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Breede River Estuarine Management Plan

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DOCUMENT USE

The National Estuarine Management Protocol (the Protocol), promulgated in May 2013 under the National Environmental Management: Integrated Coastal Management Act (Act No. 24 of 2008, as amended by Act No. 36 of 2014), sets out the minimum requirements for individual estuarine management plans.

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

This revision of the Draft Breede River Estuarine Management Plan (EMP), including the Situation Assessment 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 estuarine management plans as per the Protocol. This entailed:

- Adjust terminology as per the Protocol (see below)
- Include summary of Situation Assessment
- Include map of geographical boundaries based on EFZ
- Confirm whether the zonation map was officially approved or represents "intended" use zonation - zonation undergoing refinement using carrying capacity study (LBRCT)
- Extend monitoring plan to explicitly include a performance monitoring plan to gauge progress towards achieving EMP objectives (i.e. using performance indicators)
- Update information on institutional structures and arrangements to reflect requirements of ICM Act and the Protocol
- Restructuring of existing information into a more streamline and coherent document;
- Adding additional information where required to fill recommended information gaps;
- LiDAR data used in conjunction with SANBI data to map the 5m contour (Estuary Functional Zone);
- Operational objectives were interrogated and incorporated into Management Action Plans;
- Key Result Areas were converted into the Management Actions Plans using specific sectors not per zones. The Sectors used are
    - Institutional and Management Structure;
    - Water quantity and quality;
    - Conservation of Biodiversity;
    - Sustainable Development; and
    - Public education and awareness, and knowledge enhancement.
- An additional table is provided containing all objectives, with appropriate performance indicators.

- Institutional Arrangements require refinement based on DEADP responsibility, and desired involvement of BREAF and LBRCT.

It does not represent, or replace, the full five-year review process required to re-evaluate the applicability of the plan and to provide new information. This process is therefore still required. Nonetheless, this EMP must be considered a living document that should be regularly updated and amended as deemed necessary.

EXECUTIVE SUMMARY

Introduction

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) (ICM Act), via the prescriptions of the National Estuarine Management Protocol (the Protocol), require Estuary Management Plans to be prepared for estuaries in order to create informed platforms for efficient and coordinated estuarine management.

The Breede River estuary was one of the first estuaries in the country for which an Estuarine Management Plan was compiled as part of a pilot study under the auspices of the C.A.P.E. Estuaries Management Programme with funding from the World Bank. The process of compiling an Estuary Management Plan for the Breede River estuary commenced in 2008 when a Situation Assessment Report was commissioned as a platform for the development of the EMP (DEA, 2015). The Draft Situation Assessment and Estuary Management Plan were updated in 2011, and again as per this current project.

This current revision of the Draft Breede River Estuarine Management Plan (EMP), including the Situation Assessment and the Management Plan itself, is in response to a review conducted by the National Department of Environmental Affairs: Oceans and Coasts in 2014, to ensure compliance with the minimum requirements for estuary management plans as per the Protocol.

Situation Assessment

The Breede River is 322 km long from its source near Ceres to where it enters the Indian Ocean in Sebastian Bay, draining a catchment of approximately 12 600 km^2. The Breede River Estuary comprises approximately the lower 52 km of the river, i.e. from the mouth at Witsand to the extent of the tidal influence 10 km upstream of Malgas, and possesses a total surface area of 455 ha. Although the estuary falls within the winter/bimodal rainfall transition zone, most of the catchment falls within the winter rainfall area. Flows are strongly seasonal with peak flows and floods during the winter months, but the estuary nevertheless enters the sea through a permanently open mouth.

The Breede River Estuary is located on the border between the Swellendam Local Municipality (LM), Overberg District, the second largest local municipality in the Overberg District Municipality (DM), and Hessequa Local Municipality in the Eden DM. In terms of population distribution, the numbers within the municipal ward areas around the Breede River Estuary are mostly low (< 500 individuals), with isolated areas of larger settlement on the northern bank near Witsand and Port Beaufort at the coast (up to 500 individuals) and on the southern bank in the mid-estuary (up to 1000

individuals). Overall, service provision is of a relatively high standard. Close to 10 % of the households in the Malgas region are without access to hygienic toilets, while between 12.3 % and 14.3 % of the households in the Swellendam sub-region and Infanta, respectively, do not have access to piped water. Considerably more households are without electricity. The majority of households (76 %) around the estuary obtain an annual income ranging between R 19 601 and R 307 600. Approximately 4 % of the remaining households receive no annual income.

Most of the land abutting the Breede River is privately owned and devoted to agriculture. Approximately 36 % of the Breede catchment within the Swellendam Municipal area is natural vegetation, and 63 % cultivated croplands, urban development, mining and forestry, contribute less than 0.3 % to the catchment area. No comprehensive heritage inventories have yet been compiled for the study area and its direct environs. However, existing built environment surveys of some rural farmsteads exist as well as two known Provincial Heritage Sites (former "National Monuments").

Due to the Breede River Estuary's geographic location and size, it possesses a relatively high level of biodiversity within a region of relatively high endemism. The micro-algal community, which comprises of phytoplankton and microphytobenthos, of the estuary is present in a lower biomass than other studied estuaries. This is primarily due to the lower nutrient availability and retention time of the Breede system. A total of 59 species of fish have been recorded in the Breede River Estuary with the community dominated by marine estuarine-dependent and estuarine species. Furthermore, 65% of the species recorded by Harrison (2002) were South African endemics with these species accounting for 94 % of the total number of individuals recorded. From the total of 59 species recorded, 23 (30 %) are dependent on estuaries to complete their lifecycle. Consequently, the estuary provides an important nursery and refuge area for the coastal fishes.

The present ecological condition of the Breede River Estuary is classified as "good" and is associated with a Present Status Category of "B", i.e. largely natural, with few modifications. The Intermediate Determination of the Resource Directed Measures for the Breede River Estuary found that the largest factor that contributed to the change in the state of the Breede River Estuary from the Reference Condition to its Present State was the large reduction in river inflow. Given that large volumes of water could not be re-allocated to the estuary; estuarine specialists have decided to keep the Recommended Ecological Category of the Breede River Estuary as Category B. Other potential threats to the integrity of the Breede River Estuary are utilisation of marine living resources (e.g. through recreational fishing and bait collection), recreational activities (e.g. boating, skiing. etc.), water pollution, developments, agricultural activities, and invasive alien plants.

