & Security

The Klein River estuary is used extensively for recreational purposes, and holds significant value in this respect at local, regional and even international level. Conflict between recreational users in relation to the different types of craft and recreational activities on the water has been a long-standing issue. User safety is an issue due to limitations on public access to the estuary resulting in the concentration of users at a limited number of discrete points, peak-time overcrowding on the water, as well as violation of promulgated motorboat regulations. In addition, vandalism of shoreside infrastructure and facilities associated with estuarine recreation is also prevalent and needs to be addressed.

Table 5: Management Actions for User Value

Management Actions	Legislation	Deliverables / Indicators	Timing	Responsible Agent(s)
Management Objective 3.1: The social value of the estuary has been enhanced by the improvement of facilities for recreational users				
a) Convene meetings with recreational estuary users (consumptive and non-consumptive) to determine user needs, spatial patterns and priorities.	MSA SPLUMA LUPA ICMA NEMA EIA Regs	Information gathered on user needs, patterns and priorities	2023	RMA, OSM C
b) Identify alternatives for location and type of nodes to satisfy the various user groups and agree on criteria for sustainability / development feasibility.		Alternatives analysis, including a map with a key that identifies accommodated users Shortlist of sustainable options	2023	RMA, OSM
c) Develop concepts for each of the short listed nodes: key attraction (concept), facilities provided, associated infrastructure requirements, including access way signage etc. Determine feasibility and prioritise nodes for implementation		Project concept and feasibility report for each node Phasing plan for development of recreational nodes	2023	OSM
d) Municipality to prepare a Project and Construction Management (PCM) Action Plan for development of each of the nodes, obtain all necessary approvals (e.g. Environmental Authorisation and registration of launch sites) in preparation for implementation and construction		PCM Action Plan for each of the nodes developed Environmental authorisation obtained, approved building plans for first phase of implementation. Funding secured for construction and implementation	2023	OSM, RMA
e) Adopt and enforce a zonation plan that indicates recreational areas and mediates recreational activities on the water. The zonation is reviewed on a regular basis.	ICMA	Zonation plan adopted and enforced Number of transgressions/incidents Regular review and updating/improvement of zonation plan	2023, ongoing	RMA, OSM, DFFE,
Management Objective 3.2: Research is undertaken in order to ensure sustainable utilisation of estuary resources				
a) Undertake a baseline study on all aspects of estuarine resource use – living- and non-living, consumptive- and non-consumptive, authorised and unauthorized, to determine current use.	MLRA, NEM:BA, NEM:PAA, MPRDA, NWA	Users groups identified Meetings convened, attendance registers and minutes of meetings Data and information on user behaviour, resources and levels of extraction Current use of all estuarine resources determined – Baseline report produced Identification of future required studies	2024	DFFE, CapeNature, SANBI/ CSIR
b) Convene meetings with estuary resource users (subsistence, recreational and commercial fishers, any other sustainable livelihoods or commercial users) to obtain local insight			2024	DFFE, CapeNature

Management Actions	Legislation	Deliverables / Indicators	Timing	Responsible Agent(s)
c) Undertake Value Assessment of the identified resources to identify overexploited resources and underexploited opportunities, and identify research needs for long-term sustainability and protection for biodiversity (e.g. impacts of poaching)		Value Assessment Report Research needs identified Sustainability/ protection targets established	2023/4	DFFE, CapeNature
d) Using this information, develop a Sustainable Resource Use Action Plan for the management area that includes strategy alternatives for promoting sustainable use of resources.		Sustainable Resource Use Action Plan Alternate livelihood opportunities identified Sustainability programmes compiled	2023/4	DFFE, CapeNature
Management Objective 3.3: Measures have been introduced to improve the safety and security of people and infrastructure at agreed public recreation areas, launch sites and on the water body				
a) Identify and prioritise key issues relating to safety and security at public recreation areas and launch sites, and on the water body (e.g. upgraded/improved channel markers), identify strategy alternatives and priorities	MSA	Key issues identified and prioritised Hotspots mapped Shortcomings interrogated	2023/4	RMA, OSM, DEA: O&C, SAMSA, KREF
b) Develop a Safety & Security Strategy or approach for the estuarine area in line with the Municipal Health & Safety Strategy and Law Enforcement, which includes: • Findings of the recreational user needs assessment, • Findings of the Kleinriviersvlei Structure Plan (recreational carrying capacity investigation and recommendations) • Assessment of response strategies and development of action plans in consultation with the implementing agent(s) • Urgent interventions for immediate action		Safety and security strategies identified and prioritised Response strategies and protocols determined Agreed action plans Implementation of urgent interventions	2023/4	OSM, DEA&DP, CapeNature, SAMSA
c) Secure funding for implementation and operation of urgent safety & security interventions.		Funds allocated Implementation milestones achieved	2023/4	OSM, RMA, SAMSA

5.4 Land Use Management

The EMP makes provision to refine and embed the spatial implications of the EMP into the local Land Use Management System (LUMS).

The Overstrand Municipality holds the mandate, conferred through the Constitution, the Municipal Systems Act (2000), Land Use Planning Ordinance (1985), Spatial Planning and Land Use Management Act (2013) (SPLUMA), and Western Cape Land Use Planning Act (2014) (LUPA) for controlling new development and existing land use. Oversight of new development is provided by DEA&DP through the processes applicable to Spatial Development Framework (SDF) approval, re-zoning applications and activities subject to Environmental Impact Assessment (EIA). There are many more layers of regulation applicable to land use management and the management of the estuary water body administered by different entities; the most pertinent of which, in the Klein River estuarine management area, are:

- DoA – subdivision of agricultural land (Act 70 of 1970);
- DWS – abstraction and pollution of water (National Water Act, 1998);
- DFFE – exploitation of marine living resources (Marine Living Resources Act, 1998);
- DFFE & DEA&DP – structures in the Coastal Public Property (ICMA, 2008);
- DFFE – protection of trees (National Forest Act, 1998) (NFA);
- CapeNature – administration of provincial nature reserves and biodiversity conservation on privately owned land (Protected Areas Act, 2003; Western Cape Nature Conservation Laws Amendment Act, 2000), RMA;
- Overberg District Municipality – coastal management including inter alia, preparation of Coastal Management Programme (ICMA, 2008);
- DEA&DP – bioregional plan providing measures for management and monitoring of biodiversity in the region (NEM: Biodiversity Act, 2004) (NEM:BA); and
- OSM – administration of local by-laws relating to the recreational use of the estuary in terms of Proclamation 357.

Most of the impacts, which affect estuarine health are generated on land. The LUMS provides the mechanisms for managing these and for improving the accessibility of the estuary as a social and economic resource. The EMP provides the opportunity for integrating conservation and resource use measures into the LUMS in order to attain a holistic and aligned management framework.

The realisation of the Land-Use Management Objective – *Overstrand Municipality and land owners in the study area have introduced measures in their land use management practices to safeguard the health of the estuarine ecosystem* - will be achieved through implementation of the following:

- Spatial Zonation of the estuary;
- Environmental Management Overlay Zones (EMOZ) (which includes, *inter alia*, the Coastal Protection EMOZ); and
- Biodiversity Management Plans.

All of the Land use Management interventions will involve the OSM and the assistance of DEA&DP will be required at certain stages.

5.4.1 Management Objective 4.1: Spatial Zonation

A Municipal SDF is the strategic planning tool for guiding decisions on where development should be encouraged, where development may occur but with caution and where development should be discouraged in order to secure valuable natural resource areas.

The Overstrand Municipality, in its SDF (2006, currently under review), identified the Klein River, Stanford/Wortelgat area as a priority to be considered for designation as a Rural Development Area (RDA). Implementation of the strategy requires a "*multi-disciplinary planning/environmental analysis and assessment*" to provide guidelines for the RDA as a basis for guiding" *the location, nature, scale and design*" of development. The extent of the RDA largely coincides with the estuary management area.

The management approach in the preliminary SDF (as in the 2017 IDP) classifies the Klein River estuary as 'special place' where "*The functioning of the Klein River and its tributary as ecological corridors and linear open space areas should be protected and managed with conservation objectives in mind*" (OSM, 2017: 241). It is further stated that "*the sensitive areas of the biophysical environment (Klein River, its tributary, wetland and vlei systems)… should be protected from further urban development*" (OSM, 2017: 241).

The compatibility of these documents, and the strategies therein, must therefore be investigated and revised and/or integrated as required. Ultimately, the principles of the EMP and the spatial zonation of the Klein estuarine management area must be captured into Integrated Development Framework (cf. OSM, 2017) and the revised SDF.

5.4.2 Management Objective 4.2: Environmental Management Overlay Zones

The Overstrand EMOZ (2016) addresses land-use and development management and has been adopted and the regulations have been promulgated in terms of the Municipal Zoning Scheme. The overlay includes the adopted CML (WCG, 2015). The purpose of this Overlay is to:

- Manage the integrity of coastal ecosystems, ecosystem services, coastal dynamic processes and biodiversity within Coastal Reserves;
- Manage public access for the enhancement of social, economic and recreational opportunities within the coastal environment;
- Manage the character, sense of place and aesthetic value of coastal property; and
- Institute appropriate controls for the protection of people, property, and economic activities within the coastal environment.

5.4.3 Management Objective 4.3: Biodiversity Management Plans

The strategy for developing Biodiversity Management Plans is dependent on CapeNature processes and expertise (including partners) to introduce biodiversity conservation on privately owned land, and also supports the OSM's objective of increasing the amount of land zoned as "open space", as well as expanding the protected area network.

A three-pronged strategy is proposed for securing the conservation of biodiversity priority areas within the estuary area and connecting terrestrial, freshwater and marine systems. The objectives are:

- to identify areas (land and water) that are suitable for incorporation into the formal protected areas network through their declaration as nature reserves, protected environments and marine protected areas, and develop a plan for action towards this goal;
- to identify municipal-owned land that is suitable for biodiversity conservation purposes and develop a plan for its management.
- to identify privately-owned land parcels that would contribute to the establishment of a system of linked conservation areas and to engage the landowners in implementing this plan.

5.4.4 Management Objective 4.4: Estuarine Habitat Rehabilitation

The C.A.P.E. EP's Regional Conservation Plan identified the Klein River estuary as a high priority system requiring rehabilitation, specifically in respect to water quality (pollution), water quantity, alien vegetation clearing and mouth management. All of these aspects have been addressed above. Nonetheless, an estuarine habitats rehabilitation and management programme was identified during the initial EMP development process as a necessity. Research and data gathering are required for the development of such a programme, which is to be incorporated into the next cycle EMP.

Table 6: Management Actions for Land Use Management

Management Actions	Legislation	Deliverables / Indicators	Timing	Responsible Agent(s)
Management Objective 4.1: The spatial implications of the EMP have been integrated into the Overstrand Municipality's SDF				
a) Verify legal aspects and implication w.r.t. riparian rights, compliance with the ICM Act, and other farming legislation, required amendments to regulations and by-laws.	MSA (IDP, SDF), SPLUMA / LUPA	Regulations and by-laws amended as necessary	2023	OSM, DEA&DP, CapeNature, DRDLR
b) Review the OSM RDA proposals as per the SDF and the spatial zonation plan as per the Klein EMP.		Situation assessment	2023/4	OSM
c) Physical integration of the EMP and approved RDA spatial development proposals into the OSM LUMS.		Compatible GIS dataset, associated management guidelines handed over to OSM	2023	OSM
d) Incorporation of the product into the Overstrand Municipality's SDF review.		Spatial implications of the EMP integrated into OSM SDF	Next review	RMA, OSM
Management Objective 4.2: A Coastal Protection EMOZ, incorporating the CML relating to the Klein River estuary, has been adopted and implemented by the Overstrand Municipality as provided for in the ICMA.				
a) Obtain any necessary / outstanding approvals from regulators.	LUPA, MSA, ICMA	Approved planning scheme, regs and by-laws	2023	DEA&DP (DP) OSM RMA
b) Finalise all documentation and datasets and hand over to Overstrand Municipality.	MSA	Handover of datasets and documents to OSM	2023/4	
c) Identify any prerequisites for enforcement, including any training or mentoring. Prepare a relevant implementation plan.	MSA, NEMA, NEM:PAA	Needs analysis undertaken Appropriate training courses & mentorship identified Implementation plan developed		
d) Oversight of the integration of the EMOZ into OSM LUMs.	MSA	Ongoing liaison with OSM Meetings and minutes		
Management Objective 4.3: Public and privately owned land, and portions of the estuarine water body, are made available for management which prioritises biodiversity conservation				
a) Field survey verification of sensitivity analysis as provided in the Klein EMP fine-scale mapping of sensitive areas within the terrestrial margin and water body (coordinated with Overberg fine-scale mapping project)	NEM:PAA NEM:BA ICMA (SMA) NWA	Fine-scale mapping for conservation priority areas	2023/4	CapeNature (RMA), DFFE SANBI,

Management Actions	Legislation	Deliverables / Indicators	Timing	Responsible Agent(s)
b) Revisit and refine spatial representation of corridors and priority areas for conservation	NEM:PAA	GIS dataset – spatial representation of corridors and priority areas for conservation	2023	CapeNature, DFFE, SANBI,
c) Identify all state-, municipality- and privately owned land parcels that are suitable for inclusion in the conservation area network, particularly Critical Biodiversity Areas (CBAs) identified in the Western Cape Biodiversity Spatial Plan (WCBSP)	NEM:PAA	GIS dataset – high priority state land GIS dataset – private land	2023	CapeNature, DFFE, SANBI,
d) Develop a municipal Biodiversity Management Plan (BMP) or Biodiversity Overlay aimed at achieving zoning of all abovementioned municipal-owned land parcels as "Open Space I" or "Open Space III", in line with the WCBSP	MSA	BMP comprising Municipal Open Space System inclusive of CBAs and Ecological Support Areas Council resolution recorded in Council meeting minutes.	2023	CapeNature, DFFE, SANBI, OSM
e) Develop a conservation plan that unpacks mechanisms in the SDF and Overlay scheme for expanding and consolidating the formal conservation area network to ensure long-term protection, encompassing land administered as nature reserves and the estuary water body or portions thereof	NEM:PAA	Conservation plan for declared nature reserves and Marine Protected Areas (MPAs)	2023/4	CapeNature, DFFE
f) Assess and develop Conservation Stewardship proposals for privately-owned land, as well as in the catchment, in line with WCPAES	NEM:PAA	CapeNature representation Engagement with land owners Signed agreements Spatial monitoring and legal tracking of conservancy and stewardship agreements	2023/4	CapeNature
g) Development of guidelines for land use and management in biodiversity priority areas and corridors	NEM:PAA, MSA	Biodiversity management guidelines developed	2024	CapeNature (land) SANBI,
Management Objective 4.4: Rehabilitation of degraded habitats				
a) In hotspots where erosion or excessive trampling is noted, erect barriers to redirect users in order to allow vegetation to recover, with authorization by DEA&DP	NEM:BA, NEMA	Structures and informative signage erected and maintained	2023	OSM, CapeNature (RMA), KREF,
b) Evaluate the physical and biological change in estuarine vegetation, i.e. submerged macrophytes, salt marsh, reeds and sedges, and phragmites, using GIS-based analysis and Bornman's 2007 dataset as a baseline.	NEM:BA, NEMA, NWA	Estuarine habitats monitoring system in place Reports produced	2023/4	CapeNature (RMA), OSM,

Management Actions	Legislation	Deliverables / Indicators	Timing	Responsible Agent(s)
c) Develop an estuarine habitats rehabilitation and management programme, for incorporation into next cycle EMP		Appropriate mitigation measures identified Rehabilitation Programme and action plan developed	2023	CapeNature (RMA), OSM,

5.5 Recommend Priority Actions

It is recommended that the aspects of the EMP listed below be implemented as a matter of priority within the **first year** (i.e. **HIGH PRIORITY**). All other aspects listed in the action plans are by default then considered MEDIUM or LOW priority.

Institutional Arrangements:

- Designation/agreement of RMA role and/or co-management agreement;
- RMA to secure authorisation and budget for any new posts and/or redeploy and/or revise job descriptions of existing posts, to create EMC position to support the work of the RMA and communication with KREF;
- Reconstitution of the Klein River Estuary Forum as an advisory body, endorsement of the EMP, and election of office bearers;
- Establish systems for facilitating communication, assembling and storing monitoring information and for monitoring progress and efficiency of the EMP;
- Mandated authorities and participating institutions to confirm budget allocations for mandated activities/actions;
- Convene a workshop of participating institutions to develop an integrated approach to compliance & enforcement, and address funding requirements; and
- Participating institutions identify the individuals within their organisation responsible for enforcement (create new posts if necessary) and establish a rapid response network for all types of targeted contraventions.

Water Quality & Flow:

- Lobby for ministerial sign off / approval of the Klein River Ecological Reserve;
- Design a Monitoring & Evaluation (M&E) framework to support strategic adaptive management in the implementation of the RDM;
- Conduct field-study investigation (including baseline survey) and assessment of riparian invasive alien plants (IAPs) and sediment transportation;
- Conduct field-study investigation (including baseline sampling) and prepare assessment report on point and diffuse sources of pollution;
- Develop an integrated plan for managing IAPs, riparian rehabilitation, and erosion and sediment transportation in the catchment;
- Develop a pollution rehabilitation management plan for eradicating point and diffuse sources of pollution in the estuarine quaternary catchment (including surface water run-off, liquid waste disposal, leachate from solid waste sites);
- Establish a water quality monitoring programme, according to RDM methods and taking RQOs into account, to monitor pollutants, nutrients and salinity levels; and
- Convene a mouth management workshop to improve understanding and develop a basis for mouth management, obtain the necessary approvals for the MMP, in order to implement the MMP as and when artificial breaching/maintenance is required

User Value:

- Convene meetings with recreational estuary users (consumptive and non-consumptive) to determine user needs, spatial patterns and priorities. Analysis of user needs, spatial patterns and priorities;
- Identify alternatives for location and type of nodes to satisfy the various user groups and agree on criteria for sustainability / development feasibility;
- Adopt and enforce a zonation plan that indicates recreational areas and mediates recreational activities on the water. The zonation is reviewed on a regular basis; and
- Identify and prioritise key issues relating to safety and security at public recreation areas and launch sites, and on the water body (e.g. upgraded/improved channel markers), identify strategy alternatives and priorities.