Overall, the Breede River Estuary ranks among the top 20 estuaries in the Cape in terms of its subsistence value which was estimated at R120 000 per annum. The Breede River Estuary also holds substantial tourism value for the local communities positioned along its banks by means of visitors to the estuary and is estimated to be R 25 million

per annum. In addition, the overall property value contributed by the Breede River Estuary is estimated at R 884.1 million, the second most valuable estuary in the Cape, which translates to approximately R 26.7 million per annum in terms of the direct value to the real estate sector of the national economy.

Vision and Objectives

A Vision for the future desired state of the Breede River Estuary, and the management objectives designed to attain this Vision, were developed during engagements with the relevant role players and stakeholders from both the government and private sectors. These included:

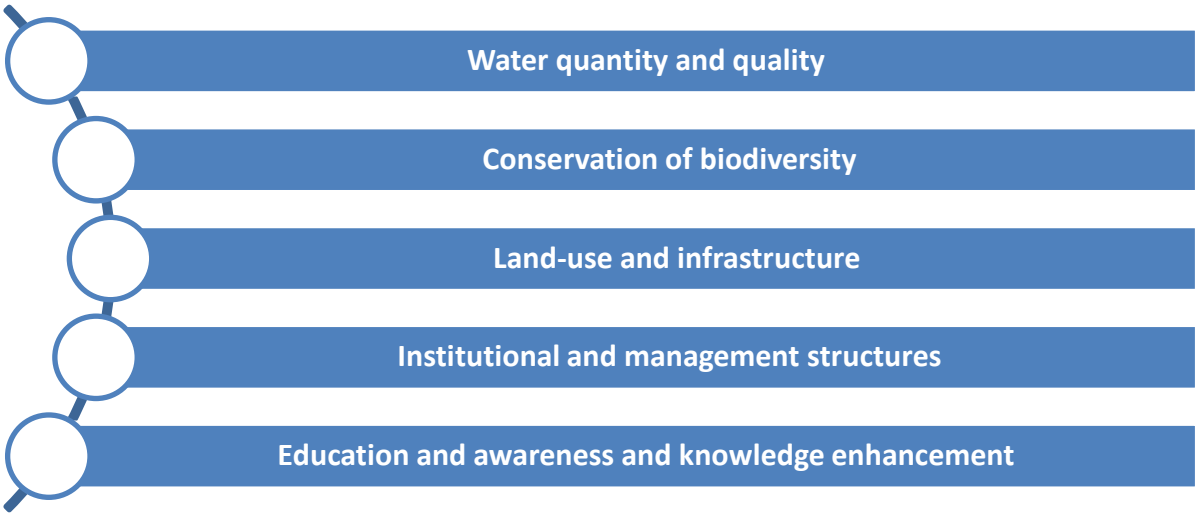
- various Directorates at the Department of Environmental Affairs and Development Planning (DEADP),
- National Department of Environmental Affairs (DEA): Oceans and Coasts,
- Department of Water and Sanitation (DWS), Breede - Gouritz Catchment Management Agency (BGCMA),
- the Department of Agriculture, Forestry and Fisheries (DAFF),
- Eden and Overberg district municipalities,
- Swellendam and Hessequa local municipalities,
- CapeNature,
- South African National Parks (SANParks),
- the Lower Breede River Conservancy Trust (LBRCT),
- the Witsand and Malagas Resident Associations,
- Infanta Ratepayers Association,
- Witsand Tourism,
- South African Police Services,
- the National Sea Rescue Institute and
- the Breede Angling Club.

The Vision for the Breede River Estuary was developed and agreed upon at a meeting of relevant stakeholders held at Witsand in 2008:

> The Breede River Estuary is the pristine pride of South African Estuaries. It is beautiful, rich in plants and animals, attracts visitors, sustains our livelihoods and uplifts our spirits. Its bountiful rewards are the fruits of our love and dedication to its wellbeing now and for future generations

This Vision essentially captures the need to conserve the **functioning** and **biodiversity** of the Breede River Estuary, which ultimately supply the ecosystem goods and services referred to in the Vision.

The corresponding key objectives have been identified as the corner stones to the achievement of the Vision are:



Spatial Zonation

The management objectives have been translated into an estuary zonation plan. The estuary zonation plan (and applicable management objectives) is consequently the blueprint against which all development, and any other activities which impact on the estuary, should be tested for compliance.

The current zonation is a further simplification of the zonation proposed in the first draft of the EMP, which was mainly derived from a habitat perspective. Consequently only three broad zones are identified:

- Conservation/protection zones

Conservation zones aim to give protection to ecologically sensitive habitats found throughout the length of the estuary. Ideally these should be afforded formal protected status, but for the purposes of the current estuary management plan it is envisaged that restriction will be placed on potentially detrimental activities such as bait collection, anchoring, beaching of boats, access by boat, grazing and trampling.

- Development buffer zones

Development buffer zones are prescribed by regulatory schemes that define development set-backs (e.g. from watercourses and wetlands, or as coastal management lines in terms of the ICM Act) or forms of 'overlay zonation' that impose development controls via the Land Use Planning Schemes.

- Recreation-based zones.

Various zones specific to different recreational activities are to be defined, based on relevant considerations of environmental and social compatibility, carrying capacities and the potential for conflict between users of the estuary.

Institutional Arrangements

To oversee the overall implementation of the original EMP, in terms of facilitating co-management and efficient governance, a then Estuary Management Forum was established in February 2009. This body, now known as the Breede River Estuary Advisory Forum (BREAF), is made up of representatives of national, provincial and local government as well as civil society.

To assist with implementation of aspects of compliance management, the Swellendam and Hessequa local municipalities appointed the Lower Breede River Conservation Trust (LBRCT) as an implementing agent (since 1986). The Breede River Estuary has therefore been managed collaboratively between CapeNature, Swellendam and Hessequa local municipalities, the former Department of Environmental Affairs Tourism: Marine and Coastal Management (MCM) now Oceans and Coasts, and Department of Water and Sanitation (DWS), and the LBRCT. CapeNature does regular monitoring on the Breede regarding jetties and slipways, bird counts etc. Swellendam Local Municipality and Hessequa Local Municipality collectively are involved through the BREAF and LBRCT. The LBRCT has dedicated staff appointed to do law enforcement under the Marine Living Resources Act and by-laws passed by Swellendam Local Municipality.

The National Estuarine Management Protocol identifies the Western Cape Department of Environmental Affairs and Development Planning (DEADP) as the Responsible Management Authority responsible for the development of the Breede River EMP as well as being responsible for the co-ordination of its implementation. The continued role of the LBRCT as one of the current implementing agents will consequently need to be re-evaluated and clearly defined taking into account their I past successes and potential future contributions.

Management Priorities

Five project plans have been compiled for the efficient and effective management of the Breede River Estuary. Each plan corresponds to a key objective and contains applicable management actions, supporting regulations, level of priority, responsible institution(s), and required resources if such information is available. These are arranged in general order of priority, but nevertheless recognize that the neglect of any leg will compromise overall success:

- Co-management and effective governance;
- Sustaining water quality & quantity;
- Conservation of biodiversity;
- Sustainable development; and
- Public education awareness.

It should be noted that there is some interconnectedness between the plans and some management actions, as they all ultimately contribute to the conservation of ecosystem function and patterns of biodiversity, which in turn leads to the conservation of a sustained supply of ecosystem goods and services delivered by the estuary.

The table below provides a summary of the Management Objectives per priority area as part of the Performance Monitoring Plan:

MANAGEMENT OUTPUTS	PERFORMANCE INDICATOR	TIMING	LEGISLATION	RESPONSIBILITY
1. Institutional and Management Structures				
1.1 Maintain a fully functional estuary advisory forum (the BREAF) that will facilitate co-management and effective governance	Constituted BREAF On-going record of meetings held	Assess at least twice a year	ICM Act Protocol	BREAF LBRCT DEADP DEA
1.2 Secure appropriate funding and legal support for implementation of the Breede River EMP	Guaranteed annual allocation of funds Specific by-laws developed	Assess twice a year	ICM Act MSA	DEADP Municipalities BREAF Implementing agent (LBRCT)
2. Water Quantity & Quality				
2.1 Ensure that the Reserves for Water Quantity and Water Quality are maintained through on-going interaction between the BREAF and BGCMA	Sustained estuarine health and function Sustained river flow Good water quality	Biannual for BGCMA	NWA: RDM	DWS DEADP BGCMA BREAF CSIR
2.2 Reduce bank de-stabilization and erosion, and habitat degradation	Number of degraded areas rehabilitated and secured	Ad hoc visual monitoring during normal daily activities or responsibilities	ICM Act CARA	Implementing agent (LBRCT) Local municipalities DWS: WfW
2.3 Minimise water pollution	Number and volume of sources of pollution reduced	Annually for DWS Monthly LBRCT	NWA NEM:WA	DEA DWS DEADP Implementing agent (LBRCT) Local municipalities

MANAGEMENT OUTPUTS	PERFORMANCE INDICATOR	TIMING	LEGISLATION	RESPONSIBILITY
2.4 Control the spread and densification of both aquatic & terrestrial invasive alien plant species	Increased number of tons removed/ hectares cleared	Annually for disturbed sites	CARA NWA	Implementing agent (LBRCT) DWS: WfW DEA:WfC Local municipalities Landowners
3. Conservation of Biodiversity				
3.1 Ensure the conservation of an optimal representations of vital estuarine habitats and associated species	Conservation areas secured through by-laws	Once a year	Municipal By-laws Protected Area Expansion strategies	DEA DAFF DEADP BREAF CapeNature Implementing agent (LBRCT) Local municipalities
3.2 Ensure sustainable resource use through effective compliance management under the Marine Living Resources Act	Reduction in infringement incidences	Ongoing for compliance and MLRA appointed personnel; daily patrols and inspections. BREAF & angling club members may assist.	MLRA	DEA DAFF CapeNature Local municipalities

MANAGEMENT OUTPUTS	PERFORMANCE INDICATOR	TIMING	LEGISLATION	RESPONSIBILITY
3.3 Regulate recreational use in and around the estuary, including water-based and aviation activities, through effective compliance management	Reduction in infringement incidences	Ongoing for compliance monitors and appointed personnel; daily patrols and inspections.	Municipal By-laws	Local municipalities BREAF DWS Implementing agent (LBRCT)
4. Land-use and Infrastructure				
4.1 Implement an estuary zonation plan that directs infrastructural development and other land use practices (e.g. agriculture) within the various development setback lines/buffer zones	Reduction/cessation of inappropriate development in and around the estuary	Every 5 years	ICM Act MSA	BREAF DEADP DAFF Implementing agent (LBRCT)
4.2 Ensure the incorporation of the EMP into the Integrated Development Plans and Spatial Development Frameworks	Reduction in illegal development and operations of jetties & slipways	Every 6 months	Seashore Act NEMA ICMA	Implementing agent (LBRCT) CapeNature
4.3 Ensure that all proposed developments within the development buffer zones adhere to the EIA process	Each development lawfully constructed	Depends on number of developments and EA granted	NEMA ICM Act	BREAF DEADP DAFF DWS Implementing agent (LBRCT) Local municipalities
4.4. Ensure the incorporation of the EMP into the Integrated Development Plans and Spatial Development Frameworks	EMP is adopted into IDPs and SDF	Every IDP/SDF review cycle	MSA ICM Act	Swellendam, Hessequa, Eden & Overberg municipalities BREAF
5. Public Education and Awareness and Knowledge Enhancement				

MANAGEMENT OUTPUTS	PERFORMANCE INDICATOR	TIMING	LEGISLATION	RESPONSIBILITY
5.1 Promote high levels of public awareness and appreciation of the ecosystem services provided by the Breede River Estuary, threats posed to its integrity, and compliance management	Increase in number of newsletters; Sufficient number of public notice boards; Increase in number of conservancy members and voluntary monitors; Increase public participation in coastal/estuary/river clean ups and other initiatives eg. Breede Watch Increase in number of visiting school groups	Once year		BREAF Implementing agent (LBRCT)
5.2 Enhance our scientific knowledge, through research and monitoring	Increase in number of research projects and monitoring programmes	Once a year		BREAF DEADP DWS DAFF Implementing agent (LBRCT) DST