Land Use Management:

- Verify legal aspects and implication w.r.t. riparian rights, compliance with ICMA, and other farming legislation, required amendments to regulations and by-laws. Drafting of amendments to regulations and bylaws;
- Review the OSM RDA proposals as per the SDF and the spatial zonation plan as per the Klein EMP; and
- Field survey verification of sensitivity analysis as provided in the Klein EMP fine-scale mapping of sensitive areas within the terrestrial margin and water body (co-ordinated with Overberg fine-scale mapping project).

6 SPATIAL ZONATION

6.1 Introduction

Spatial zonation of activities on an estuary is necessary to avoid user conflict and to guide sustainable utilization without degradation of the estuarine environment. The spatial zonation plan provides a means of geographically transposing the aims of the management objectives, where applicable, and is informed by the following (DEA, 2015):

- The geographical boundary of the estuary (i.e. the estuarine functional zone);
- Important habitats (e.g. floodplain, open water, sandflats, etc.);
- The surrounding land uses and existing infrastructure;
- Areas designated for the conservation and protection of biodiversity;
- Appropriate buffers in which land use and development are strictly controlled and monitored; and
- Zones for where certain types of recreational activities are permissible and carrying capacities thereof.

A habitat sensitivity analysis should be the baseline which guides the differentiation of the various zones, identifying threatened, ecologically important habitats as no-go or minimal disturbance zones; those areas which can support controlled, sustainable exploitation of marine living resources; and those where various forms and levels of appropriate water-based recreation are acceptable.

6.2 Geographical Boundaries – Estuarine Functional Zone

The ICMA defines an estuary as "*a body of surface water -*

a) that is permanently or periodically open to the sea;
b) in which a rise and fall of the water level as a result of the tides is measurable at spring tides when the body of surface water is open to the sea; or
c) *in respect of which the salinity is higher than fresh water as a result of the influence of the sea, and where there is a salinity gradient between the tidal reach and the mouth of the body of surface water*".

For the purposes of determining the Resource Directed Measures (RDM), DWS defines the geographical boundaries of an estuary as follows; "*the seaward boundary is the estuary mouth and the upper boundary the full extent of tidal influence or saline intrusion, whichever is furthest upstream, with the five meter above mean sea level (MSL) contour defined as the lateral boundaries*."

The Estuarine Functional Zone (EFZ) is defined by the 2014 Environmental Impact Assessment (EIA) Regulations (GN 985) as "*the area in and around an estuary which includes the open water area, estuarine habitat (such as sand and mudflats, rock and plant communities) and the surrounding floodplain area…*". The NEMP acknowledges the EFZ as the geographical

boundary of estuaries in South Africa. In practice, it is found that the 5 m topographic contour approximates the EFZ for most estuaries in South Africa. It is consequently commonly used to delineate the EFZ in the absence of specific biophysical assessments. In this way, certain activities are not permitted within an estuary without prior Environmental Authorisation.

The EFZ of the Klein River estuary is depicted below in Figure 4.

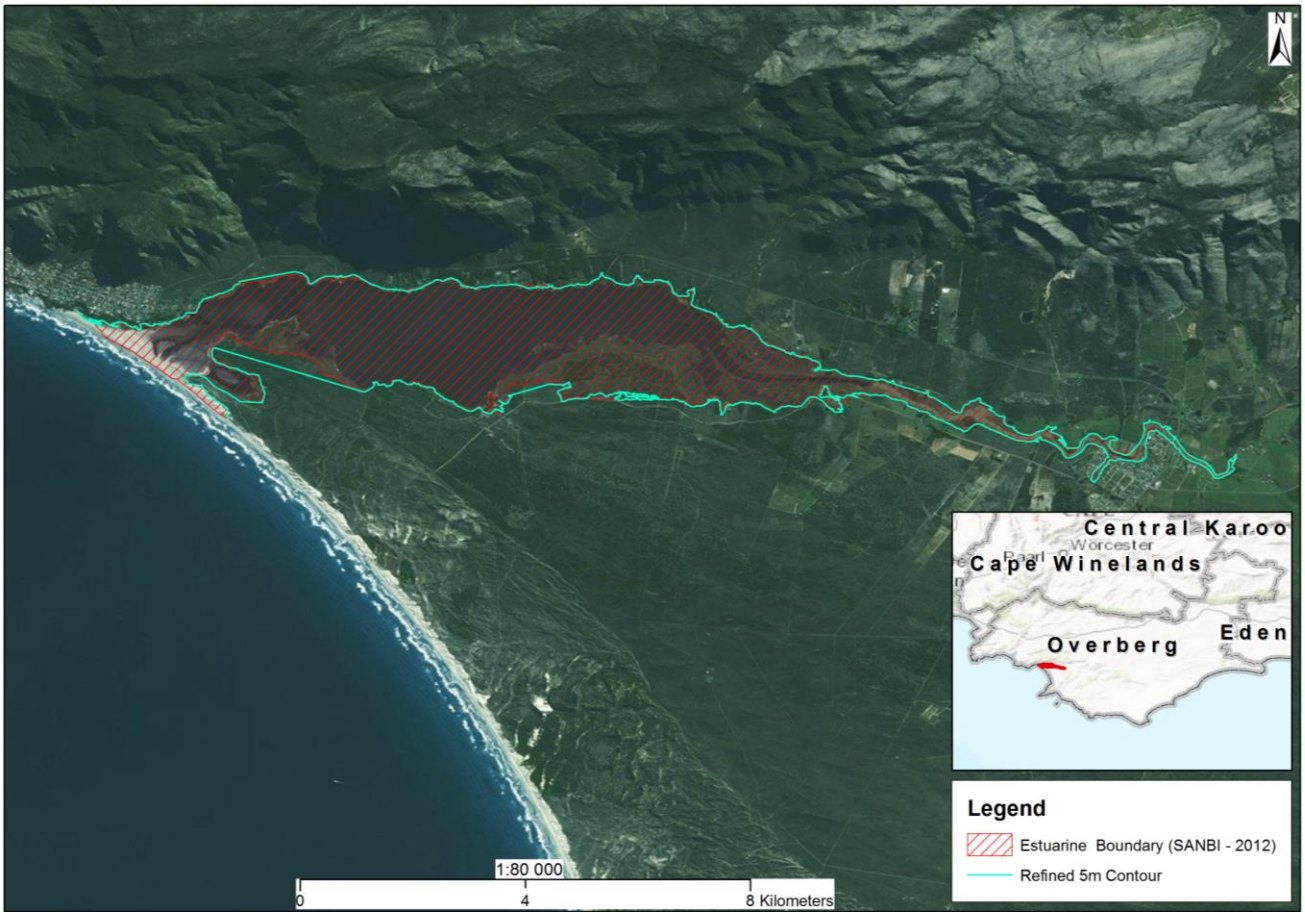

Figure 4: Map of the geographical boundaries of the Klein River estuary, according to 5 m topographical contour, defining the estuarine functional zone

6.3 Coastal Protection Zone and proposed Coastal Management Line

The ICM Act defines a default Coastal Protection Zone (CPZ) which, in essence, consists of a continuous strip of land, starting from the High Water Mark (HWM) and extending 100 m inland in developed urban areas zoned as residential, commercial, or public open space, or 1 000 m inland in areas that remain undeveloped or that are commonly referred to as rural areas. It also includes certain sensitive or at-risk land such as estuaries, littoral active zones and protected areas.

The Provincial MEC, in consultation with the Local Municipalities, is required to refine and formally adopt the CPZ. A process is currently underway to formally establish a CPZ for the Western Cape Coastline. In accordance with provisional delineation of the CPZ for estuaries in the Overberg, as per draft delineations recommended in the Coastal Set-back / Management Lines for the Overberg District project (WCG, 2015), the CPZ is informed by a coastal risks zone approximated by the 10 m amsl contour or 1:100yr floodline around an estuary, whichever is wider.

The ICMA also provides for the establishment of a Coastal Management Line (CML), designed to limit development in ecologically sensitive or vulnerable areas, or an area where dynamic natural processes pose a hazard or risk to humans. A CML, as envisaged by the amended ICM Act, is informed by the projections of risk emanating from dynamic coastal processes such as sea level rise or erosion, information on ecological or other sensitivities adjacent to the coast, as well as the location and extent of existing development and existing executable development rights.

The CML is a continuous line, seawards of which lies:

- Areas of biophysical or social sensitivities such as sensitive coastal vegetation identified as priority conservation areas and formal protected areas,
- those areas that should be left undeveloped, or only be granted appropriately restricted development rights, due to a high risk from dynamic coastal processes, or
- coastal public property.

In estuaries, the CML is delineated by the 5 m amsl contour or 1:100yr floodline, whichever is wider, to differentiate a zone where formal development should be discouraged. The coastal boundaries for the Klein River estuary are illustrated in Figure 5.

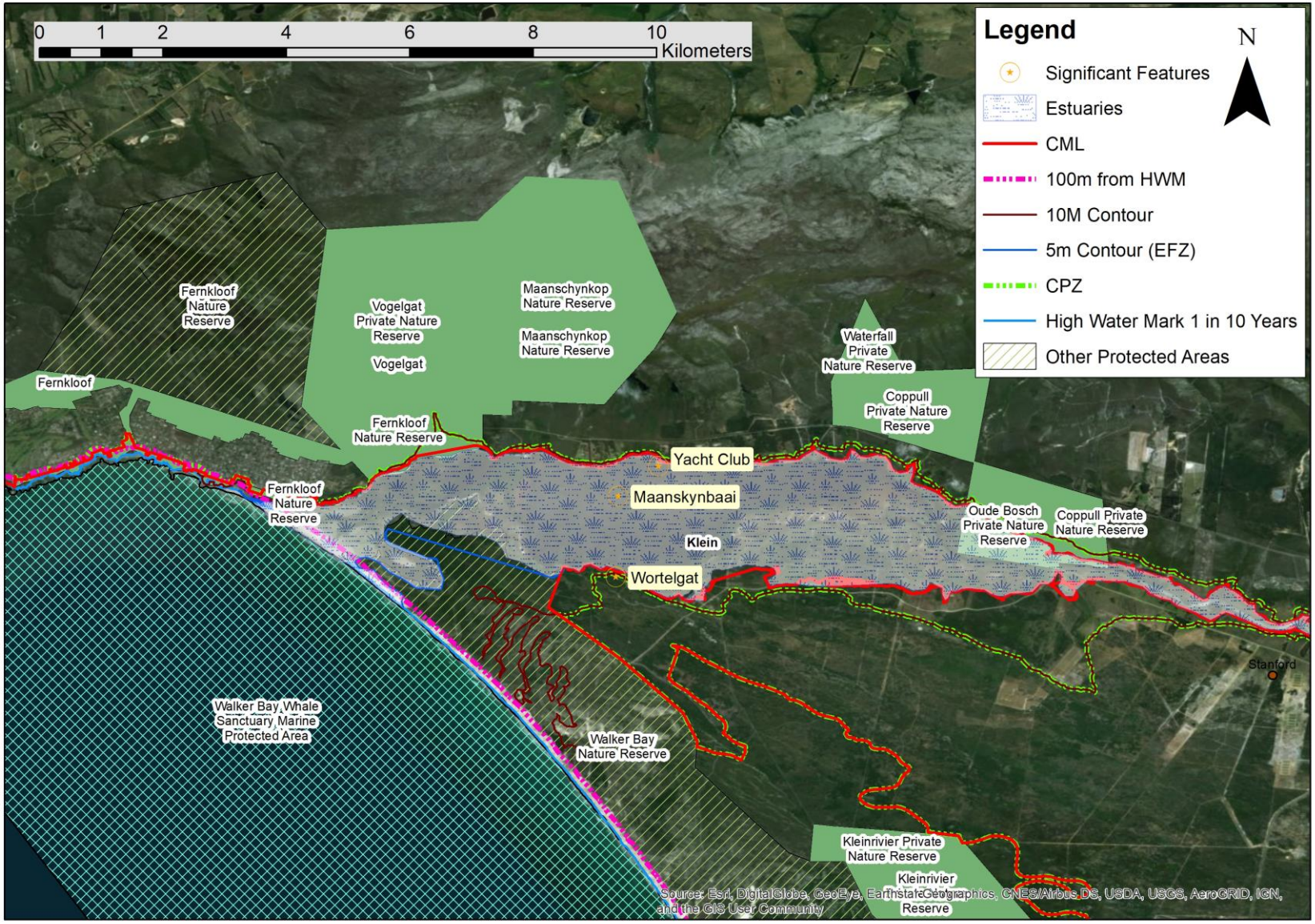

Figure 5: Coastal boundaries of the Klein River estuary and risk projections (WCG, 2015)

6.4 Environmental Impact Assessment regulatory line

In respect of the EIA regulatory scheme, an additional line called the Development Set-Back Line (DSL) needs to be differentiated as it relates to the 'development set-back' referred to in the EIA regulations[1] rather than the coastal management lines described in the ICM Act. However, as part of the on-going process of defining coastal management lines for the Western Cape, it is currently proposed that the CML, as defined under ICMA, also be used as the DSL.

Reference to development set-backs is found in the so-called EIA Listing Notices that list a range of activities that require different levels of environmental impact assessment and the issuing of an environmental authorisation prior to being undertaken.

Typically, an activity would be listed in the form of a range of thresholds which, if exceeded, trigger the need for an environmental impact assessment in the form of a Basic Assessment or full-scale EIA. In some cases, however, a development set-back line is used as spatial reference to include or exclude activities. The EIA regulations indicate that: "*development setback" means a setback line defined or adopted by the competent authority*". This implies that if such a setback is defined, the setback delineation replaces the default parameters for an activity, as read within the context of that activity. The competent authority in the Western Cape is DEA&DP or the National Department of Environmental Affairs.

The EIA regulations also refer to whether a development is in front or behind the line – for a coastal development set-back this equates to any development seaward of the line being 'in front of', whilst landward of the line being 'behind'.

An important further point to note is that the development set-backs are usually linked to the presence of urban built-up areas. The regulations indicate that ""*urban areas" means areas situated within the urban edge (as defined or adopted by the competent authority), or in instances where no urban edge or boundary has been defined or adopted, it refers to areas situated within the edge of built-up areas*". These exclusion areas create *de facto* islands in the area below the DSL, within which the specifically excluded EIA triggers don't apply.

The Western Cape Government, as designated competent authority, considers the area below/seaward of existing development as falling outside of the 'built-up area'. Therefore, any exclusions based on a listed activity taking place within the built-up area would not apply to this strip of coastal land, and the prescriptions for environmental assessments related to the particular activity will apply. For example, the beach in front of seafront houses is not considered 'built-up' and environmental authorisations will be required to execute any listed activities on that beach.

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[1] The Environmental Impact Assessment Regulations, 2014, published under Government Notice No. 982 in Gazette No. 3822 of 4 December 2014, in terms of sections 24(5) and 44 of the National Environmental Management Act, 1998 (Act No. 107 of 1998)

6.5 Spatial Zonation Plan

The zonation of the Klein River estuary is largely guided by the zonation of the estuarine water body as established by Proclamation 357 (Regulations for the control of inland waters), issued in terms of the Nature Conservation Ordinance (1972) to control recreational use of the system. The Overstrand Municipality utilises buoys and landmarks (beacons) to demarcate the specified zones (visible in Figure 6).

The habitat map developed using data from Bornman (2007) and Turpie & Clark (2007), was used as the baseline for the identification of sensitive estuarine habitats on the Klein River estuary (Figure 6). The EMP makes provision for the following zones:

- Sanctuary Zones;
- Restricted Zone; and
- Recreation Zone.

These are depicted in Figure 7. Details of the extent, intention and supported / non-supported uses of the estuary zones are provided in the guidelines in Table 8.

Appendix 3 contains a detailed spatial zonation plan for the entire Klein EFZ, inclusive of all surrounding land parcels and zonation, inasmuch as it would apply to a SDF specific to the Klein River estuary. This is accompanied by detailed operational objectives and management guidelines applicable to the various all land parcels or uses. These would need to be amended or updated upon changes in land use or zoning.

6.5.1 Sanctuary Zones

Within the estuary water body, there are two areas that contain the greatest diversity of habitats and thereby offer the greatest potential for attaining the target of conserving 33% of all estuarine habitats (Turpie & Clark, 2007). These are located towards the mouth (west), and at the head of the lagoon (east) where sediment deposition occurs. The two areas, which together support the habitats reported in Table 7 and illustrated in Figure 6, are proposed as no-take sanctuary zones, supporting low impact recreational activities only.