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ABBREVIATIONS & ACRONYMS

amsl	Above mean sea level
BGCMA	Breede-Gouritz Catchment Management Agency
BREAF	Breede River Estuary Advisory Forum
C.A.P.E.	Cape Action for People and the Environment
CAA	Civil Aviation Act (Act No. 13 of 2009)
CARA	Conservation of Agricultural Resources Act (Act No. 43 of 1983)
CFR	Cape Floristic Region
CMP	Coastal Management Programme
CPZ	Coastal Protection Zone
CSIR	Council for Scientific and Industrial Research
DAFF	National Department of Agriculture, Forestry and Fisheries
DEA	National Department of Environmental Affairs
DEADP	Western Cape Government's Department of Environmental Affairs & Development Planning
DM	District Municipality
DWS	National Department of Water and Sanitation
EAF	Estuary Advisory Forum
EFZ	Estuarine Functional Zone
EIA	Environmental Impact Assessment
EMP	Estuarine Management Plan(s)
ERC	Ecological Reserve Category
EZP	Estuary Zonation Plan
ha	hectares
HWM	High-water mark
I&AP	Interested and Affected Party
ICM Act	National Environmental Management: Integrated Coastal Management Act (Act No. 24 of 2008) as amended
IDP	Integrated Development Plan
IUCN	International Union for Conservation of Nature
LBRCT	Lower Breede River Conservancy Trust
LM	Local Municipality
LUPA	Provincial Western Cape Land Use Planning Act (Act 3 of 2014)
MCM	Marine and Coastal Management
MEC	Member of the Executive Council
MLRA	Marine Living Resources Act (Act No. 18 of 1998) as amended
MSA	Municipal Systems Act (Act No. 32 of 2000)
NEM:BA	National Environmental Management: Biodiversity Act (Act No. 10 of 2004)
NEM:WA	National Environmental Management: Waste Act (Act No. 59 of 2008)
NEMA	National Environmental Management Act (Act No. 107 of 1998)
NWA	National Water Act (Act No. 36 of 1998) as amended
RDM	Resource Directed Measures
REC	Recommended Ecological Category
REI	River-Estuary Interface
RMA	Responsible Management Authority
SANParks	South African National Parks
SDF	Spatial Development Framework
SPLUMA	National Spatial Planning and Land Use Management Act (Act 16 of 2013)
the Protocol	National Estuarine Management Protocol
TPC	Threshold of Potential Concern

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) (ICM Act), aims to facilitate the efficient and coordinated management of all estuaries, in accordance with:

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

The Protocol, promulgated in 2013, 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 Protocol and the National Coastal Management Programme (CMP) (DEA, 2014). The Protocol 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[1]; and
f) The process for reviewing EMPs to ensure that they comply with the requirements of the ICM Act.

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

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

   (i) the Protocol; 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 ICM Act;

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.

[1] The National Estuarine Management Protocol identifies the Western Cape Department of Environmental Affairs and Development Planning as the management authority responsible for developing and co-ordinating implementation of the Breede Estuarine Management Plan

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 ICM Act 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 ICM Act 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 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 ICM Act.

The National Coastal Committee (the MINTEC Working Group 8) 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, so as 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 INTRODUCTION

The process of compiling an Estuarine Management Plan (EMP) for the Breede River estuary commenced in 2008 when a Situation Assessment Report was commissioned as a platform for the development of the EMP (DEA, 2015). The Draft Situation Assessment and EMP were updated in 2011, and again as per this current project.

A Vision for the future desired state of the Breede River Estuary, and the management objectives designed to attain this Vision, were developed during engagements with the relevant role players and stakeholders from both the government and private sectors. These included various Directorates at the Department of Environmental Affairs and Development Planning (DEADP), National Department of Environmental Affairs (DEA): Oceans and Coasts, Department of Water and Sanitation (DWS), Breede - Gouritz Catchment Management Agency (BGCMA), the Department of Agriculture, Forestry and Fisheries (DAFF), Eden and Overberg district municipalities, Swellendam and Hessequa local municipalities, CapeNature, South African National Parks (SANParks), the Lower Breede River Conservancy Trust (LBRCT), the Witsand and Malagas Resident Associations, Infanta Ratepayers Association, Witsand Tourism, South African Police Services, the National Sea Rescue Institute and the Breede Angling Club.

To oversee the overall implementation of the original EMP, in terms of facilitating co-management and efficient governance, an Estuary Management Forum was established in February 2009. This body, now known as the Breede River Estuary Advisory Forum (BREAF), is made up of representatives of national, provincial and local government as well as civil society.

The National Estuarine Management Protocol (the Protocol) identifies the Western Cape Department of Environmental Affairs and Development Planning (DEADP) as the Responsible Management Authority (RMA) responsible for the development of the Breede River EMP as well as being responsible for the co-ordination of its implementation. The continued role the LBRCT as the current implementing agent, will need to be confirmed. Because of changes in the national regulatory regime for estuaries the role of the LBRCT, who have successfully managed aspects of compliance management on the estuary since 1986, will need to be re-evaluated and clearly defined taking into account their past successes and potential future contributions.

This EMP is a strategic planning document, and as such does not provide detailed, routine planning for the management of the estuary. This detail should be captured by the RMA or its assigned representative, in its annual budget, Plan of Operations, Integrated Development Plan (IDP), Annual Performance Plan (APP) etc. (as applicable) with the management plan forming the platform for more fine-scale planning. The EMP should also be recognized as a dynamic document, whereby certain components could be revised as important new information becomes available and management priorities change. Adaptive management should be continually pursued through a process of annually reviewing the progress made in

achieving the management objectives. Finally, the management plan should be subject to a comprehensive revision on a five-year cycle, as required by the Protocol.

2 FRAMEWORK FOR DEVELOPMENT OF THE MANAGEMENT PLAN

The Breede River EMP was initially developed using the generic framework for Estuarine Management Plans (Van Niekerk & Taljaard, 2007). The current update places it in line with the Protocol. Figure 1 below is a graphical representation of this framework. Essentially it highlights that successful management of the estuary requires, in the first instance, the setting of a "Vision" of the future desired state of the estuary, followed by the development of overarching objectives, and subsequently management objectives to achieve this state. At the finer scale, an estuary zonation plan and management action plans are then developed as a blueprint for the implementation of the greater objectives, and therefore the EMP as a whole. The implementation of the EMP, should be continually monitored in terms of successes, shortcomings, and the availability of new data (gleaned from both monitoring and research studies), and re-calibrated accordingly. In such a way, management becomes adaptive, and the attainment of the Vision more realistic.