Table 7: Extent of habitats in proposed sanctuary areas of the Klein River estuary

Habitat Types	Total Area (ha)	Area in Sanctuary Zones (ha)	% In Sanctuary Zones
Open water	704.11	249.22	35.4
Phragmites	57.58	30.40	52.8
Reeds and sedges	40.08	27.28	68.1
Rocky bank	4.33	3.84	88.8
Salicornia and *Sarcocornia*	8.45	8.31	98.3
Saltpan	1.55	1.55	100.0
Sand banks	159.18	78.25	49.2
Submerged vegetation	202.49	74.45	36.8
Supratidal saltmarsh	161.03	137.63	85.5

The Western Sanctuary area is immediately east of the marine environment and abuts the Walker Bay Nature Reserve on the south. It includes areas of rocky banks and *Salicornia – Sarcocornia*, some supratidal saltmarsh and submerged vegetation. In comparison, the Eastern Sanctuary area encompasses expanses of supratidal salt marsh, reeds and sedges, isolated salt pan, and submerged vegetation (Figure 6).

6.5.2 Restricted Zone

In the vicinity of the Western Sanctuary Area, the area north of the channel is characterised by extensive sand banks and is closest to the urban area of Hermanus. For this reason, it was decided to exclude this from the Sanctuary zone so that livelihood strategies dependent on bait collection and fishing in this area are not compromised. Undeveloped land adjoining this Restricted area (Figure 7) is proposed for conservation in order to establish an ecological corridor that links marine systems, Walker Bay Nature Reserve, the Western Sanctuary zone, and Fernkloof / Vogelgat Nature Reserves.

6.5.3 Recreational Use Zone

The Western and Eastern Sanctuary Zones are separated by a large body of open water that is proposed for recreational use, supporting the existing established use of this estuary for water sport, angling, and other water-based recreational activities that provide amenity for residents and tourists (**Figure 8**).

This area is also the intended focus area for nodal development and use of water-related shore-side facilities, and also allows for sustainable use of estuary resources for livelihood strategies and job creation purposes (e.g. harvesting of plants, aquaculture initiatives).

A Recreational Zones and Activities Map for the Klein River estuary was developed in 2015 through an intensive stakeholder process lasting almost one year, driven by the Overstrand Municipality and CapeNature. The map provides brief regulations for the demarcated sections of the estuary, which correspond to the existing land beacons (**Figure 8**). Further regulations are provided for the upper reaches of the estuary, namely section 16 F (**Figure 9**). The final draft was developed in 2015, and still needs to be formally approved by the RMA and Overstrand Municipality, who implement additional river by-laws.

NOTE: The newly developed recreational activities map for the Klein River estuary, does not incorporate all the recommended and/or indicated zones (e.g. sanctuary and restricted zones) of the initial spatial zonation plan, nor does it indicate the recently established coastal boundaries (CPZ, CML, etc.). It is not certain therefore, to what extent the sanctuary areas and associated regulations are enforced.

It is imperative that the Klein River estuary zonation plan be revised by the RMA to create a consolidated map and amended regulations (if necessary), and enter public engagement, if deliberations or amendments are required.

6.5.4 Other Zones

6.5.4.1 Existing Conservation Areas

Turpie & Clark (2007) set a target for securing habitats in the *terrestrial margin* at 50%. The extent of transformed land in an area defined by a 1 km offset from estuarine habitats, extending as far as 1 km beyond the R43 bridge, is currently approximately 50%.

Existing conservation areas border on the Klein River estuary (Figure 6 and Figure 5). These include the Walker Bay Forest Reserve on the southern bank at the mouth and a private nature reserve on the northern bank abutting the Eastern Sanctuary area. The latter, together with relatively untransformed land and 100 m buffer offset from the banks of the estuary and river within the CPZ, are zoned as Spatial Planning Category (SPC) 'Conservation 2' areas. Statutory conservation areas are zoned as 'Conservation 1' areas.

The area to the north of the Eastern Sanctuary zone is relatively untransformed and presents opportunities for creating linkages between the sanctuary and the Kleinriviersberge through existing private nature reserves and conservancies, and other areas holding potential for biodiversity prioritization.

The draft Protected Area EMOZ makes provision for all the regulations associated with protected areas and needs to be integrated into the OSM planning scheme in order to ensure that land use managers, developers and the public have access to the information.

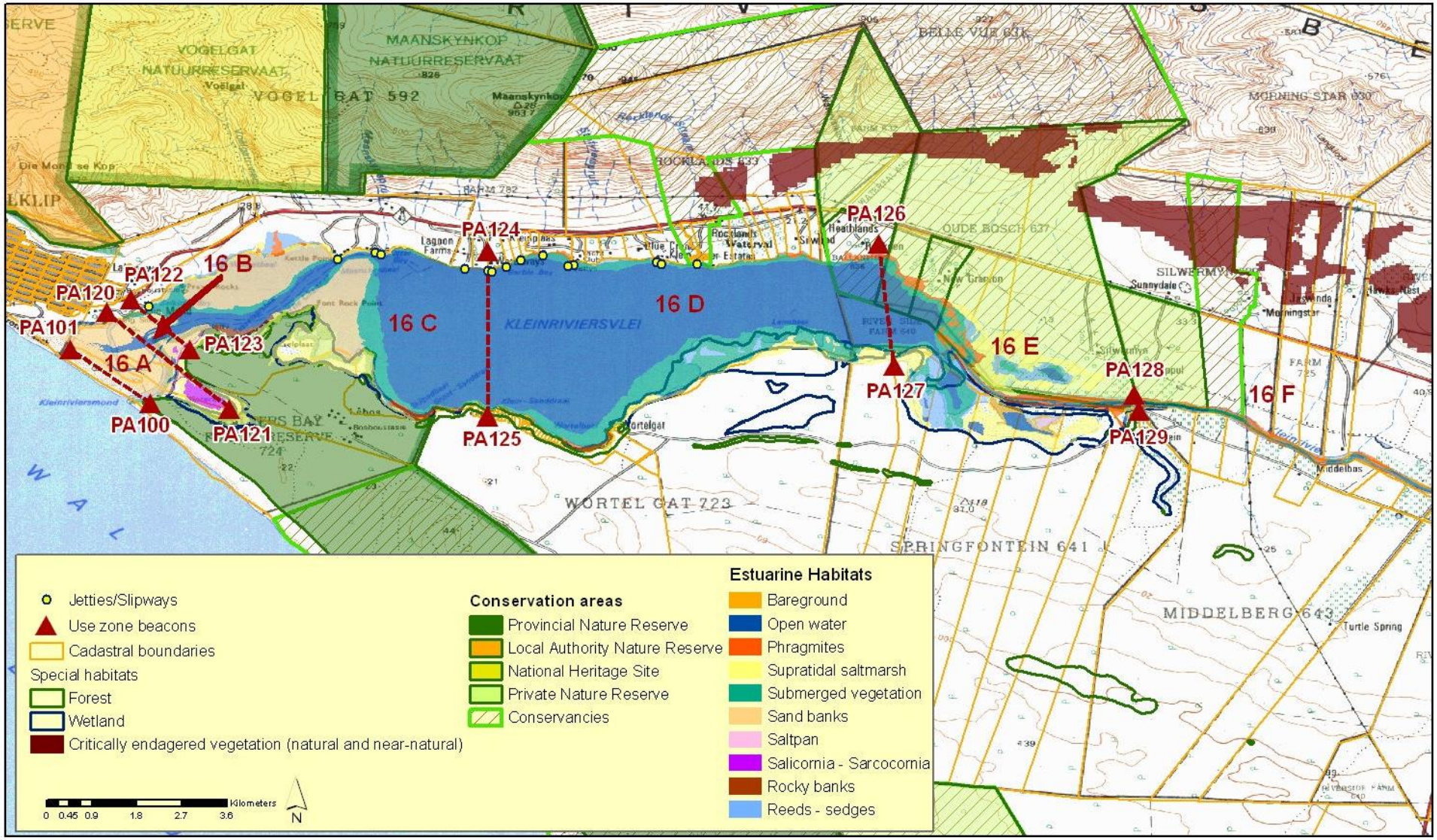

Figure 6: Estuarine habitats (compiled using data from Bornman, 2007 and Turpie & Clark, 2007)

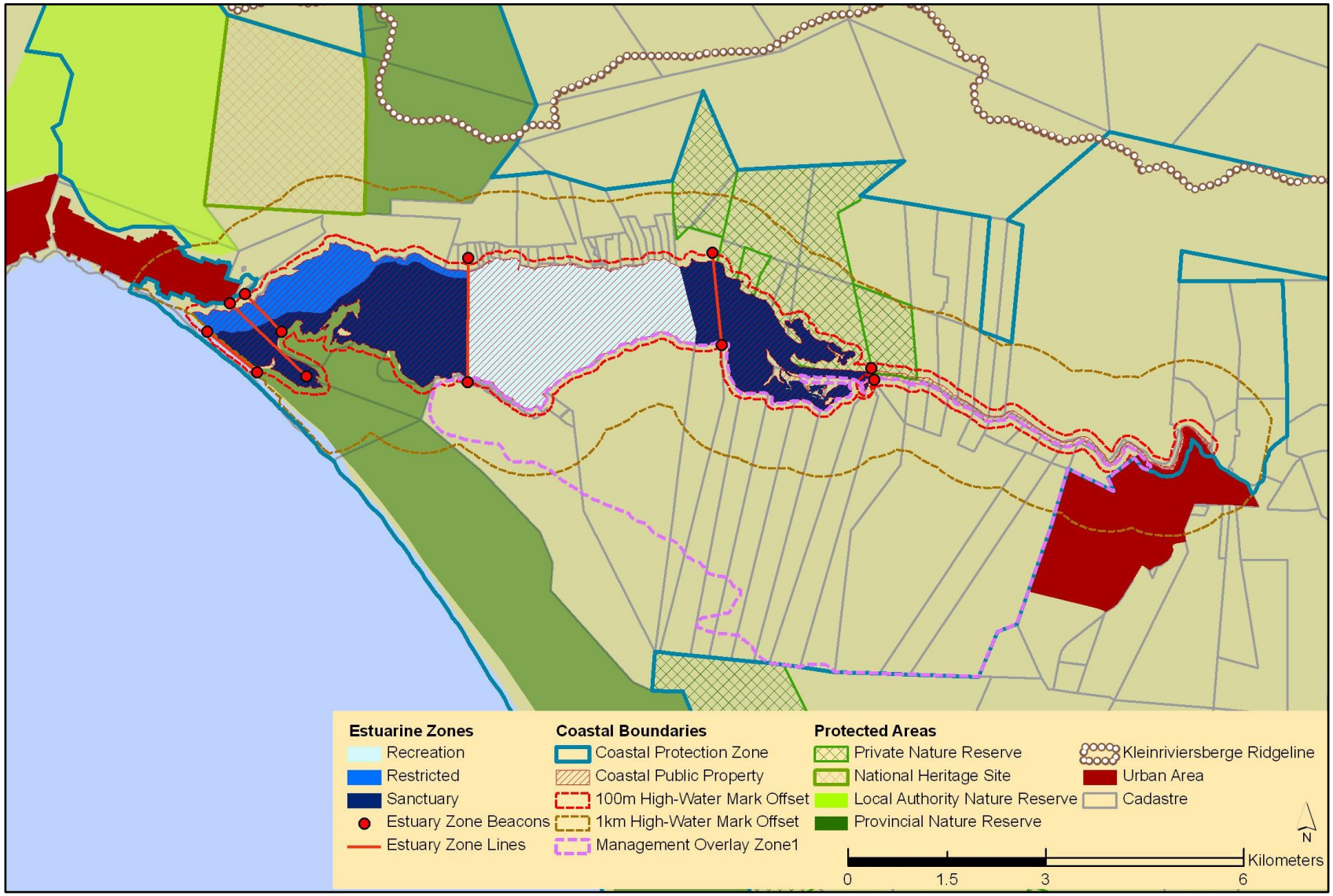

Figure 7: Spatial Zonation of the Klein River estuarine functional zone

A - No boat or craft propelled by engine allowed

B - Angling area. No watersport with power driven boats or crafts. Boats allowed to transfer goods at 10 km/h

C - Speed limit of 10 km/h applies at all times

D - No restriction on watersport

E - Bird Sanctuary. No powerdriven boats except authorised by a permit

F - Only Kleinriver Assocation of Boating (KRAB) permit holders and riparian owners are entitled to use power driven boats

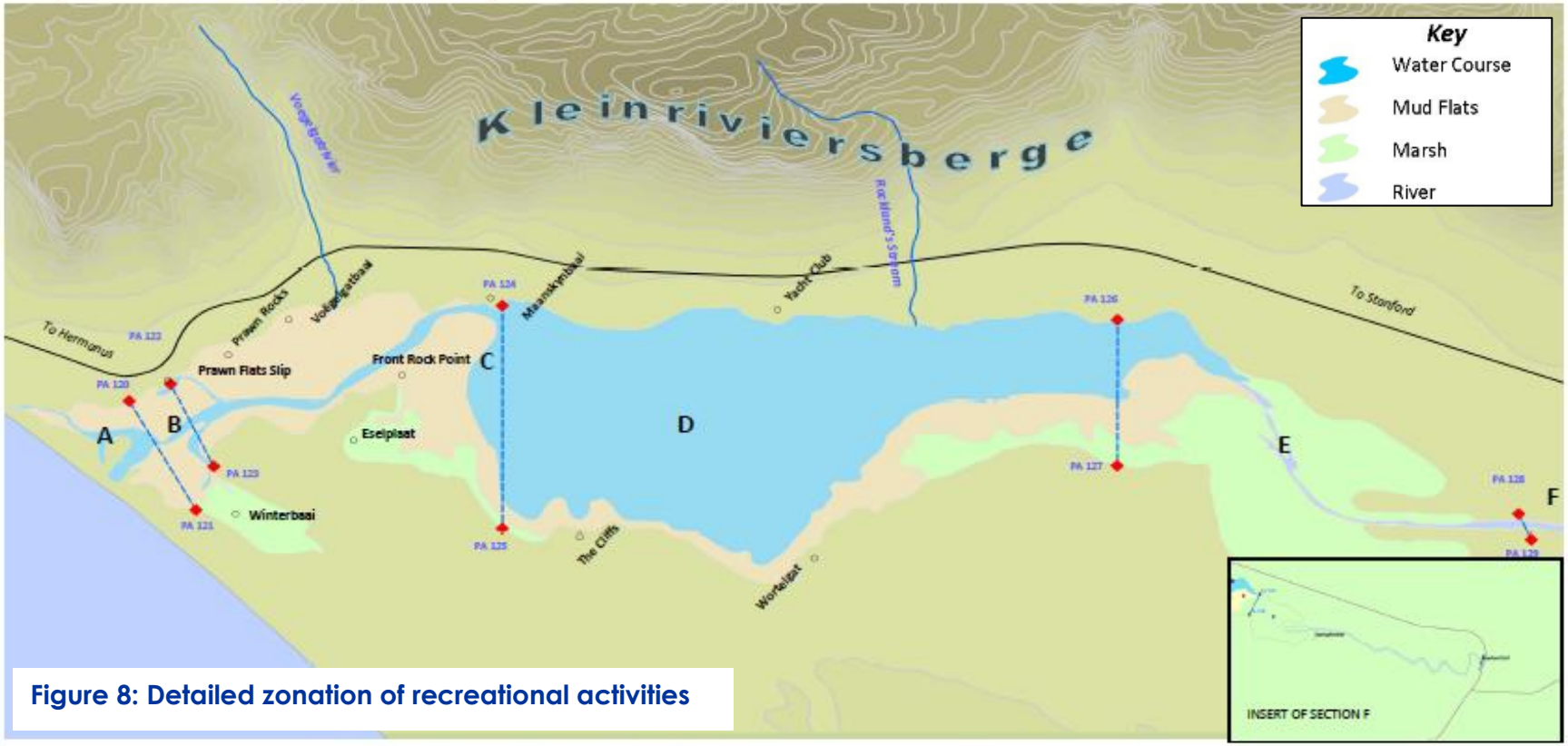

Figure 8: Detailed zonation of recreational activities

Recreational Zones and Activities for the Klein River Estuary is governed by the following legislation:

The relevant Cape Nature legislation applicable to a tidal river system

Overstrand Municipality by-law relating to the control and use of the Bot and Klein River Estuaries (P.N.6147 OF 2004)

www.overstrand.gov.za Emergency nr: 028 313 8111

Only Klein River Association of Boating (KRAB) permit holders and riparian owners are entitled to use power driven boats.
KEEP RIGHT AT ALL TIMES
Upstream of Powerline Corner- seasonal no wake zone (15 Dec-15 Jan, Easter weekend). Water sport prohibited.
Blind corner, narrow channel, submerged rocks on south bank. DEAD SLOW-NO WATER SPORT.
No Access- Lower limit of powerboating. NO ACCESS TO ESTUARY.

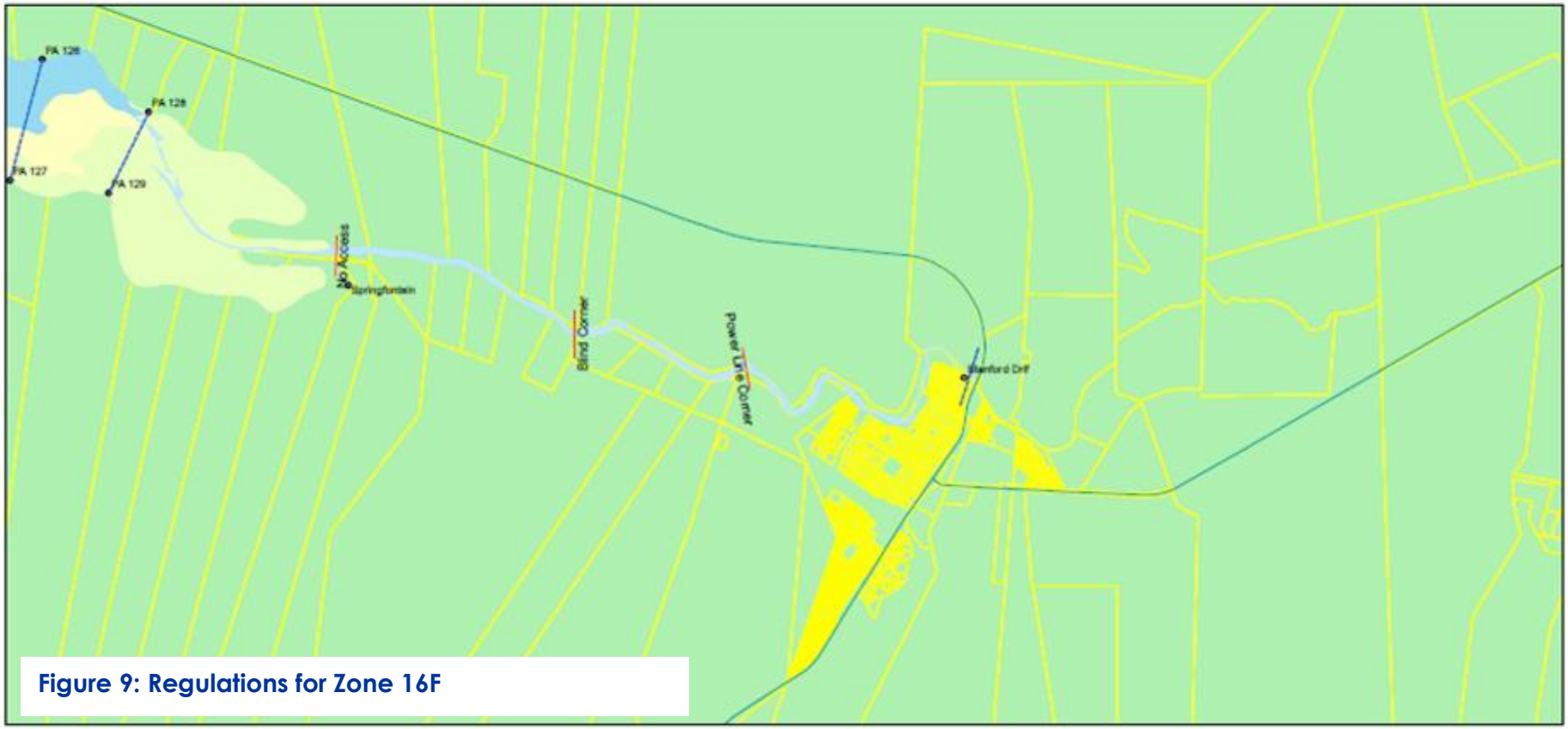

Figure 9: Regulations for Zone 16F

Recreational Zones and Activities for the Klein River Estuary is governed by the following legislation:
The relevant Cape Nature legislation applicable to a tidal river system
Overstrand Municipality by-law relating to the control and use of the Bot and Klein River Estuaries (P.N. 6147 of 2004)
Emergency nr: 028 313 8111

6.5.4.2 *Management Overlay Zone 1*

The 'Management Overlay Zone 1' covers the extent of the Agulhas Limestone Fynbos vegetation, which is indicative of wet limestone substrata, within the CPZ on the southern side of the estuary (**Figure 8**). This unique area may be hydrologically sensitive in terms of aquifer recharging processes and thus a precautionary approach to managing development is recommended.

The implementation of an 'overlay zonation' enables the imposition of development controls via the municipal land use planning scheme. In this regard, a temporary moratorium on any new boreholes, *in situ* sewerage and waste disposal is recommended on the south shore. While the Coastal Protection and Riverine EMOZs incorporates some provisions in respect to abstraction of water, conservancy tanks and waste disposal close to rivers, the latter is limited to 50 m from the river margin and does not extend over the entire Agulhas Limestone Fynbos vegetation area.

On the north side of the estuary, hydrological sensitivity must be considered through the application of the guidelines in the buffer zones.

6.5.4.3 *Core Agriculture*

There is a high proportion of transformation in the areas east and south of the lagoon, primarily under agricultural use, including the area surrounding Stanford and a portion on the north side of the Klein River. The benefits to retaining farmland around Stanford relate to the productivity potential of the land as well as securing the village's character as a rural village.

A riparian buffer of 100 m from the banks of the main stem of the river is proposed as a precautionary measure in the absence of flood line information. Use of the buffer is limited to existing footprints, as described in the guidelines for Conservation 2.

6.5.5 Coastal Boundaries and Policy Lines

In the central area of the lagoon, the northern bank of the estuary is fairly densely developed. It is recommended that pressure for development be accommodated through densification of this 'RDA development node' rather than allowing it to spread, linear fashion, along the length of the estuary. This also improves the viability of extending municipal services to the area. Piped sewerage is an urgent necessity in order to address the impacts of septic tanks on estuary water quality. The development of public recreation facilities, aimed at enhancing the social and economic value of the estuary, is supported in this area that has frontage on to the Recreational zone of the estuary. On the south shore, a pocket of transformed area has been included in the development node although it is likely that this will be lower density and slower to develop than the north shore.

Any proposed developments will be subject to the regulations associated with the legislated coastal boundaries and other policy lines detailed above.

- Figure 5 indicates the Coastal Management Line (CML) as developed by the provincial Overberg CML delineation process (WCG, 2015). This line is designed to

control development in ecologically sensitive or vulnerable areas and can be used to prohibit or restrict development seawards of a particular point. Such restrictions would be applicable in the designated development areas adjacent to the estuary;

- Figure 7 above shows the implications of including the full extent of *any land parcel* which falls within 1 km of the high-water mark (HWM), in the CPZ. Coastal Public Property comprises the water body of the estuary and any intertidal habitats, being defined as the area below the HWM. Figure 7 also shows the zone defined by a 100 m offset from the HWM, this being the area that is subject to requirements in terms of the EIA Regulations, described in the Situation Assessment Report: and
- The draft Coastal Protection EMOZ incorporates specific provisions of the ICMA and EIA Regulations (viz. coastal boundaries, such as the CPZ, Coastal Public Property, 100 m and 1000 m HWM offsets, etc.), and needs to be integrated into the OSM planning scheme in order to ensure that land use managers, developers and the public have access to the information.

Table 8: Management guidelines for the Klein River estuarine management area

DESCRIPTION / LOCATION	SPECIFIC INTENT	ESTUARY AND LAND USE MANAGEMENT GUIDELINES	LEGISLATION / POLICY / PLANS/ GUIDELINES	ENFORCING AGENT
ESTUARY SANCTUARY ZONE (WATER BODY)				
Western estuary sanctuary zone: south of the main channel (dynamic delimiter), extending over zones 16A, 16B, 16C as defined in Proclamation 357, and including the full extent of estuarine habitats on the south bank.	• *In situ* conservation of biodiversity, serving to attain the minimum target for conservation of 33% of all estuarine habitats, as established in the Conservation Plan for Temperate South African Estuaries (Turpie & Clark, 2007). • Sanctuary area for birds, fish and invertebrates, and the protection of habitats. • Monitoring undisturbed ecosystems and undertaking non-destructive research. • Environmental education. • Low impact, non-motorised recreational uses. • Limited duration periodic sailing events.	**Supported uses and activities:** • Management of mouth conditions in conformity with the current approved Mouth Maintenance Management Plan. • Canoes, kayaks, paddle skis, row boats and other low impact non-motorised craft (remain safe distance from feeding and roosting birds) • Sailing and para-sailing – only registered participants during authorised regattas • Bird watching, hiking, swimming, non-destructive scientific research. • Licensed guided catch-and-release enterprises. Release of concessions to be managed in compliance with open and transparent procurement processes. **Non-supported uses and activities:** • Unauthorised breaching of the mouth. • No bait collecting. No killing or removal of fish or invertebrates at any time by any means except permitted scientific research. • No motorised boats. No sail craft (except as supported). No jet skis. • No planting, no harvesting of plant material (with the exception of rehabilitation activity relating to invasive alien vegetation). No aquaculture. No sand mining. **Infrastructure and municipal services:** • No bridges or causeways. No launching. No jetties. No wharfs or edge hardening. **Management interventions** – • Patrolling and enforcement of MLRA regulations and local by-laws.	**NEM: PAA** **ICMA** **National Biodiversity Plan (Turpie et al., 2012)** **MLRA Regulations** **Health Act / Water quality guidelines**	**RMA** **DEA&DP** **DFFE** **Overberg DM** **OSM**

DESCRIPTION / LOCATION	SPECIFIC INTENT	ESTUARY AND LAND USE MANAGEMENT GUIDELINES	LEGISLATION / POLICY / PLANS/ GUIDELINES	ENFORCING AGENT
		• Monitoring, evaluation, and adaptive management action where required		
Eastern estuary sanctuary zone: full extent of zone 16E as defined in Proclamation 357 and an extension westwards of beacons PA126-PA127, measuring approximately 440 m at the mid-point (to be verified) and including the full extent of estuarine habitats on the north and south banks.		**Supported uses and activities:** • Canoes, kayaks, paddle skis, rowing boats and other low impact non-motorised craft, excluding sails craft (remain safe distance from feeding and roosting birds) • Bird watching, hiking, swimming, non-destructive scientific research. • Sustainable levels of harvesting of plant material from estuarine habitats to support job creating enterprises and livelihood strategies. • Rehabilitation of the riparian reserve. **Non-supported uses and activities:** • No bait collecting. No killing or removal of fish or invertebrates at any time by any means except permitted scientific research. • No removal of indigenous vegetation, no planting of any material (except where rehabilitation is underway), no fertilisers or pesticides in the riparian reserve. • No motorised boats. • No sail crafts. • No jet skis. • No sand mining. **Infrastructure and municipal services:** • No bridges or causeways. No launching. No jetties. No wharfs or edge hardening. **Management interventions** – • Patrolling and enforcement of MLRA regulations and local by-laws. • Monitoring, evaluation, and adaptive management action where required	**NEM: PAA** **ICMA** **National Biodiversity Plan (Turpie et al., 2012)** **MLRA Regulations** **Health Act / Water quality guidelines**	**DFFE** **CapeNature (RMA)** **Overberg DM** **OSM**
ESTUARY RESTRICTED ZONE (WATER BODY)				

DESCRIPTION / LOCATION	SPECIFIC INTENT	ESTUARY AND LAND USE MANAGEMENT GUIDELINES	LEGISLATION / POLICY / PLANS/ GUIDELINES	ENFORCING AGENT
North of, and including the main channel (dynamic delimiter), and including the full extent of estuarine habitats on the north bank, extending over zones 16A, 16B and 16C (as defined in Proclamation 357), restricted to a limit of 100 m from the bank at Maanskynbaai.	• Restricted use to support adjacent estuary and terrestrial conservation areas. • Low impact recreational uses. • Subsistence and recreational fishing and bait collection. • Limited duration periodic sailing events. • Sustainable use of estuary resources for livelihood strategies and job creation purposes.	**Supported uses and activities:** • Management of mouth conditions in conformity with the current approved Mouth Maintenance Management Plan. • Line fishing from the shore or from a boat or craft in compliance with MLRA permitting system and bag limits. • Bait collecting, subject to periodic review, in compliance with MLRA permitting system and bag limits. • Collection of mud prawn, sand prawn, bloodworm, pencil bait and tapeworm restricted to daylight hours, using legal implements. • Canoes, kayaks, paddle skis, rowing boats and other low impact non-motorised craft. • Motorised boats < 7Hp in transit only. • Sailing and para-sailing – only registered participants during authorised regattas. • Bird watching, hiking, swimming, non-destructive scientific research. • Aquaculture enterprises, subject to EIA, licensing and concessions awarded through open and transparent procurement processes. • Sustainable levels of harvesting of plant material from estuarine habitats to support job creating enterprises and livelihood strategies. • Rehabilitation of the riparian reserve. **Non-supported uses and activities:** • Unauthorised breaching of the mouth. • No capturing or removal of fish during mouth breaching events. • No capturing of linefish species with cast nets, seine nets, gill nets or traps. • No removal of indigenous vegetation, no planting of any material (except where rehabilitation is underway), no fertilisers or pesticides in the riparian reserve. • No jet skis. No motorised boats > 7HP. No skiing. • No sail craft except as supported. • No sand mining.	**MLRA Regulations Health Act / Water quality guidelines ICMA PLS Regulations CARA (IAPs) EIA regulations (structures below high-water mark, activities within 100 m of high-water mark).**	**RMA, DEA&DP Overberg DM OSM DFFE**

DESCRIPTION / LOCATION	SPECIFIC INTENT	ESTUARY AND LAND USE MANAGEMENT GUIDELINES	LEGISLATION / POLICY / PLANS/ GUIDELINES	ENFORCING AGENT
		Infrastructure and municipal services: • No bridges or causeways. • Limit of one only licensed launch site and jetty. No other wharfs or edge hardening. **Management interventions**: • Patrolling and enforcement of MLRA regulations and local by-laws. • Monitoring, evaluation, and adaptive management action where indicated, relating to: o Impacts of bait collection on habitats. Interventions may include annual rotation of bait collection areas, boardwalk access. o Individual species' stock status. Interventions may include reduced bag limits, reduced number of fishing competitions, upgrading of patrols and enforcement effort. o harvesting of plant material. Interventions may include seasonal rotation of harvesting areas. o disturbance or invasive alien plants or animals.		
ESTUARY RECREATION ZONE (WATER BODY)				
Zone 16D as established in Proclamation 357, *excluding* the sanctuary zone extension westwards of Beacons PA126-127, including the full extent of estuarine habitats	• Accommodate water sport activity, angling, and other water-based recreational activities that provide amenity for residents and tourists. • A focus for nodal development and use of water-related shoreside facilities. • Adaptive management of recreational activities to stay	**Supported uses and activities:** • Line fishing from the shore or from a boat or craft in compliance with MLRA permitting system and bag limits. • Bait collecting, subject to periodic review, in compliance with MLRA permitting system and bag limits. Collection of mud prawn, sand prawn, bloodworm, pencil bait and tapeworm restricted to daylight hours, using legal implements. • Rehabilitation of the riparian reserve. • Canoes, kayaks, paddle skis, rowing boats, motorised boats, sail craft, power boats, subject to periodic review of guidelines, by-laws and public notices aimed at ensuring safety and security of all users. • Bird watching, hiking, swimming, scientific research.	**MLRA Regulations Health Act / Water quality guidelines ICMA PLS Regulations (launch sites) CARA (IAPs) EIA regulations (structures below high-**	**DFFE / CapeNature (RMA) Overberg DM OSM**

DESCRIPTION / LOCATION	SPECIFIC INTENT	ESTUARY AND LAND USE MANAGEMENT GUIDELINES	LEGISLATION / POLICY / PLANS/ GUIDELINES	ENFORCING AGENT
on north and south banks.	within physical and social carrying capacity using spatial and temporal sub-zones and permitting system. • Sustainable use of estuary resources for livelihood strategies and job creation purposes.	• Aquaculture enterprises, subject to licensing and concessions awarded through open and transparent procurement processes. • Sustainable levels of harvesting of plant material from estuarine habitats to support job creating enterprises and livelihood strategies. **Non-supported uses and activities:** • No capturing of linefish species with cast nets, seine nets, gill nets or traps. • No capturing or removal of fish during mouth breaching events. • No jet skis. • No sand mining. • No removal of indigenous vegetation, no planting of any material (except where rehabilitation is underway) in the riparian reserve. **Infrastructure and municipal services:** • No bridges or causeways. • Launch sites, jetties, wharfs and edge hardening, subject to compliance with ICMA, PLS Regulations (licensing of launch sites) and EIA regulations (structures below high-water mark, activities within 100 m of high-water mark). • Cleaning services to address water-borne waste at public recreational nodes. **Management interventions**: • Safety and security guidelines to be developed to establish spatial and temporal separation of conflicting activities. • Ongoing monitoring, evaluation and adaptive management action, where indicated, to address issues relating to physical and social carrying capacity. **Management interventions** – • Patrolling and enforcement of MLRA regulations and local by-laws. • Monitoring, evaluation, and adaptive management action where indicated, relating to:	**water mark, activities within 100 m of high-water mark).**	

DESCRIPTION / LOCATION	SPECIFIC INTENT	ESTUARY AND LAND USE MANAGEMENT GUIDELINES	LEGISLATION / POLICY / PLANS/ GUIDELINES	ENFORCING AGENT
		○ Impacts of bait collection on habitats. Interventions may include annual rotation of bait collection areas, boardwalk access. ○ Individual species' stock status. Interventions may include reduced bag limits, reduced number of fishing competitions, upgrading of patrols and enforcement effort. ○ harvesting of plant material. Interventions may include seasonal rotation of harvesting areas. ○ disturbance or invasive alien plants or animals.		
CONSERVATION 1 (TERRESTRIAL) Bioregional Spatial Planning Category "A.b Other Statutory Conservation Areas"				
Statutory conservation areas: provincial, local and registered private nature reserves (Open Space III). **Kleinriviersberge – areas above the 120 m contour (recommendation of the Kleinriviersvlei Structure Plan and consistent with Overstrand Municipality proposal to**	• In situ conservation of biodiversity, serving to attain the minimum target for conservation of 50% of the estuary margin, as established in the Conservation Plan for Temperate South African Estuaries (Turpie & Clark, 2007). • Monitoring undisturbed ecosystems and undertaking non-destructive research. • Environmental education. • Non-consumptive land-uses (e.g. eco-tourism). • Providing a broader spectrum of outdoor recreation opportunities as opposed to Category A.a,	**Supported uses:** • Day visitor facilities, walking, horse-riding trails. No private ownership of tourist infrastructure – any developments by concession or lease. The release of concessions to be managed in compliance with open and transparent procurement processes. • Existing and sustainable harvesting of natural resources such as medicinal plants, wild flowers, etc. **Infrastructure and municipal services:** • Existing roads only. No new roads permitted without an EIA. Pedestrian pathways, hiking trails, bicycle paths, horse trails, designed to minimise impact on estuarine and other special habitats. • No overhead lines or masts. Use of solar panels encouraged. • Sewerage: septic tank or approved VIP system, subject to approved design and geohydrological report. • Solid waste – Temporary storage on site in room or containers that are inaccessible to foraging animals. Transported to a municipal transfer station and / or a licensed disposal site. **Management interventions**: • Fire management – compliance with Veld and Forest Fires Act.	**NEM: PAA / NEM: BA** **NEMA** **National Biodiversity Plan (Turpie et al., 2012)** **CARA** **Veld and Forest Fires Act**	**RMA, DFFE DALRRD**