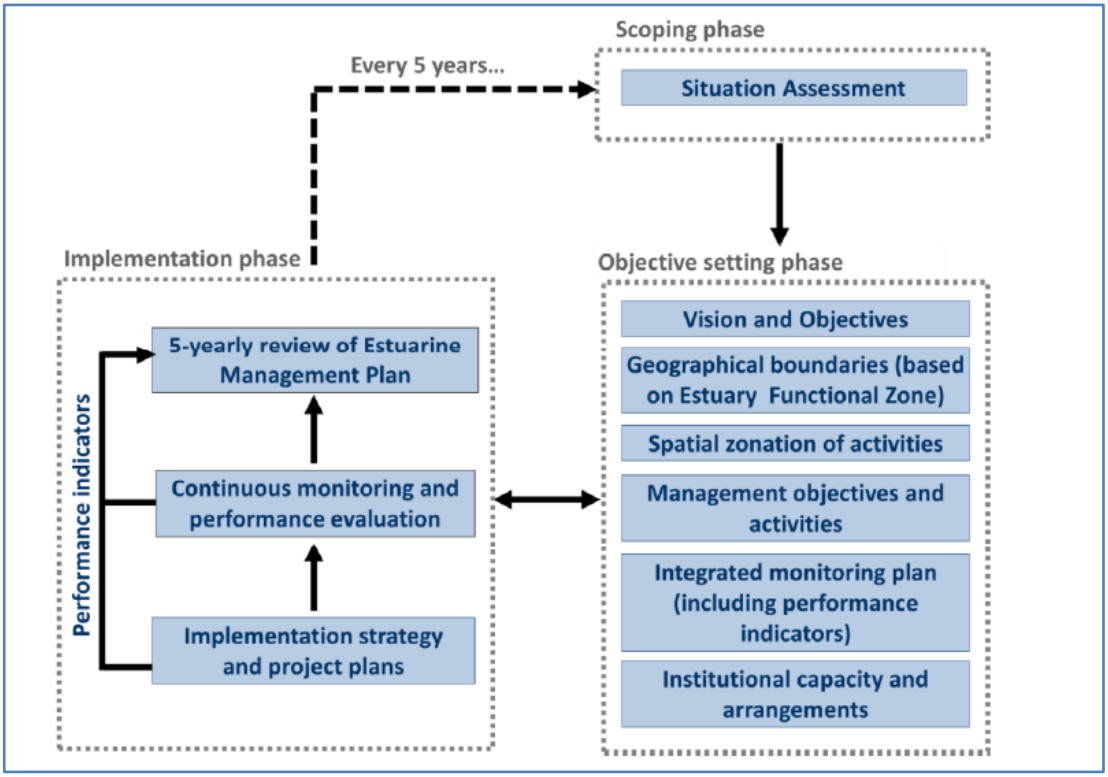

Figure 1: The framework for the development of the estuarine management plans (DEA, 2015)

3 SUMMARY OF SITUATION ASSESSMENT

3.1 Introduction

The Breede River Estuary was selected, as one of six estuaries in the Western and Eastern Cape, for the development of an EMP, as part of a pilot study under the auspices of the C.A.P.E. Estuaries Management Programme with funding from the World Bank. This was in line with Section 34 of the National Environmental Management: Integrated Coastal Management Act (No. 24 of 2008, as amended by Act 36 of 2014) (ICM Act), which states that EMPs must be developed for all estuaries in South Africa. The Breede River EMP underwent its first revision in 2010/2011.

With the promulgation of the Protocol, all previously developed plans needed to be aligned with the minimum requirements prescribed therein. This update of the Breede River Estuary EMP is in response to this directive.

3.2 Geographic and Socio-Economic Context

Approximately 82 km (61%) of the total length of the lower Breede River falls within the Swellendam Local Municipality (LM) within the Overberg District, the second largest local municipality in the Overberg District Municipality (DM). However, the permanently open Breede River Estuary itself is situated on the border between the Swellendam LM and the Hessequa LM of the Eden DM.

The human population in the Swellendam LM is the second lowest of all four municipalities that comprise the Overberg DM with 35,916 individual and experienced a 2.4 % growth rate based on the 2001 census. The Human Development Index (HDI) for the Swellendam LM is the second lowest (0.63) in the Overberg District, which is below the HDI for the district (0.66).Approximately 66.6 % of the population is of working age, with 39.6 % economically active. The current unemployment rate is 11.4 % while the youth unemployment rate is 15%.The three major sectors of employment are agriculture (26 %), and agro-processing of products and other light industrial, manufacturing (20 %) and tourism (5 %). In comparison, the Hessequa LM, of the Eden District, with a total population of 52,642 individuals had a growth rate of 1.7%. Approximately 64.6 % of the population is of working age (39.7% economically active), with the unemployment rate of 14.1 % and a youth unemployment rate of 18.9%. The main economic sectors include Trade (20.3%), community services (18.5%), construction (15.6%), finance (15%), agriculture (14.3%), transport (12.2%), manufacturing (3%).

In terms of population distribution, the numbers within the municipal ward areas around the Breede River Estuary are mostly low (< 500 individuals), with isolated areas of larger settlement on the northern bank near Witsand and Port Beaufort at the coast (up to 500 individuals) and on the southern bank in the mid-estuary (up to 1000 individuals). Overall, service provision is of a relatively high standard. Close to 10 % of the households in the Malgas region are without access to hygienic toilets, while between 12.3 % and 14.3 % of the households in the Swellendam sub-region and Infanta, respectively, do not have access to piped water. Considerably more

households are without electricity. The majority of households (76 %) around the estuary obtain an annual income ranging between R 19 601 and R 307 600. Approximately 4 % of the remaining households receive no annual income.

The Swellendam LM is currently the third biggest contributor (13.8 %) to the economic growth and Regional Gross Domestic Product of the Overberg District. The main economic sectors are primary agriculture (and related sectors like transport and storage), and agro-processing of products and other light industrial. Light industry, construction and vibrant financial & business services and retail, and catering and accommodation activities have seen noteworthy economic growth in recent years. Tourism focuses on cultural heritage tourism activities and eco-tourism particularly at resort towns along the coast. In the immediate areas surrounding the Breede River Estuary, economic activity is dominated by finance, insurance & real estate (31.8 %), followed by agriculture (29 %) as the second most important sector. Most of the land abutting the Breede River is privately owned and devoted to agriculture. Approximately 36 % of the Breede catchment within the Swellendam Municipal area is natural vegetation, and 63 % cultivated croplands, urban development, mining and forestry, contribute less than 0.3 % to the catchment area.