DESCRIPTION / LOCATION	SPECIFIC INTENT	ESTUARY AND LAND USE MANAGEMENT GUIDELINES	LEGISLATION / POLICY / PLANS/ GUIDELINES	ENFORCING AGENT
establish the R43 as a scenic route)	e.g. opportunities for mechanised activities, such as 4X4 access. • Sustainable resource uses, such as game capturing and harvesting of plant products, e.g. buchu.	• Invasive alien vegetation – compliance with CARA, Biodiversity Act. • No clearing of coastal vegetation or disturbance of dunes or dune vegetation. • Any development or infrastructure installations subject to EA. Investigate potential for declaration of statutory protection in terms of Mountain Catchment Areas Act of the area above the 120 m contour.		
CONSERVATION 2 (TERRESTRIAL) Bioregional Spatial Planning Category "B: Buffer areas"				
• **Areas of private or municipal-owned land that are relatively untransformed and serve to connect Conservation I category areas to the Western and Eastern Sanctuary Zones of the estuary.** • **Relatively untransformed privately-owned land on the south side of the estuary, adjoining the Eastern Sanctuary Zone,**	• In situ conservation of biodiversity, serving to attain the minimum target for conservation of 50% of the estuary margin, as established in the Conservation Plan for Temperate South African Estuaries (Turpie & Clark, 2007). • Halt transformation of remaining untransformed natural environments in high-value, high-sensitivity biodiversity areas. • Ecological corridors linking core conservation areas.	**Supported uses:** • Continued use of existing infrastructure and farm lands, within the existing footprint of transformed areas. Change of use, or consent use, of existing infrastructure for agri-tourism or eco-tourism purposes. No new development or cultivation outside the existing footprint of transformed areas. • Conservancy and Stewardship agreements, financial incentives to owners who implement biodiversity prioritisation management interventions. • Designation of formal protected areas. Day visitor facilities, walking, horse-riding trails. • Development or continuation of enterprises involving the sustainable harvesting of natural resources such as medicinal plants, wild flowers etcetera. • Subdivision of agricultural land, if it supports the intentions of this SPC, subject to authorisation in terms of LUPO and Act 70 of 1970, and EIA if a listed activity. • Gardens planted with local indigenous vegetation. Maintain existing indigenous vegetation, rehabilitate transformed areas. Limited extent of lawn.	**NEM: PAA / NEM: BA** **National Biodiversity Plan (Turpie et al., 2012)** **NEMA** **CARA** **Veld and Forest Fires Act** **NEMA** **NEM: ICMA**	**CapeNature** **DFFE** **DEA&DP**

DESCRIPTION / LOCATION	SPECIFIC INTENT	ESTUARY AND LAND USE MANAGEMENT GUIDELINES	LEGISLATION / POLICY / PLANS/ GUIDELINES	ENFORCING AGENT
containing high value wetlands. • **100 m buffer offset from the banks of the estuary and river within the CPZ.**		**Infrastructure and municipal services:** • No in situ sewerage discharge or disposal of solid waste within 100 m of the bank of any river or water course. **Management interventions:** • Promote stewardship and protected area designation. • Fire management – compliance with Veld and Forest Fires Act. • Invasive alien vegetation – compliance with CARA, Biodiversity Act.		
CORE AGRICULTURE				
Southern part of the estuary management area, and area surrounding Stanford, including a portion on the north side of the Klein River.	• Maintain the agricultural reserve of farmland required for food production purposes. • Protection of prime or unique agricultural land. • Maintain a rural or pastoral character for tourism purposes. Promote LandCare and Area Wide Planning	**Supported uses:** • Extensive and intensive agriculture (Agriculture I) excluding intensive feed farming and other consent uses which are supported in other spatial planning categories within the estuary management area. • Maintenance of corridors of natural vegetation between and around fields. Water-wise practices. • Subdivision not supported, to be managed as provided for in Overstrand Municipality SDF Policy No.5 (Section 5: p49). **Infrastructure and municipal services:** • No in situ sewerage discharge or disposal of solid waste within 100 m of the bank of any river or water course. **Management interventions**: • Compliance with, and monitoring and enforcement of, restrictions and responsibilities applicable to the riparian reserve (30 m on either side of major rivers, 20 m on smaller rivers and 10 m on streams, according to former DWAF's guidelines on demarcation of Riparian Reserves).	**NEM:BA** **CARA** **Veld and Forest Fires Act** **SPLUMA / LUPA**	**DFFE /** **CapeNature** **DALRRD** **OSM**

DESCRIPTION / LOCATION	SPECIFIC INTENT	ESTUARY AND LAND USE MANAGEMENT GUIDELINES	LEGISLATION / POLICY / PLANS/ GUIDELINES	ENFORCING AGENT
		• 100 m precautionary riparian buffer on the main stem and estuary of the Klein River, due to no floodlines information being available, managed in accordance with guidelines for Conservation 2. • Integrated farm planning. Crop rotation. • Fire management – compliance with Veld and Forest Fires Act. • Invasive alien vegetation, erosion control – compliance with CARA, Biodiversity Act.		
MANAGEMENT OVERLAY ZONE 1				
Limestone fynbos area south of the estuary	Application of the precautionary principle in this area where geohydrological processes associated with aquifer recharging are not yet known	Interim management intervention, pending completion of geohydrological modelling for this area: • No new boreholes. • No new in situ sewerage disposal. • No in-situ solid waste disposal.	**Municipal Systems Act** **OSM Land use planning scheme** **NWA**	**OSM** **DWS**
RIPARIAN RESERVE				
Impact zone adjacent to Klein River and minor tributaries and streams	• Reduce sediment load, surface run-off of pollutants, and leachate into the river and estuary; • Control of invasive alien vegetation; • Flood attenuation and minimisation of flood damage • Maintenance and/or rehabilitation of salt marsh and other estuarine habitats	• No cultivation or clearing of indigenous vegetation within 30 m of the bank of a major river, 20 m on smaller rivers and 10 m on streams (former DWAF's guidelines on demarcation of Riparian Reserves). • 100 m buffer for geohydrological processes, i.e. no septic tank soakaway solid waste disposal within 100 m of a river, stream or water course. • Invasive alien vegetation management programme developed. • No development or infrastructure below the 1:100-year floodline. Precautionary principle to be applied until such time as floodlines have been calculated. 100 m buffer to be managed according to guidelines for Conservation 2. • Minimise impacts on sensitive habitats, such as salt marshes, by constructing elevated walkways in areas where access is required or desired, and discouraging access in other areas.	**NEM:BA** **CARA** **Veld and Forest Fires Act** **NWA** **SPLUMA / LUPA**	**DEA / CapeNature** **DALRRD** **DWS** **OSM**

DESCRIPTION / LOCATION	SPECIFIC INTENT	ESTUARY AND LAND USE MANAGEMENT GUIDELINES	LEGISLATION / POLICY / PLANS/ GUIDELINES	ENFORCING AGENT
		• Restrict access for boat launching to public launch sites; provide appropriate infrastructure that serves to minimise impacts on estuarine habitats at these locations. • Likewise, encourage small craft users to launch at designated points within a contained area that is managed to minimise impacts.		

7 IMPLEMENTATION

7.1 Institutional Structure & Arrangements

It is essential that this EMP is regarded as a strategic plan that can guide the detailing of management actions and identification of implementing agents. Therefore, it does not specify the required resources (human and financial) required for proper management of the estuary. However, it does offer a schedule or phased planning approach that incorporates capacity building and implementation at the local level over a five-year period. It is crucial that champions/project leaders/teams are identified who will be responsible for the formulation of detailed project plans and the implementation thereof. The CapeNature Governance Tool will be used to identify, monitor, and report on the implementation of Management objectives.

7.1.1 Key Role Players

Co-management and effective governance has been identified as a vital aspect to the efficient and effective management of the Klein River estuary. Figure 10 displays the key role players that should be included in its management.

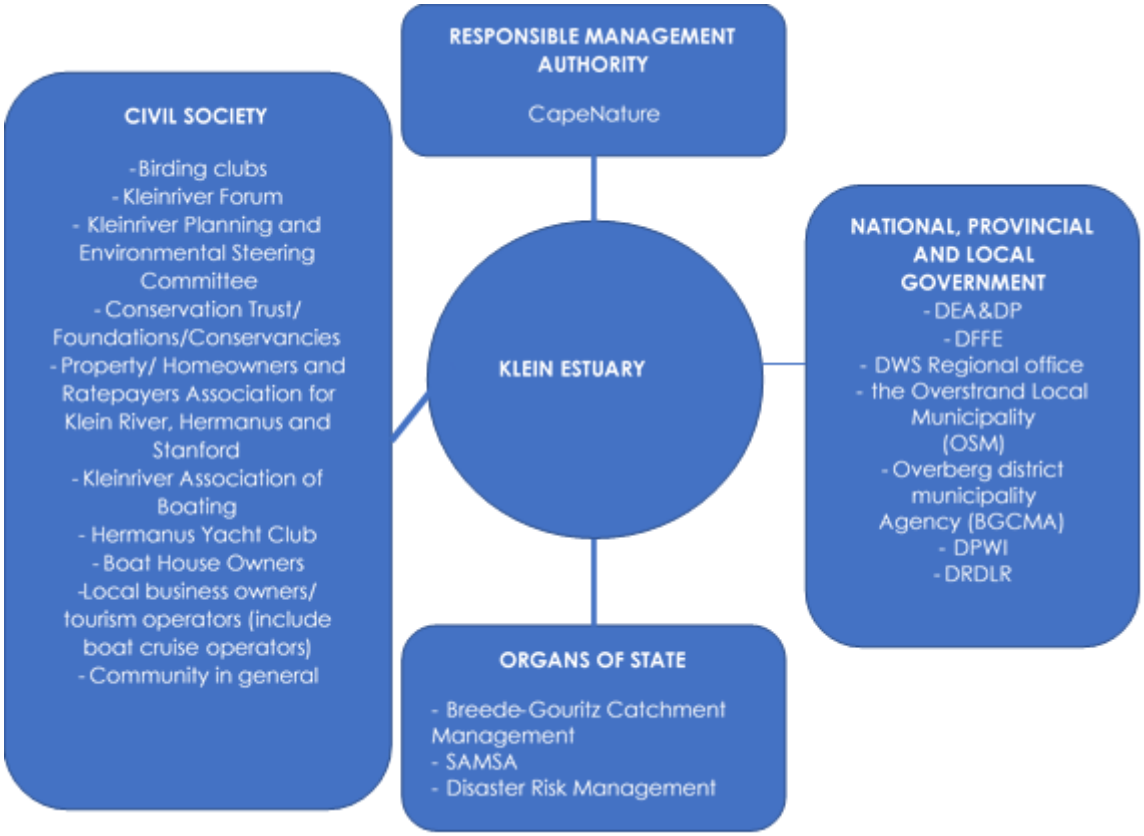

Figure 10: Key role players for the management of the Klein River estuarine system where CapeNature is the RMA

7.1.2 Responsible Management Authority

The 2021 NEMP identifies CapeNature as the RMA, responsible for the development of the Klein River Estuary EMP, as well as being responsible for the co-ordination of its implementation, because the estuary is identified as part of the Western Cape Protected Area Expansion Strategy. In addition, the Walker Bay State Forest / Nature Reserve, located on the eastern shores, is administered by CapeNature which plays a significant role in management of the estuary portion within the protected area. Nonetheless, the Overstrand Local Municipality (OSM), may play a co-management role in assisting with estuarine management functions.

Thus, co-operative governance between CapeNature and the OSM should be facilitated and/or management responsibilities formalised through a signed co-management agreement**.** However, implementation of the EMP can be affected through a range of different forums and agencies.

Given the number of estuaries within the OSM, it is strongly recommended that an Estuarine Management Co-ordinator (EMC) be identified within the RMA to administer estuary-related matters at the local level. The agreed RMA should also hold the responsibility of chairing and facilitating the Estuary Advisory Forum meetings.

7.1.3 Klein River Estuary (Advisory) Forum (KREF)

According to the NEMP (2021), the role of the KREF is interpreted as providing an advisory service to the RMA on issues specific to the management and implementation of the EMP, as well as being the hub that links all stakeholders, which serves to foster stakeholder engagement and to facilitate the implementation of the project plans identified.

The broader community will be able to voice concerns and raise issues via the KREF. This includes Ratepayers' Associations, Non-Governmental Organisations, community groups, conservancies, etc., as well as representatives from surrounding industry and agriculture. Local members will play an invaluable role in providing on the ground, local insight and support to the authorities. Any representatives are obliged to raise issues identified by their constituents and to provide feedback to the constituents. Importantly, the forum will not represent or supplant the individual positions of its members unless specifically mandated to do so.

More specifically, the KREF should consist of the following:

1. A chairperson representing the RMA who will take the lead in co-ordinating the forum;
2. Government Representatives of the major management sectors/areas with executive powers in terms of respective legislation:
    a. Conservation & Living Resources;
    b. Land-use and infrastructure development;
    c. Water quantity and quality; and
    d. Social (and cultural) issues.

3. Representatives of all the above remaining institutions and interest groups. Existing institutions such as CMAs, Water User Associations (WUAs) or catchment forums and conservancies may be used instead of establishing a new separate forum, but these would need to be expanded to include representatives from all interest groups.

The KREF serves to keep all stakeholders informed of the progress and effectiveness of the EMP, identifies areas of concern and makes management recommendations that may need to be incorporated into the EMP, liaises with government departments, through the RMA, to ensure they fulfil their legal obligations and interacts with tertiary & research institutions to help coordinate research programmes. The KREF is thereby instrumental in facilitating the implementation of the action plans.

The KREF and its members may also be directly involved with monitoring programmes by collecting data (physical measurements or visual observations) and can act as the eyes and ears for law enforcement authorities.

7.1.4 Government Departments and Organs of State

The successful implementation of the Klein River EMP may be seen as dependent on the contribution of a number of governmental role players, including:

- **Western Cape Government departments**: Responsible for legislative support, including compliance, funding, research and monitoring, as well as education and awareness;
- **Municipalities, including Overstrand Local Municipality, and Overberg District Municipality**: Responsible for fulfilling key municipal roles as well as the provision of management, technical and legislative support, and funding;
- Relevant **National Government departments,** especially Environmental Affairs, Water & Sanitation (via the regional office), Agriculture, Forestry & Fisheries (regional), Rural Development and Land Reform;
- **Organs of State,** such as CapeNature, who is responsible for general conservation in the region, including the Walker Bay Nature Reserve, biological monitoring, compliance management and facilitating rehabilitation, South African National Biodiversity Institute (SANBI).

The National Department of Environmental Affairs is generally responsible for national standardisation of estuarine management and approval of provincially-led estuarine management plans. Direct involvement in individual estuaries, such as the Klein River system, will occur via existing forums for intergovernmental coordination. These forums will have the management of the various estuarine systems on their agenda from time to time.

- **Western Cape Provincial Coastal Committee**: Responsible for facilitating co-management and effective governance and provincial co-ordination of estuarine management; and
- **Overberg District Municipal Coastal Committee**: Responsible for facilitating co-management and effective governance.

A crucial element towards achieving the vision and objectives of this plan, is to ensure that the responsible authorities and their constituent departments, fulfil their roles and responsibilities as identified within the EMP. In terms of practical implementation of the EMP, each responsible government department is required to produce internal project plans linked the identified management actions, and in line with their legislative mandates. Funding and staff resources will need to be sourced within each respective sector department and/or institute. Alternatively, departments may fund other entities to undertake their necessary functions on their behalf.

7.2 Projects

Effective implementation of this EMP requires the conversion of the priority actions into detailed project plans, which must be prepared and adopted into the respective departmental or institutional implementation strategies. A template for such project plans is provided in the EMP Development Guideline (DEA, 2015) and is attached as Appendix 5 for ease of reference. This template can also be utilised to facilitate the implementation of following research priorities as provided in the 2011 SAR. However, the degree to which these have been completed and their outcomes must be ascertained as part of the 5-year formal review. **The implementation of these objectives and actions will be monitored and reported on as part of the CapeNature Estuary Governance Tool process.**

- Identification of the cause of poor water quality and the source of *E. coli* and nutrients that contribute to eutrophication of estuarine water.
- Factors contributing to extended mouth closures, including freshwater and sediment flow into the estuary from the fluvial and groundwater sources, water-borne sediment from the marine environment and Aeolian processes in the mouth area.
- Impact of groundwater abstraction on freshwater flow into the estuary, particularly from Die Oog that supplies Stanford and surrounding areas; risk of salinisation resulting from over-abstraction.
- Role of alien vegetation in sediment transportation from riparian areas in the riverine catchment, and adjoining fields during flood events; implications for management and removal.
- Capacity of the estuarine catchment to support continued growth of the resident human population, particularly in terms of fresh water and waste disposal.
- Calculation of the 1:100 year flood line for the estuary, and development of a GIS dataset for integration into the OSM's land use management system. This should include specific focus on the Klein River Rural Development Area.
- Compilation of baseline data on fish communities present in the system and spatial distribution, to support informed decisions on zoning.
- Survey of levels of resource extraction and local communities' dependence on the estuary for livelihoods, food or other needs.
- Updating of the GIS dataset of cadastres, using latest data from the Deeds Office, and expansion of metadata to include land ownership categories (e.g. state, municipal, private, etc.).

- Impact of chicken farms and other intensive agriculture / Agri industries located or proposed in the vicinity of the estuary or any water course feeding into the estuary or river.
- Jetties, slipways, boathouses – status of launch sites (licensed/unlicensed), suitability of their location, legality in terms of new legislation, property and access rights.

The Klein River estuary SAR highlighted the need for a centralised estuaries database. Data collected during preparation of the EMP will be stored with the South African Environmental Observation Network (SAEON) and made available to the EMC once established.

8 MONITORING & EVALUATION

8.1 Resource Monitoring

Appendix 1 (Table 10) provides a list of recommended abiotic and biotic parameters to be monitored on the Klein River estuarine system to assess changes in health of the system over time. This monitoring programme is in alignment with the Reserve Determination Study (Anchor, 2015). Additional recommendations have been included for monitoring of visitor numbers, profiles and opinions, and angler catch, and effort required in terms of the management plan.

8.1.1 Ecological Specifications

Ecological Specifications (EcoSpecs) are clear and measurable specifications of ecological attributes (in the case of estuaries - hydrodynamics, sediment dynamics, water quality and different biotic components) that define a specific ecological category, in the case of the Klein River estuary, a Category B (Anchor, 2015).

Thresholds of potential concern (TPC) are defined as measurable end points related to specific abiotic or biotic indicators that if reached (or when modelling predicts that such points will be reached) prompts management action. In essence, TPCs should provide early warning signals of potential non-compliance to ecological specification (i.e. not the point of 'no return'). The EcoSpecs, as well as the TPCs, representative of a Category B for the Klein River estuary (Anchor, 2015), are presented in Table 9 (Appendix 1).

8.2 Review, Evaluation & Reporting System

Within the 5 year implementation period, each EMP implementing agent will gather the information needed for monitoring purposes and forward it to CapeNature prior to the date for compilation of the Quarterly Report, at the latest. Quarterly reports will be prepared and circulated to RMA members at least 2 weeks prior to meetings (held quarterly). An annual report will need to be compiled and submitted to DEA&DP and DEA: O&C (every two years according to NEMP).

In the longer term, the Klein EMP should be reviewed and updated on a five-yearly basis to ensure that objectives and targets are being achieved. An audit should be undertaken alongside the review to evaluate the success and failures with the implementation of the management plan according to the specified performance indicators and deliverables (Appendix 2). The audit should ultimately be the responsibility of the RMA, supported by OSM and the KREF. CapeNature will be responsible for setting up a system for assembling and storing the monitoring information, preparing quarterly progress reports for the Overberg Municipality and the Regional Coastal Committee, conducting annual internal evaluations and compiling annual reports.

The review will involve revisiting the Situation Assessment to determine the progress or changes that have come about as a result of the EMP in terms of the objectives that were originally set as well as any changes in legislation or policies, and followed by revisions or

refinement of the objectives and where necessary, aspects of the management actions plans or monitoring protocol. The KREF will play a pivotal role in providing clarity on:

i) mandates applicable to the study area;
ii) any delegations currently in effect regarding the mandates;
iii) the interpretation of responsibilities as assigned to various institutions in the action plans; and
iv) any delegations to be negotiated in respect of these responsibilities.

The RMA will need to provide funds for the review and drafting of the subsequent EMPs.

9 RECOMMENDATIONS AND CONCLUSION

The following recommendations are made to assist/ improve management of the Klein River estuary:

- The newly developed recreational activities map for the Klein River estuary, does not incorporate all the recommended and/or indicated zones (e.g. sanctuary and restricted zones) of the initial spatial zonation plan, nor does it indicate the recently established coastal boundaries (CPZ, CML, etc.). It is imperative that the Klein River estuary zonation plan be revised by the RMA to create a consolidated map, and enter into public engagement if amendments are required.
- Refinement of the spatial zonation is required to include the following aspects:
    - areas of trampling and compaction of the salt marsh, point source inputs for water quality monitoring, and areas identified for rehabilitation;
    - possible demarcation of a recreational area at the mouth; and potentially,
    - peak user days regulations.
- A stringent compliance strategy must be devised in collaboration with South African Maritime Safety Authority (SAMSA) and DWS to enforce compliance with recommended and promulgated recreational boating regulations.
- An estuarine habitats rehabilitation and management programme should be compiled for the subsequent revision of the EMP.

In conclusion, the EMP presents an integrated and holistic approach to addressing not just the impacts but also the social and economic drivers that affect estuarine health. Most of these are problems that cannot be solved overnight, or opportunities that cannot be realised in a day. The actions proposed in this EMP will be the first steps of a long-term process designed to secure ongoing and sustainable improvements to the current situation.

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APPENDIX 1: ECOLOGICAL SPECIFICATIONS AND RECOMMENDED RESOURCE MONITORING PLAN

The following table provides the Ecological Specifications and the Thresholds of Potential Concern (TPCs) for the Klein River estuary area, which should be seen as targets to be met within 5 years. TherKREFter the estuary should be maintained such that these thresholds are not breached (Anchor, 2015).

Table 9: Ecological Specifications and Thresholds of Potential Concern associated with an Ecological Category B in the Klein River estuary

ECOLOGICAL COMPONENT	ECOLOGICAL SPECIFICATION	THRESHOLD OF POTENTIAL CONCERN
1. HYDRODYNAMICS	Water quality of the influent water at the head of the estuary and in the estuary itself should approximate Reference conditions as closely as possible. Important risk factors include elevated pH and nutrient levels in the influent waters and low oxygen levels in the estuary especially at night.	• pH levels in influent waters at the head of the estuary rise above 7.5 • Dissolved Inorganic Nitrogen (DIN) levels in influent waters at the head of the estuary exceed 1000 µg/ℓ • Dissolved Inorganic Nitrogen (DIN) levels in influent waters at the head of the estuary exceed 30 µg/ℓ • Dissolved oxygen levels in the estuary drop below 4 mg/ ℓ • Levels of contaminants (herbicides, pesticides, trace metals and hydrocarbons) in influent water at the head of the estuary or in the estuary itself exceed SA Water Quality Guideline levels
2. SEDIMENT DYNAMICS	Estuary should be allowed to function as naturally as possible within minimal human intervention	• Mouth is breached artificially when water level is <2.6 m • Amount of time mouth remains open drops below 22%, averaged over a period of 3 years
3. WATER QUALITY	Salinity structure and the occurrence of different abiotic states should correspond as closely as possible with the Reference condition; State 5 (Closed hypersaline) should not occur at all.	• % time in State 1 (Open, marine) drops below 10% • Salinity in any part of the estuary exceed 35

ECOLOGICAL COMPONENT	ECOLOGICAL SPECIFICATION	THRESHOLD OF POTENTIAL CONCERN
4. MICROALGAE	Phytoplankton biomass, measured as water column chlorophyll-a should not exceed 10 ug l-1. Maintain high subtidal benthic microalgae biomass during the closed mouth phase and high intertidal benthic microalgae biomass during the open phase.	Phytoplankton biomass greater than 10 ug l^{-1}. Deviation in benthic microalgae biomass by 20 % compared with Present State concentrations. No brackish epipelic diatoms are found during the closed phase.
5. MACROPHYTES	Maintain the distribution of plant community types i.e. Submerged macrophyte, Ruppia cirrhosa beds during closed mouth brackish conditions, salt marsh, Salicornia meyeriana marsh during open mouth conditions, Phragmites australis stands in the middle/ upper reaches and salt marsh grasses indicative of brackish conditions.	Greater than 20% change in the area covered by different macrophyte habitats for baseline open and closed mouth conditions.
6. INVERTEBRATES	*Benthic Invertebrates:* The estuary should have viable populations of *Callianassa kraussi* in sandy zones and U. africana in muddy zones. Breeding in both species ceases at salinities lower than 17 ppt during prolonged mouth phase. In *U. africana* and export of larvae into marine and postlarvae back to estuary ceases.	Abundance of *C. kraussi* and *U. africana* drops below 50% of recorded total abundances in each season. No recruits in population recorded. (Identify zones where these are abundant based from the study and these would be where the above would be assessed)
	Zooplankton: Prolonged close mouth would result in a loss of marine species (e.g. *Pseudodiaptomus* sp.) from the zooplankton community.	Absence of indicator marine species (*Pseudodiaptomus* sp.) changes by more than 50% of current levels (still to be determined).
7. FISH	Retain the following fish assemblages in the estuary (based on abundance): • estuarine species (20-30%) • estuarine associated marine species (60-70%) • indigenous freshwater species (<1%) All numerically dominant species are represented by 0+ juveniles.	Level of estuary associated marine species drops below 50% of total abundance. Level of estuarine species increases above 50% of total abundance. Occurrence of alien freshwater species in the estuary. Absence of 0+ juveniles of any of the dominant fish species.
8. BIRDS	The estuary should contain a rich avifaunal community that includes representatives of all the original groups, significant numbers of migratory waders and terns, as well as a healthy breeding population of resident waders. The estuary should support thousands of birds in summer and hundreds in winter.	Numbers of waterfowl drop below 600, waders below 100 in summer, and terns below 250 Overall numbers of bird species drop below 1000 for 3 consecutive counts.

The following table provides a list of recommended abiotic and biotic parameters that should be monitored for the Klein River estuarine system as provided by the Klein River Ecological Water Requirement study (Anchor, 2015). Additional recommendations have been included for monitoring estuarine usage.

Table 10: Recommended Resource Monitoring Programme for the Klein River estuary

ECOLOGICAL COMPONENT	MONITORING ACTION	TEMPORAL SCALE (frequency and when)	SPATIAL SCALE (No. Stations)
1. HYDRODYNAMICS	Record water levels	Continuous	DWA station G4R004 (Yacht Club Jetty)
	Measure freshwater inflow into the estuary	Continuous	Head of the estuary
	Aerial photographs of estuary (spring low tide)	Every 3 years	Entire estuary
2. SEDIMENT DYNAMICS	Bathymetric surveys: Series of cross-section profiles and a longitudinal profile collected at fixed 500 m intervals, but in more detailed in the mouth (every 100m). The vertical accuracy should be about 5 cm.	Every 3 years	Entire estuary
	Set sediment grab samples (at cross section profiles) for analysis of particle size distribution (PSD) and origin (i.e. using microscopic observations)	Every 3 years (with invert sampling)	Entire estuary
3. WATER QUALITY	Collect data on conductivity, temperature, suspended matter/turbidity, dissolved oxygen, pH, inorganic nutrients and organic content, and toxic substances in river inflow	Monthly continuous	At river inflow
	Assess and better quantify wastewater input (e.g. nutrients and organics) from point and diffuse sources (e.g. caravan park, WWTW).	Once-off detailed Possibly long-term (e.g. peak seasons) if input remains significant (preferably these should be mitigated)	In stream (source/s)
	Record longitudinal salinity and temperature profiles (and any other in situ measurements possible e.g. pH, DO, turbidity)	Seasonally, every year	Entire estuary (12 stns)
	Water quality measurements taken along the length of the estuary (surface and bottom samples) for system variable (pH, dissolved oxygen, suspended solids/turbidity) and inorganic nutrients in addition to the longitudinal salinity and temperature profiles.	Seasonal surveys, every 3 years or when significant change in water inflows or quality expected	Entire estuary (12 stns)

ECOLOGICAL COMPONENT	MONITORING ACTION	TEMPORAL SCALE (frequency and when)	SPATIAL SCALE (No. Stations)
4. MICROALGAE	Record the relative abundance of dominant phytoplankton groups, i.e. flagellates, dinoflagellates, diatoms and blue-green algae Chlorophyll-a measurements taken at the surface, 0.5 m and 1m depths , under typically high and low flow conditions using a recognised technique, e.g. HPLC or fluoroprobe. Intertidal and subtidal benthic chlorophyll-a measurements	Summer and winter survey every 3 years	Entire estuary (5 stns)
5. MACROPHYTES	Ground truthed maps; Record number of plant community types, identification and total number of macrophyte species, number of rare or endangered species or those with limited populations documented during a field visit; Record percentage plant cover, salinity, water level, sediment moisture content and turbidity on a series of permanent transects along an elevation gradient; Take measurements of depth to water table and ground water salinity in supratidal marsh areas	Summer survey every 3 years	Entire estuary (5 stns)
6. INVERTEBRATES	Zooplankton: Record species and abundance of zooplankton, based on samples collected across the estuary at each of a series of stations along the estuary.	Summer and winter every 3 years	Entire estuary (6 stns)
	Benthic Invertebrates: Record benthic invertebrate species and abundance, based on van Veen type grab samples in subtidal and core samples in intertidal at a series of stations up the estuary, and prawn holes density. Measures of sediment characteristics at each station.	Winter and summer survey every 2 years	Entire estuary (min. 5 stns)
7. FISH	Record species and abundance of fish, based on seine net and gill net sampling.	Summer and winter survey every 3 years	Entire estuary (6 stns)
8. BIRDS	Undertake counts of all water associated birds, identified to species level.	A series of monthly counts, followed by winter and summer survey every year	Entire estuary (4 sections)
	Conduct regular counts of users, collecting statistics on the profile (origin, gender, age, income category) and activities of visitors to the Klein estuary using self-fill in questionnaires	Continuous	Visitor entry points and key sites of interest

ECOLOGICAL COMPONENT	MONITORING ACTION	TEMPORAL SCALE (frequency and when)	SPATIAL SCALE (No. Stations)
9. HUMAN USE	Conduct regular counts of users and boats, separated by type.	Twice per week	Entire estuary
	Survey visitor opinions on impacts of key management interventions.	Intensively (3x/week) every 5th year	Entire estuary
	Creel surveys of Catch, Effort and C.P.U.E. for shore and boat-based anglers, and surveys of illegal bait harvesting.	Intensively (3x/week) every 5th year	Entire estuary

APPENDIX 2: RECOMMENDED PERFORMANCE MONITORING PLAN

Table 11: Recommended Performance Monitoring Plan for the Klein River Estuarine Management Plan

MANAGEMENT OUTPUTS	PERFORMANCE INDICATORS	TIMING	RELEVANT LEGISLATION	RESPONSIBLE AUTHORITY
1. INSTITUTIONAL ARRANGEMENTS				
1.1 Institutional roles and responsibilities for planning, management and enforcement are agreed. **Tag: *Who does what***	• Signed agreement or delegation clarifying areas operation, and roles and responsibilities • EMP Implementation Memoranda of Agreement • Signed Memoranda of Agreement / Understanding for delegations for delegations for the implementation of the EMP. • Alignment and linkages with supporting programmes and projects activated • Feedback received from participating agencies • Quarterly and annual reporting to DEA and KREF, undertaken by EMC • Action plans updated as and when required • Integrated evaluation of EMP at 5 yearly intervals	Twice a year	ICMA NEMP	OSM, Cape Nature, Key partners,
1.2 An effective and sustainable organisational structure is facilitating and coordinating implementation of the EMP. **Tag: *Someone to hold it all together***	• EMC position and office established • Estuary Advisory Forum (KREF) Meeting minutes, attendance register • Communication network established • EMC distribution of Progress Reports • Monitoring information and storage system established • Outputs monitoring system established, with associated reporting system (performance reporting) • EMP evaluated and updated at 5 yearly intervals	Twice a year	ICMA NEMP	RMA, OSM, CapeNature,
1.3 Institutions and individual roleplayers have the necessary capacity and	• Human resources available and project champion(s) for allocated management actions	Twice a year	ICMA NEMP	RMA, CapeNature,

resources to engage in estuarine management. **Tag:** ***Knowing what's important***	• Funding available for facilitation of specialist input and attendance at training course • Training course attendance records and qualifications • Signed MOUs for additional support via secondments • Staff appraisals ito management actions and projects • Adequate infrastructure, equipment and resources to fulfil management responsibilities • Funding secured for 5 year cycle			OSM, Key partners
1.4 There is improved compliance from citizens and officials through improved capacity for enforcement of the legislation relating to resource use in and around the estuary. **Tag:** ***Understanding and respecting the law***	• Workshop convened Inter-governmental MOU • Agreement reached on management action plan – activities, responsibilities and time frames • Inter-governmental MOU • Participating institutions identify and deploy enforcement officers • Rapid response network established with key authorities • Funds are allocated for training • Training course attendance records • Compliance hotline established • Budgets allocated for Compliance campaign projects including education and awareness	Twice a year	Relevant legislation for participating institutions	DEA&DP, OSM, CapeNature, other enforcement agencies
2. WATER QUANTITY AND QUALITY				
2.1 District and Local Municipalities and the Breede-Gouritz Water Management Agency co-operate to implement Resource Directed Measures (RDM). **Tag:** ***Setting the limits***	• Ecological Reserve approved by Minister DWS, with Ecological reserve and Resource quality objectives gazetted • Baseflow to the estuary is restored and protected. • Implementation of the Reserve, including licensing of all water use, capping of licenses issued, ecological monitoring, monitoring of license conditions • GIS dataset of 1:100 and 1:50 floodlines • Monitoring and Evaluation implementation plan developed, with MOUs for implementation	Twice a year for DWS	NWA ICMA	BGCMA, DWS, DEA&DP, OSM, TLM, ODM