3.3 Abiotic Characteristics of the Estuary

The Breede River is 322 km long from its source near Ceres to where it enters the Indian Ocean in Sebastian Bay, draining a catchment of approximately 12 600 km^2. Pertaining to its size, the Breede River Estuary is approximately 52 km long, i.e. from the mouth at Witsand to the extent of the tidal influence 10 km upstream of Malgas, and possesses a total surface area of 455 ha. Although the estuary falls within the winter/bimodal rainfall transition zone, most of the catchment falls within the winter rainfall area. Flows are strongly seasonal with peak flows and floods during the winter months. The estuary enters the sea through a permanently open mouth located at the southern end of an extensive sand spit and it is considered highly unlikely that the mouth will close under present day conditions. The channel of the estuary is incised in the coastal plain and depths of 3 to 6 m and deeper points are common over the first 28 km.

Three large and numerous smaller dams within the catchment impede the mean annual runoff (MAR) reaching the estuary to the present day 1 034 x 106 m^3, which is approximately 42 % of the MAR under natural conditions. The estuary is highly responsive to freshwater inflows and high flows of 20-95 $m^3.s^{-1}$ are able to completely flush and reset the system during a tidal cycle. In turn, the estuary ranges from well mixed during spring highs to stratified during spring lows and neaps and the river-estuary influence (REI) zone may shift 8-10 km between tides.

The state of the physico-chemical environment is temporally variable and is linked to freshwater flows and tidal exchange. The Breede displays five different abiotic states based on these factors, ranging from strongly freshwater-dominated usually in winter (flows > 20 $m^3.s^{-1}$) to strongly marine-dominated only in summer (<0.5 $m^3.s^{-1}$); the latter reflecting severe freshwater shortage under extreme drought conditions. Salinity is

typically low during winter flows, with marine conditions occurring 3 km upstream during summer. Furthermore, the permanently open state of the mouth dictates a horizontal salinity gradient is present, with the REI creating an ecologically productive zone that fluctuates in distance from the mouth and length depending of fluvial input.

Turbidity of the estuary is generally higher during winter with peak flows with relatively clear conditions prevailing during the summer months, particularly during high tide when saltwater intrusion is at its maximum. The concentration of suspended solids throughout the estuary is typically low (<10 mg/L). The Breede River Estuary is well-oxygenated attributed to strong outflow, strong residence times and weak stratification of the water column, which prevents the development of oxygen poor conditions even at depth. Nutrients are also strongly correlated with seasonal flows as run-off from precipitation transporting nutrients from upstream agricultural activities. However, the Breede River Estuary is regarded as an unpolluted system with no toxic substances recorded but the pesticides and herbicides associated with agriculture may pose a future threat.

3.4 Biotic Characteristics of the Estuary

Due to the Breede River Estuary's geographic location and size, it possesses a relatively high level of biodiversity within a region of relatively high endemism. The micro-algal community, which comprises of phytoplankton and microphytobenthos, of the estuary is present in a lower biomass than other studied estuaries. This is primarily due to the lower nutrient availability and retention time of the Breede system. The micro-algal community of the estuary tends to be more diverse at the mouth, where nutrients from the marine environment are available. The steep slopes of the valley within which the estuary occurs, limits the extensive growth of macrophytes but these nevertheless are a major source of organic material. Twenty-three dominant macrophytes occur within the estuary with *Zostera capensis* and *Potamogeton pectinatus*as the principle species forming the basis of the macrophyte community. These two species occur in abundances in correlation to the salinity gradient of the estuary. A critical macrophyte community within the estuary is the saltmarsh present at Green Point, which is in a relatively pristine condition and possesses the highest diversity of plant species.

The zooplankton and hyperbenthic communities of the estuary occur along a salinity gradient but these are poorly represented as they are present in very low diversity and abundances when compared to other estuarine systems. Therefore, they are not considered an important component of the estuarine biota. In contrast to the zooplankton and hyperbenthic communities, the macrobenthos communities are distributed based on substrate type. The highest diversity of macrobenthos occurs within the *Zostera* beds and saltmarshes whereas sand flats possess the lowest diversity. These habitats are critical for the maintenance of bait organism populations such as *Upogebia africana* (mudprawn), and *Arenicola loveni* (blood worm) and *Solen capensis* (pencil bait), respectively. *U. africana*is particularly vulnerable to overexploitation as it is restricted to fine/muddy sediments that are easily accessible in the intertidal zone.

A total of 59 species of fish have been recorded in the Breede River Estuary with the community dominated by marine estuarine-dependent and estuarine species. Furthermore, 65% of the species recorded by Harrison (2002) were South African endemics with these species accounting for 94 % of the total number of individuals recorded. From the total of 59 species recorded, 23 (30 %) are dependent on estuaries to complete their lifecycle. Consequently, the estuary provides an important nursery and refuge area for the coastal fishes. The distribution of the fish species for the Breede River Estuary is dependent on habitat type and salinity gradients. The greatest species diversity and abundance occurs in close proximity to the mouth and muddy habitats. The avifauna recorded for the Breede River Estuary lists 177 species. The bird survey of the Breede as part of the Ecological Reserve Methodology (ERM) study, produced a total of 48 waterbirds recorded during summer and winter of 2000, with 1900 and 560 individuals counted during these periods, respectively. Invertebrate feeders (waders) are the most important group, comprising 55 % and 47 % of the bird community in summer and winter, respectively.

3.5 Ecological State and Importance

Considering the size of the Breede River Estuary, the diversity of habitats and their respective biota, the system has been classified as a 'Highly Important' estuary and is ranked as the 19th most important estuary within South Africa (Turpie & Clark, 2007). Using several characteristics used to describe the vegetation communities, the Botanical Importance Score for the Breede River Estuary was calculated as 350. This is the fifth highest score among all South Africa estuaries and exemplifies the importance of the Breede River Estuary in terms supporting estuarine vegetation communities, particularly intertidal saltmarsh. In terms of fish, the system ranks among the top 20 most important estuaries in South Africa in terms of overall conservation importance. In addition, numerous tagged individual fish have been recaptured in adjacent coastal waters indicating the intrinsic connectivity between the Breede and neighbouring estuaries in terms of fish movement along the coastline. Furthermore, the estuary marks the most southerly distribution for *Carcharhinus leuca,* the Zambezi shark. This species is currently listed as Near Threatened by the IUCN Red List and the Breede River Estuary is considered critical habitat for this species, and potentially a pupping and nursery ground. Importantly, the Breede River Estuary is also utilised by two bird Red Data species, the African Black Oystercatcher and Caspian Tern.