2.2 Water quality is improved, and flow is improved, through prioritised riparian restoration initiatives and an intensive local municipality-driven campaign to 'clean up' polluting activities and installations. **Tag: *Rehabilitation & Safety***	• Detailed maps of invasive alien vegetation and pollution sources • Implementation of the integrated management plan for invasive alien vegetation and sediment transportation • Recovery of natural vegetation and eroded areas	Once a year	NWA CARA NEM:BA	BGCMA, DWS, DFFE, RMA, CapeNature, OSM
	• Implementation of the pollution rehabilitation management plan, reported in minutes of meetings. • Reduced pollution incidents and improved water quality • Funding secured for Clean-Up Campaign interventions • Signed agreements with landowners, contracts for implementation of Clean-up Campaign • Water quality monitoring programme established, database established and water quality reports distributed	Twice a year for DWS Monthly for KREF Ad hoc visual monitoring during normal daily activities	NWA, MSA	RMA, DWS, BGCMA, OSM, ODM, CapeNature
2.3 Mouth management is carried out in accordance with an approved plan that has been adopted by RMA Responsible Management Authority	• Improved understanding of mouth management • Mouth Management Plan and Maintenance Management Plan adopted and implemented • Necessary approvals obtained • Support from agencies capacitated to oversee artificial breaching interventions. • Monitoring of breaching and evaluation and reporting of process	Ad hoc (as and when breaching is requested)	NEMA EIA Regulations	RMA, DEA&DP (IEM), OSM, CapeNature

3. USER VALUE				
3.1 The social value of the estuary has been enhanced by the improvement of facilities for recreational users. **Tag: *Amenity***	• Focus group meetings convened and estuary user needs analysed and determined • Phasing plan and Project Concept and Feasibility Reports for development of selected nodes. • Project and Construction Management Action Plan prepared for development of each of the nodes • Zonation plan for recreational areas and uses adopted and enforced • Regular review and updating/improvement of zonation plan	Once a year	MSA SPLUMA / LUPA ICMA EIA Regs MLRA Bylaws	RMA, OSM, CapeNature, DEA&DP,
3.2 Research is being undertaken in order to ensure sustainable utilisation of estuary resources. **Tag: *Economy***	• Focus group meetings convened with user groups • Baseline report produced on current use of all estuarine resources • Data and information on user behaviour, resources and levels of extraction • Identification of future required studies • Value Assessment Report produced with sustainability /protection targets • Sustainable Resource Use Action Plan	Twice a year	MLRA NWA NEM:BA	DFFE, CapeNature, SANBI / CSIR
3.3 Measures have been introduced to improve the safety and security of people and infrastructure at agreed public recreation areas, launch sites and on the water body. **Tag: *Confidence***	• Key issues relating to safety and security are analysed and addressed. • Safety & Security Strategy implemented, particularly urgent interventions • Funding allocation is approved in annual budget	Twice a year	MSA	RMA, OSM, CapeNature, DEA: O&C, DEA&DP, SAMSA, KREF

4. LAND USE MANAGEMENT				
4.1 The spatial implications of the EMP have been integrated into the Overstrand Municipality's SDF. **Tag: *Managing change***	• Land legal aspects of the management area verified • Regulations and bylaws amended as necessary • Evaluation of OSM RDA proposals (SDF) relative to Klein EMP and spatial zonation • Conservation and development objectives for the estuary management area / rural development area are aligned • Hand-over of compatible GIS dataset and associated management guidelines to OSM. • Spatial implications of the EMP integrated into OSM SDF	IDP / SDF 5 year cycle review	MSA, SPLUMA/ LUPA	OSM, DEA&DP (DP), DRDLR, CapeNature
4.2 A Coastal Protection Environment Management Overlay Zone (EMOZ) incorporating the Coastal Management Line relating to the Klein River estuary has been adopted and implemented by the Overstrand Municipality as provided for in the ICMA. **Tag: *Making it enforceable***	• Approved planning scheme, regulations and by-laws • Up-to-date cadastral and zoning GIS dataset • Hand-over of datasets and documents to OSM • EMOZ is integrated into the OSM LUMS (with ongoing liaison maintained)	Once a year	ICMA	DEA&DP, OSM, CapeNature
4.3 Public and privately-owned land, and portions of the estuary water body, are made available for management which prioritises biodiversity conservation. **Tag: *Promoting stewardship***	• Field verification of habitat sensitivity analyses (co-ordinated with Overberg fine-scale mapping project) • Spatial representation of corridors and priority areas for conservation refined (GIS data set) • Opportunities (land parcels) suitable for inclusion into conservation area network identified • Overstrand Municipality and the Estuary Forum reach agreement on conservation and development targets. Resolution recorded in minutes of Estuary Forum meeting. • OSM has adopted a Biodiversity Management Plan (Open Space System) - Council resolution recorded in Council meeting minutes.	Once a year	ICMA, NEM:PAA, NEM:BA	OSM, CapeNature, RMA, DEA SANBI,

	• CapeNature and DEA have adopted a Conservation plan for declared nature reserves and MPAs - Record of resolution of adoption of the plan. • Gazetted notices relating to declaration of protected areas. • Increase in Conservation Stewardship agreements in line with WCPAES • Spatial monitoring and legal tracking of conservancy and stewardship agreements. • Biodiversity management guidelines developed			
4.4 Estuarine habitat that has been degraded is rehabilitated and continues to perform critical ecosystem functions and contribute to the biodiversity value of the estuary. **Tag: *Restoring habitats***	• Appropriate Structures and informative signage erected to initiate rehabilitation programme • Estuarine habitats monitoring system in place to evaluate change in estuarine habitat/vegetation • Update of Bornman's 2007 GIS dataset of Klein River estuarine habitats • Estuarine habitats rehabilitation and management programme developed and implemented	Twice a year	NEM:BA, NEMA, NWA	RMA, OSM, CapeNature, KREF

MANAGEMENT OUTCOMES	PERFORMANCE INDICATORS	IMPLEMENTING AGENTs
1. **Participants are engaged in an organisational structure for implementation of the Klein EMP. They have the necessary institutional capacity for effective delivery.** **Tag:** ***Institutional arrangements***	EMP quarterly progress reports compiled by RMA, oversight monitoring by DEA&DP / CapeNature.	**OSM, DEA&DP and participating institutions**
2. **The ecological health and functioning of the Klein River estuary is improved and the water is safe for human contact.** **Tag:** ***Water Quality and Flow***	Water quality, flow and ecosystem health monitoring reported in RMA's Quarterly Reports.	**BGCMA, DWS**
3. **Users and managers of estuarine resources and amenities attach greater social and economic value to the Klein River estuary than they do currently.** **Tag:** ***User value***	Interviews conducted as part of the First Generation Klein EMP Final Evaluation.	**OSM, DFFE**
4. **The Overstrand Municipality and land owners in the study area have introduced measures in their land use management practices to safeguard the health of the estuarine ecosystem.** **Tag:** ***Land Use Management***	• Integration of EMP products into Overstrand Municipality land use management system; • Re-zoning of Overstrand Municipality land to Open Space III; • Spatial and legal tracking of conservation conservancy agreements. • Coastal Management Line implemented	**OSM, DEA&DP, CapeNature**

APPENDIX 3: DETAILED SPATIAL ZONATION OF THE KLEIN RIVER ESTUARY ESTUARINE FUNCTIONAL ZONE TAKING ALL LAND PARCELS AND USES INTO ACCOUNT IN THE CONTEXT OF A SPATIAL DEVELOPMENT FRAMEWORK SPECIFIC TO THE ESTUARY

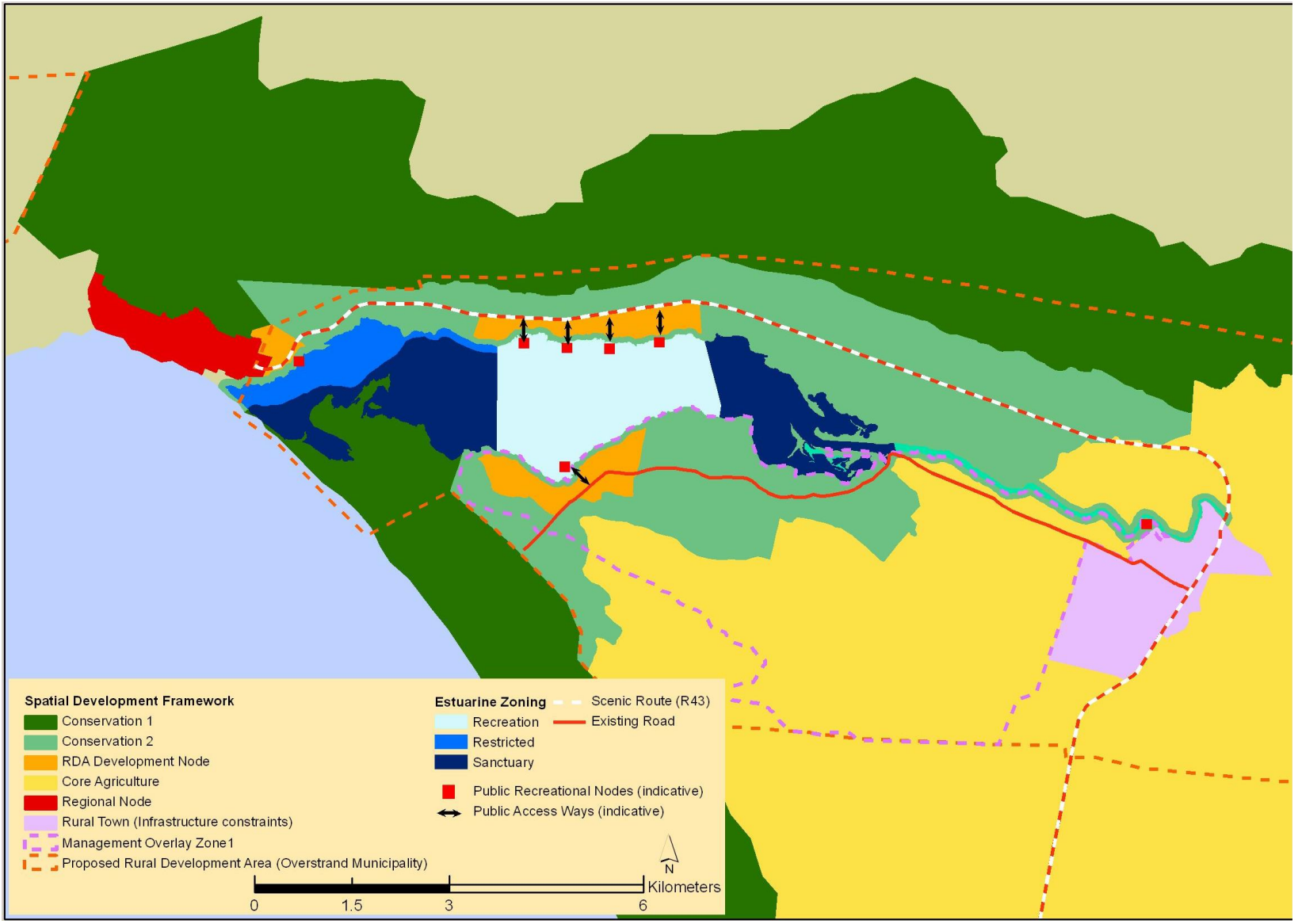

Figure 11: Detailed spatial zonation of the Klein River estuary, surrounding land parcels and uses as may be reflected in a spatial development framework specific to the estuary

Table 12: Operational objectives and management guidelines for the Klein River estuary taking all land parcels within the estuarine functional zone into account

SPATIAL PLAN- NING CATEGORY	DESCRIPTION / LOCATION	SPECIFIC INTENT	ESTUARY AND LAND USE MANAGEMENT GUIDELINES
ESTUARY SANCTUARY ZONE **(WATER BODY)**	Western estuary sanctuary zone: south of the main channel (dynamic delimiter), extending over zones 16A, 16B, 16C as defined in Proclamation 357, and including the full extent of estuarine habitats on the south bank.	a. *In situ* conservation of biodiversity, serving to attain the minimum target for conservation of 33% of all estuarine habitats, as established in the Conservation Plan for Temperate South African Estuaries (Turpie & Clark, 2007); b. Sanctuary area for birds, fish and invertebrates, and the protection of habitats; c. Monitoring undisturbed ecosystems and undertaking non-destructive research;	**Supported uses and activities:** Management of mouth conditions in conformity with the approved Mouth Management Plan. Canoes, kayaks, paddle skis, row boats and other low impact non-motorised craft. Sailing and para-sailing – only registered participants during authorised regattas Bird watching, hiking, swimming, non-destructive scientific research. Licensed guided catch-and-release enterprises. Release of concessions to be managed in compliance with open and transparent procurement processes. **Non-supported uses and activities:** Unauthorised breaching of the mouth. No bait collecting. No killing or removal of fish or invertebrates at any time by any means except permitted scientific research. No motorised boats. No sail craft (except as supported). No jet skis. No planting, no harvesting of plant material (with the exception of rehabilitation activity relating to invasive alien vegetation). No aquaculture. No sand mining. **Infrastructure and municipal services:** No bridges or causeways. No launching. No jetties. No wharfs or edge hardening. **Management interventions** – refer 6.5
	Eastern estuary sanctuary zone: full extent of zone 16E as defined in Proclamation 357 and an extension westwards of		**Supported uses and activities:** Canoes, kayaks, paddle skis, rowing boats and other low impact non-motorised craft excluding sails. Bird watching, hiking, swimming, non-destructive scientific research. Sustainable levels of harvesting of plant material from estuarine habitats to support job creating enterprises and livelihood strategies.

SPATIAL PLAN- NING CATEGORY	DESCRIPTION / LOCATION	SPECIFIC INTENT	ESTUARY AND LAND USE MANAGEMENT GUIDELINES
	beacons PA126-PA127, measuring approximately 440m at the mid-point (to be verified) and including the full extent of estuarine habitats on the north and south banks.	d. Environmental education; e. Low impact, non-motorised recreational uses; f. Limited duration periodic sailing events.	Rehabilitation of the riparian reserve. **Non-supported uses and activities:** No bait collecting. No killing or removal of fish or invertebrates at any time by any means except permitted scientific research.. No removal of indigenous vegetation, no planting of any material (except where rehabilitation is underway), no fertilisers or pesticides in the riparian reserve. No motorised boats. No sail craft. No jet skis. No sand mining. **Infrastructure and municipal services:** No bridges or causeways. No launching. No jetties. No wharfs or edge hardening. **Management interventions** – refer 6.5
ESTUARY RESTRICTED ZONE **(WATER BODY)**	North of, and including the main channel (dynamic delimiter), and including the full extent of estuarine habitats on the north bank, extending over zones 16A, 16B and 16C (as defined in Proclamation 357), restricted to a limit of 100m from the bank at Maanskynbaai.	a. Restricted use to support adjacent estuary and terrestrial conservation areas; b. Low impact recreational uses; c. Subsistence and recreational fishing and bait collection; d. Limited duration periodic sailing events; e. Sustainable use of estuary resources for livelihood	**Supported uses and activities:** Management of mouth conditions in conformity with the approved Mouth Management Plan Line fishing from the shore or from a boat or craft in compliance with MLRA permitting system and bag limits. Bait collecting, subject to periodic review, in compliance with MLRA permitting system and bag limits. Collection of mud prawn, sand prawn, bloodworm, pencil bait and tapeworm restricted to daylight hours, using legal implements. Canoes, kayaks, paddle skis, rowing boats and other low impact non-motorised craft. Motorised boats < 7Hp in transit only. Sailing and para-sailing – only registered participants during authorised regattas. Bird watching, hiking, swimming, non-destructive scientific research. Aquaculture enterprises, subject to EIA, licensing and concessions awarded through open and transparent procurement processes. Sustainable levels of harvesting of plant material from estuarine habitats to support job creating enterprises and livelihood strategies. Rehabilitation of the riparian reserve.

SPATIAL PLAN- NING CATEGORY	DESCRIPTION / LOCATION	SPECIFIC INTENT	ESTUARY AND LAND USE MANAGEMENT GUIDELINES
		strategies and job creation purposes.	**Non-supported uses and activities:** Unauthorised breaching of the mouth. No capturing or removal of fish during mouth breaching events. No capturing of linefish species with cast nets, seine nets, gill nets or traps. No removal of indigenous vegetation, no planting of any material (except where rehabilitation is underway), no fertilisers or pesticides in the riparian reserve. No jet skis. No motorised boats > 7HP. No skiing. No sail craft except as supported. No sand mining. **Infrastructure and municipal services:** No bridges or causeways. Limit of one only licensed launch site and jetty. No other wharfs or edge hardening. **Management interventions** – refer 6.5
ESTUARY RECREATION ZONE **(WATER BODY)**	Zone 16D as established in Proclamation 357, *excluding* the sanctuary zone extension westwards of Beacons PA126-127, including the full extent of estuarine habitats on north and south banks.	a. Accommodate water sport activity, angling, and other water-based recreational activities that provide amenity for residents and tourists. b. A focus for nodal development and use of water-related shoreside facilities. c. Adaptive management of recreational	**Supported uses and activities:** Line fishing from the shore or from a boat or craft in compliance with MLRA permitting system and bag limits. Bait collecting, subject to periodic review, in compliance with MLRA permitting system and bag limits. Collection of mud prawn, sand prawn, bloodworm, pencil bait and tapeworm restricted to daylight hours, using legal implements. Rehabilitation of the riparian reserve. Canoes, kayaks, paddle skis, rowing boats, motorised boats, sail craft, power boats, subject to periodic review of guidelines, by-laws and public notices aimed at ensuring safety and security of all users. Bird watching, hiking, swimming, scientific research. Aquaculture enterprises, subject to licensing and concessions awarded through open and transparent procurement processes. Sustainable levels of harvesting of plant material from estuarine habitats to support job creating enterprises and livelihood strategies. **Non-supported uses and activities:**

SPATIAL PLAN- NING CATEGORY	DESCRIPTION / LOCATION	SPECIFIC INTENT	ESTUARY AND LAND USE MANAGEMENT GUIDELINES
		activities to stay within physical and social carrying capacity using spatial and temporal sub-zones and permitting system. d. Sustainable use of estuary resources for livelihood strategies and job creation purposes.	No capturing of linefish species with cast nets, seine nets, gill nets or traps. No capturing or removal of fish during mouth breaching events. No jet skis. No sand mining. No removal of indigenous vegetation, no planting of any material (except where rehabilitation is underway) in the riparian reserve. **Infrastructure and municipal services:** No bridges or causeways. Launch sites, jetties, wharfs and edge hardening, subject to compliance with ICMA (Coastal Public Property), ORV Regulations (licensing of launch sites) and EIA regulations (structures below high water mark, activities within 100m of high water mark). Cleaning services to address water-borne waste at public recreational nodes. **Management interventions:** refer 6.5 Safety and security guidelines to be developed to establish spatial and temporal separation of conflicting activities. Ongoing monitoring, evaluation and adaptive management action, where indicated, to address issues relating to physical and social carrying capacity.
CONSERVATION 1 (TERRESTRIAL) Bioregional Spatial Planning Category "A.b Other Statutory Conservation Areas"	Statutory conservation areas: provincial, local and registered private nature reserves (Open Space III). Kleinriviersberge – areas above the 120m contour (recommendation of the Kleinriviersvlei Structure Plan and consistent with	a. In situ conservation of biodiversity, serving to attain the minimum target for conservation of 50% of the estuary margin, as established in the Conservation Plan for Temperate South African Estuaries (Turpie & Clark, 2007);	**Supported uses:** Day visitor facilities, walking, horse-riding trails. No private ownership of tourist infrastructure – any developments by concession or lease. The release of concessions to be managed in compliance with open and transparent procurement processes. Existing and sustainable harvesting of natural resources such as medicinal plants, wild flowers, etcetera. **Infrastructure and municipal services:** Existing roads only. No new roads permitted without an EIA. Pedestrian pathways, hiking trails, bicycle paths, horse trails, designed to minimise impact on estuarine and other special habitats. No overhead lines or masts. Use of solar panels encouraged. Sewerage: septic tank or approved VIP system, subject to approved design and geohydrological report. Solid waste – Temporary storage on site in room or containers that are inaccessible to foraging animals. Transported to a municipal transfer station and / or a licensed disposal site.

SPATIAL PLAN- NING CATEGORY	DESCRIPTION / LOCATION	SPECIFIC INTENT	ESTUARY AND LAND USE MANAGEMENT GUIDELINES
	Overstrand Municipality proposal to establish the R43 as a scenic route)	b. Monitoring undisturbed ecosystems and undertaking non-destructive research. c. Environmental education. d. Non-consumptive land-uses (e.g. eco-tourism). e. Providing a broader spectrum of outdoor recreation opportunities as opposed to Category A.a, e.g. opportunities for mechanised activities, such as 4X4 access. f. Sustainable resource uses, such as game capturing and harvesting of plant products, e.g. buchu.	**Management interventions:** Fire management – compliance with Veld and Forest Fires Act. Invasive alien vegetation – compliance with CARA, Biodiversity Act. No clearing of coastal vegetation or disturbance of dunes or dune vegetation. Any development or infrastructure installations subject to full EIA. Investigate potential for declaration of statutory protection in terms of Mountain Catchment Areas Act of the area above the 120m contour.
CONSERVATION 2 (TERRESTRIAL)	Areas of private or municipal-owned land that are relatively	a. In situ conservation of biodiversity, serving to attain the minimum	**Supported uses:**

SPATIAL PLAN- NING CATEGORY	DESCRIPTION / LOCATION	SPECIFIC INTENT	ESTUARY AND LAND USE MANAGEMENT GUIDELINES
Bioregional Spatial Planning Category "B: Buffer areas"	untransformed and serve to connect Conservation I category areas to the Western and Eastern Sanctuary Zones of the estuary. Relatively untransformed privately owned land on the south side of the estuary, adjoining the Eastern Sanctuary Zone, containing high value wetlands. 100m buffer offset from the banks of the estuary and river within the Coastal Protection Zone.	target for conservation of 50% of the estuary margin, as established in the Conservation Plan for Temperate South African Estuaries (Turpie & Clark, 2007); b. Halt transformation of remaining untrans-formed natural environments in high-value, high-sensitivity biodiversity areas; c. Ecological corridors linking core conservation areas.	Continued use of existing infrastructure and farm lands, within the existing footprint of transformed areas. Change of use, or consent use, of existing infrastructure for agri-tourism or eco-tourism purposes. No new development or cultivation outside the existing footprint of transformed areas. Conservancy and Stewardship agreements, financial incentives to owners who implement biodiversity prioritisation management interventions. Designation of formal protected areas. Day visitor facilities, walking, horse-riding trails. Development or continuation of enterprises involving the sustainable harvesting of natural resources such as medicinal plants, wild flowers etcetera. Subdivision of agricultural land, if it supports the intentions of this SPC, subject to authorisation in terms of LUPO and Act 70 of 1970, and EIA if a listed activity. Gardens planted with local indigenous vegetation. Maintain existing indigenous vegetation, rehabilitate transformed areas. Limit ed extent of lawn. **Infrastructure and municipal services:** No *in situ* sewerage discharge or disposal of solid waste within 100m of the bank of any river or water course. **Management interventions:** Promote stewardship and protected area designation. Fire management – compliance with Veld and Forest Fires Act. Invasive alien vegetation – compliance with CARA, Biodiversity Act.
CORE AGRICULTURE	Southern part of the estuary management area, and area surrounding Stanford, including a portion on the	a. Maintain the agricultural reserve of farmland required for food production purposes;	**Supported uses:** Extensive and intensive agriculture (Agriculture I) excluding intensive feed farming and other consent uses which are supported in other spatial planning categories within the estuary management area. Maintenance of corridors of natural vegetation between and around fields. Water-wise practices.

SPATIAL PLAN- NING CATEGORY	DESCRIPTION / LOCATION	SPECIFIC INTENT	ESTUARY AND LAND USE MANAGEMENT GUIDELINES
	north side of the Klein River.	b. Protection of prime or unique agricultural land; c. Maintain a rural or pastoral character for tourism purposes. d. Promote LandCare and Area Wide Planning	Subdivision not supported, to be managed as provided for in Overstrand Municipality SDF Policy No.5 (Section 5: p49). **Infrastructure and municipal services:** No *in situ* sewerage discharge or disposal of solid waste within 100m of the bank of any river or water course. **Management interventions:** Compliance with, and monitoring and enforcement of, restrictions and responsibilities applicable to the riparian reserve (30m on either side of major rivers, 20m on smaller rivers and 10m on streams, according to DWAF's guidelines on demarcation of Riparian Reserves). 100m precautionary riparian buffer on the main stem and estuary of the Klein River, due to no floodlines information being available, managed in accordance with guidelines for Conservation 2. Integrated farm planning. Crop rotation. Fire management – compliance with Veld and Forest Fires Act. Invasive alien vegetation, erosion control – compliance with CARA, Biodiversity Act.
RURAL DEVELOPMENT AREA (RDA) DEVELOPMENT NODE	Area south of the current alignment of the R43 on the north side of the estuary, with frontage on to the estuary Recreational Zone. Area of transformed land on the south side of the estuary, with frontage on to the	a. Designated node for non-agricultural development within the Rural Development Area; b. Opportunities for diversification of activities on farmland; c. Efficiency of municipal services through clustered compact development;	**Supported uses:** Roadside tourist facilities in accordance with Overstrand Municipality SDF Policy No.10 (Section 5: p58). Extensive and intensive agriculture (Agriculture I) excluding intensive feed farming. On-the-farm agri-tourism consent uses: guest farms, bed-and-breakfast enterprises, in accordance with Overstrand Municipality SDF Policy No.11 (Section 5: p59). Eco-tourism developments: guest houses, resorts, camping, hotels, in accordance with Overstrand Municipality SDF Policy No.12 (Section 5: p61). Public recreation nodes that enhance the social and economic value of the estuary, and related access ways. Subdivision of agricultural land, if it supports the intentions of this SPC, subject to authorisation in terms of LUPO and Act 70 of 1970, and EIA if a listed activity. Gardens planted with local indigenous vegetation. Maintain existing indigenous vegetation, rehabilitate transformed areas. Limited extent of lawn. **Non-supported uses and activities:**

SPATIAL PLAN- NING CATEGORY	DESCRIPTION / LOCATION	SPECIFIC INTENT	ESTUARY AND LAND USE MANAGEMENT GUIDELINES
	estuary Recreational Zone.	d. Enhancing the social and economic value of the estuary;	Golf courses, polo estates or other land uses that are water intensive and generate contaminated or nutrient rich run-off. Canalisation of water courses, streams and rivers. Construction or infrastructure within the 1:100 year floodline. Precautionary principle to be applied until such time as floodlines have been calculated. 100m precautionary riparian buffer on the main stem and estuary of the Klein River, managed in accordance with guidelines for Conservation 2. Privatisation of Coastal Public Property (area below the HWM). **Infrastructure and municipal services:** Piped sewerage and water supply, and refuse collection service, is a pre-requisite to any new development in these areas.
PUBLIC ACCESS WAYS	On north side of estuary, to provide access from R43 at safe locations, to public recreation areas. On south side of the estuary, to provide access from the unsurfaced public road to a communal launch site.	a. Provide public access to the estuary at suitable locations (Requirement of the ICMA). b. Provide safe access to recreational nodes developed. c. Improve security by increasing visibility of estuary recreational areas.	**Supported uses (north side of the estuary):** Vehicular access roads, subject to compliance with ICMA (access to Coastal Public Property), and EIA regulations (construction of roads, activities within 100m of high water mark) and appropriate engineering standards. Pedestrian pathways, hiking trails, bicycle paths, horse trails, designed to minimise impact on estuarine and other special habitats. Landscaping with indigenous materials, protection of water courses in their natural (un-canalised) state. Highly visible signposting on the R43. **Supported uses (south side of the estuary):** Vehicular access road, subject to compliance with ICMA (access to Coastal Public Property), and EIA regulations (construction of roads, activities within 100m of high water mark) and appropriate engineering standards. **Management interventions:** Management activities under Management Objective 3.1 and 3.3 and ongoing associated operation and maintenance.
PUBLIC RECREATIONAL NODES	Location of public recreational nodes to be identified.	a. Support nodal development of public recreational facilities that	**Supported uses (north side of the estuary):** Launch sites, jetties, limited extend of edge hardening or wharfs, subject to compliance with ICMA (Coastal Public Property), ORV Regulations (licensing of launch sites) and EIA regulations (structures below high water mark, activities within 100m of high water mark).

SPATIAL PLAN- NING CATEGORY	DESCRIPTION / LOCATION	SPECIFIC INTENT	ESTUARY AND LAND USE MANAGEMENT GUIDELINES
	Limit of one node only in the area bordering the Restricted zone of the estuary. Limit of one node only in the Recreational/Resort area on the south side of the estuary.	enhance the social and economic value of the estuary. b. Indicate where development might be located.	Sports clubs that provide boat mooring and storage facilities and otherwise cater to the needs of members who make use of the estuary for recreational purposes. Public facilities for day visitors, including parking, toilets and picnic sites. Phased release of a limited number of concessions for development of restaurants and other facilities that reserve right of admission to paying customers and that serve to enhance the social value of the estuary. **Supported uses (south side of the estuary):** Communal launch site and associated parking, servicing residents, subject to compliance with ICMA (Coastal Public Property), ORV Regulations (licensing of launch sites) and EIA regulations (structures below high water mark, activities within 100m of high water mark). **Infrastructure and municipal services:** Access – as per Public Access Way category; Piped sewerage and water supply, and refuse collection service, is a pre-requisite to any new development in these areas. Any development or infrastructure installations subject to full EIA. Landscaping of recreational facilities providing opportunities for environmental education. Use of non-indigenous vegetation limited to lawns. Buildings associated with recreational facilities providing shelter from wind, shaded summer areas, sunny winter areas, and optimising surveillance as a security strategy. **Management interventions:** Management activities under Management Objective 3.1 and 3.3 and ongoing associated operation and maintenance.
RURAL TOWN	Stanford	Support the function of this settlement node as a rural village and tourist attraction	Limits to growth determined by the capacity of the environment to support and sustain it, i.r.o. potable water and liquid waste disposal. No development or infrastructure below the 1:100 year floodline. Precautionary principle to be applied until such time as floodlines have been calculated. Urgent intervention required i.r.o. pollutants entering the estuary from Stanford via sewerage pump station overflow and *leiwater*, possibly also from septic tanks via underground hydrological system.

SPATIAL PLAN- NING CATEGORY	DESCRIPTION / LOCATION	SPECIFIC INTENT	ESTUARY AND LAND USE MANAGEMENT GUIDELINES
REGIONAL NODE	Hermanus	Support the function of this settlement node as an administrative and tourist centre	Growth management via application of the urban edge and estuary management area Spatial Conservation and Development Framework as presented herein. Potential leachate entering the estuary from the old Hermanus dumpsite, and possible leak or overflow from sewerage pumping station, requires investigation. Extension of piped services – water and sewerage – to the RDA Development Node on the north side of the estuary.
MANAGEMENT OVERLAY ZONE 1	Limestone fynbos area south of the estuary	Application of the precautionary principle in this area where geohydrological processes associated with aquifer recharging are not yet known	Interim management intervention, pending completion of geohydrological modelling for this area: - No new boreholes; - No new in situ sewerage disposal; - No in-situ solid waste disposal.

SPATIAL PLAN- NING CATEGORY	DESCRIPTION / LOCATION	SPECIFIC INTENT	ESTUARY AND LAND USE MANAGEMENT GUIDELINES
RIPARIAN RESERVE	Impact zone adjacent to Klein River and minor tributaries and streams	a. Reduce sediment load, surface run-off of pollutants, and leachate into the river and estuary; b. Control of invasive alien vegetation; c. Flood attenuation and minimisation of flood damage d. Maintenance and/or rehabilitation of salt marsh and other estuarine habitats	No cultivation or clearing of indigenous vegetation within 30 m of the bank of a major river, 20 m on smaller rivers and 10 m on streams (former DWAF's guidelines on demarcation of Riparian Reserves). 100 m buffer for geohydrological processes, i.e. no septic tank soakaway solid waste disposal within 100 m of a river, stream or water course. Invasive alien vegetation management programme developed. No development or infrastructure below the 1:100 year floodline. Precautionary principle to be applied until such time as floodlines have been calculated. 100 m buffer to be managed according to guidelines for Conservation 2. Minimise impacts on sensitive habitats, such as salt marshes, by constructing elevated walkways in areas where access is required or desired, and discouraging access in other areas. Restrict access for boat launching to licensed launch sites; provide appropriate infrastructure that serves to minimise impacts on estuarine habitats at these locations. Likewise, encourage small craft users to launch at designated points within a contained area that is managed to minimise impacts.

APPENDIX 4: MOUTH MANAGEMENT PLAN

Van Niekerk, L., Huizinga, P. and Carla-Louise Ramjukadh, C-L. 2017. Klein Estuary Mouth Management Plan. Prepared by the Council for Scientific and Industrial Research on behalf of Royal HaskoningDHV for the Western Cape Government, Department of Environmental Affairs & Development Planning.

This should not be confused with the Klein River Estuary mouth maintenance plan (MMP) which will be finalised for a five year period in December 2022. This is a legal document that will be adhered to when planning any mouth management activities with the constraints of this EMP.

APPENDIX 5: PROJECT PLAN TEMPLATE

Source: DEA (2015)

ACTION	Describe the action to be undertaken
COMPLETION DATE	Provide date of expected completion
PERFORMANCE INDICATOR	
Requirements stipulated in policy and legislation	
Available methods, protocols and best practice-guides	
Spatial zonation consideration (e.g. limits/targets)	
Detailed work plan	Task 1: Task 2: Task 3: Task 4:
Scheduling	TASK / TIME (months) 1 2 3 4 5 6 7 8 9 1 ■ ■ 2 ■ ■ ■ 3 ■ ■ 4 ■ ■
Milestone/interim performance indicator	MILESTONE / INTERIM PERFORMANCE INDICATOR / DUE DATE 1 2 3
Responsibilities for different tasks	E.g. Identify specific departments, personnel and/or service providers responsible for execution of this action
Monitoring and reporting plan	E.g. • Define data and information to measure in order to monitor performance indicator/s • Specify frequency at which data/information should be collected/monitored • Where and when to report on progress
Human resource plan	HUMAN RESOURCE / WEEKS PER TASK 1 2 4 4 Staff member 1 Staff Member 2 Service provider
Financial resource plan	TASK / COST (ZAR) 1 2 3 4 TOTAL