The present ecological condition of the Breede River Estuary is classified as "good" and is associated with a Present Status Category of "B", i.e. largely natural, with few modifications. The Intermediate Determination of the Resource Directed Measures for the Breede River Estuary found that the largest factor that contributed to the change in the state of the Breede River Estuary from the Reference Condition to its Present State was the large reduction in river inflow. Given that large volumes of water could not be re-allocated to the estuary; estuarine specialists have decided to keep the Recommended Ecological Category of the Breede River Estuary as Category B. Other potential threats to the integrity of the estuary are utilisation of marine living resources (e.g. through recreational fishing and bait collection), recreational activities

(e.g. boating, skiing. etc.), water pollution, developments, agricultural activities, and invasive alien plants.

A more recent Ecological Reserve Determination study was conducted by DWS in 2015, the results of which have not yet been published. However, this new information and other recent research will be included in the five-year of the Breede EMP.

3.6 Ecosystem Goods and Services

The concept of ecosystem goods and services stems from the perception of ecosystems as natural capital, which contributes to economic production. Goods, services and attributes may be defined as follows:

- **Goods** are harvested resources, such as fish;
- **Services** are processes that contribute to economic production or save costs, such as water purification; and
- **Attributes** relate to the structure and organisation of biodiversity, such as beauty, rarity or diversity, and generate less tangible values such as spiritual, educational, cultural and recreational value.

The services obtained from ecosystems can be categorised as follows:

- **Provisioning services** such as food and water;
- **Regulating services** such as flood and disease control;
- **Cultural services** such as contextual benefits derived through tangible and intangible heritage resources of cultural significance; and
- **Supporting services**, such as nutrient cycling, that maintains the conditions for life on Earth.

The main types of ecosystem services that are likely to be produced by the Breede River Estuary are summarised in Table 1.

Table 1: Summary of Ecosystem Services provided by the Breede River Estuary and their respective importance

ECOSYSTEM SERVICE		DESCRIPTION	IMPORTANCE IN BREEDE
PROVISIONING SERVICES (GOODS)	**Water**	Provision of water for subsistence use	LOW • Water for irrigation (upriver)
	Food, medicine	Production of fish and food plants, medicinal plants	HIGH • Provision of food for subsistence users
	Raw materials	Production of craftwork materials, construction materials	MEDIUM • Provision of material for subsistence users

ECOSYSTEM SERVICE		DESCRIPTION	IMPORTANCE IN BREEDE
REGULATING SERVICES	**Climate regulation**	Carbon storage, oxygen and ozone production, urban heat amelioration	LOW
	Disturbance regulation	Flood control, drought recovery, refuge from pollution events	HIGH • Provides protection from floods and storms • Both plant and animals adapted to withstand ebb and flow – natural buffer against floods and droughts
	Water regulation	Provision of dry season flows for agricultural, industrial & domestic uses	NEGLIGIBLE
	Ecological regulation	Regulation of malaria, bilharzia, liver fluke, etc.	HIGH
	Erosion control & sediment retention	Prevention of soil loss by vegetation cover, capture of soil	HIGH
SUPPORTING SERVICES	**Waste treatment**	Break down of waste, detoxifying pollution, dilution and transport of contaminants	MEDIUM • Dilution & assimilation of treated wastewater discharged above the estuary • Riparian & wetland habitats serve as a purification system to absorb various pollutants produced by agriculture and development
	Refugia/ nursery areas	Critical habitat for migratory fish and birds, important habitats or nursery areas for species	VERY HIGH • Important habitat for estuarine, marine and freshwater animal and plant species; • Calm protected environment being a suitable nursery area for many marine fish species • Provision of numerous habitats - Salt marshes, sand flats, mud flats, mud banks, reedbeds, riparian habitat • Maintenance of high biodiversity
	Export of materials & nutrients	Transfer of nutrients and sediments to marine ecosystems	HIGH • High level of deposited and generated nutrients that result in many animals and plants, thus a very productive area • Provision of sand supply for coastal processes • Important ecological corridor that includes the surrounding terrestrial ribbon along its banks
	Genetic resources	Medicine, product for materials science, genes for resistance to	LOW

ECOSYSTEM SERVICE		DESCRIPTION	IMPORTANCE IN BREEDE
		plant pathogens & crop pests, ornamental species	
CULTURAL SERVICES (ATTRIBUTES)	**Human interaction with natural landscapes (and other tangible/ intangible heritage resources), which may include a complex range of cultural practices, such as the development of institutions, the application of capital, and human processes involving memories, emotions, the senses, and aesthetic appreciation**	Wide range of tangible and intangible heritage resources, which may also be experienced through the characteristics, rarity, uniqueness and "sense of place" of a natural landscape or place, thus rendering it to be of aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance	VERY HIGH • intrinsically linked to early (colonial) settlement and agricultural development • association with early slavery • ecological, scenic, scientific and recreational and tourism value • key cultural landscape element • living heritage • Social-historical significance ito the role of the estuary and its importance as a fishing resource • Wide range of (modern) recreational and tourism-related activities e.g. power boating, water skiing, wakeboarding, kite surfing, swimming, kayaking/canoeing, shore-based angling, boats –based fishing, bait collection, hiking/ walking, birding, other animal (game) spotting

3.7 Exploitation of Living Resources

Presently angling is the most important attraction of the Breede River Estuary with exploitation from recreational anglers and bait collectors. Approximately 40.8 tons of linefish are caught annually from the Breede River Estuary by recreational anglers (40 % of Cape south coast total). In addition, cast netting and illegal seine and gillnetting occur within the estuary. Numerous fish species are heavily exploited in the Breede River Estuary and the current levels of fishing effort remain unsustainable. The stocks of white steenbras and dusky kob are collapsing, leervis are maximally exploited and the status of spotted grunter, is unknown. Although commercial linefishing is not permitted in estuaries, it is not inconceivable that some commercial line fishermen may use the river as a launching site to sea.

3.8 Social Considerations

The direct and indirect benefits derived from estuarine ecosystems services are manifested directly or indirectly in tangible income and employment. Overall, the Breede River Estuary ranks among the top 20 estuaries in the Cape in terms of its subsistence value which was estimated at R120 000 per annum. The Breede River Estuary also holds substantial tourism value for the local communities positioned along

its banks by means of visitors to the estuary and is estimated to be R 25 million per annum, placing it in the top 10 Cape[2] estuaries. In addition, the overall property value contributed by the Breede River Estuary is estimated at R 884.1 million, the second most valuable estuary in the Cape, which translates to approximately R 26.7 million per annum in terms of the direct value to the real estate sector of the national economy.

3.9 Spatial Planning and Land Use Management

Recent promulgation of the National Spatial Planning and Land Use Management Act (Act 16 of 2013) (SPLUMA), and subsequently the Provincial Western Cape Land Use Planning Act (Act 3 of 2014) (LUPA) sets out a new statutory framework for Spatial Planning and Land Use Management within the province. Both Swellendam and Hessequa LM's have respective Bylaws on Municipal Land Use Planning in place, though their Zoning Schemes have not yet been finalised.

Development objectives entrenched in SPLUMA have been assimilated into the Western Cape LUPA which in turn sets out a framework for the adjudication of land use planning applications in the province requires that local municipalities have due regard to at least the following when doing so:

- Applicable spatial development frameworks;
- Applicable structure plans;
- Land use planning principles referred to in Chapter VI (Section 59);
- Desirability of the proposed land use; and
- Guidelines that may be issued by the Provincial Minister regarding the desirability of proposed land use.

As such, it is crucial that findings and recommendations emanating from this Situation Assessment Report be incorporated into spatial planning policy and land use management processes as it pertains to the study area, where appropriate. The findings of the Overberg District Setbacks Project (DEADP 2012) which entailed the development of coastal management lines, together with a floodline overlay will also need to be included in future land use management. This may for example be at a policy level (e.g. continuously refining generally broad-based policies in Spatial Development Frameworks (SDFs) pertaining to development that may affect the estuary) or at land use management level (e.g. Definition and implementation of an overlay zone, ensuring continued and effective liaison between the local municipalities and local stakeholders such as the LBRCT, CapeNature, etc.).

[2] C.A.P.E. Programme included the three Cape Provinces, viz. Western Cape, Eastern Cape and Northern Cape

3.10 Heritage Resource Management

The National Heritage Resources Act establishes a statutory framework for the management of heritage resources (tangible and intangible), which include the identification, grading and management of said resources. This is significant because, within the context of this report, heritage resources would not only include the Breede River Estuary as key informant defining the local rural cultural landscape but also the occurrence of archaeological as well as palaeontological resources along the estuary banks. Of further interest would be historic themes related to early (pre-colonial and colonial) settlement, slavery, and maritime history.

No comprehensive heritage inventories have yet been compiled for the study area and its direct environs. However, existing built environment surveys of some rural farmsteads exist as well as two known Provincial Heritage Sites (former "National Monuments"). Given the overlap of apparent environmental and heritage sensitivities, it is reasonable to consider a holistic approach towards future conservation of the Breede River Estuary.

3.11 Existing Institutional Arrangements

The LBRCT has successfully implemented aspects of compliance management on the estuary effectively since 1986. The LBRCT is currently appointed as an implementing agent for the Swellendam and Hessequa local municipalities (LMs) in the Lower Breede River. The Breede River Estuary has been managed collaboratively between, CapeNature, Swellendam and Hessequa LMs, the former Department of Environmental Affairs: Marine and Coastal Management (MCM) and Department of Water and Sanitation (DWS) and the LBRCT. CapeNature do regular monitoring on the Breede regarding jetties and slipways, bird counts etc. Swellendam LM and Hessequa LM collectively are involved through the LBRCT. The LBRCT has dedicated staff appointed to do law enforcement under the Marine Living Resources Act and bylaws passed by Swellendam LM.

As mentioned above, the Protocol now identifies the Western Cape DEADP as the RMA responsible for the development of the Breede River EMP as well as being responsible for the co-ordination of the EMP's implementation. The continued management of implementation by the LBRCT, who have successfully managed aspects of compliance management on the estuary since 1986, will need to be re-assessed and confirmed.

3.12 Primary Impacts

It is evident that the Breede River Estuary provides a variety of direct and indirect benefits to both the local and national economies. However, the delivery of the services summarised above, as well as the aforementioned socio-economic benefits, is dependent on the ecological wellbeing of the Breede River Estuary. Principally, the wellbeing of the estuary is dependent on the water quality and quantity that enters into the system from the catchment. Disturbances in the catchment area above the estuary will be routinely transferred as secondary and cumulative impacts to the

estuary itself. With regards to the Breede River Estuary, water quantity issues stem from the dams within the catchment and water quality issues from the agricultural return-flows and release of treated and partially treated wastewater effluent. In addition, high levels of boating activity occur in the estuary during summer when the system is most biologically active. This negatively impacts on the productivity of estuarine biota, as well as causing bank erosion from the wave activity and beaching of boats, particularly on *Zostera* bed and mud flats.

If the integrity of the Breede River Estuary is to be maintained these threats needs to be addressed urgently and effectively. The proposed management plan will address the management and mitigation to ensure the continued provision of the above goods and services. In the same vein, the economic importance of the estuary will highlight the need for the Minister to sign off on the Reserve. A well-planned communication campaign will have to be developed to ensure wide spread buy-in by stakeholders.

3.13 Opportunities

3.13.1 Protected Area potential

According to the conservation plan for temperate South African estuaries, partial protection of the Breede River Estuary is recommended, i.e. a no-take sanctuary zone should be included. The recommended proportion of the estuary margin that should remain undeveloped, or with a >500m development 'setback' line is given as 50 % (Turpie & Clark, 2007).

Various options exist for a larger protected area along the river banks. According to the ICM Act, it is required to have a 1 km offset, i.e. coastal protection zone from the high water mark of an estuary. This should be used as the departure point for determining sensible ecological boundaries (bio-physical) on where this protected area should be located. Land ownership within the 1 km offset zone does not need to be affected. This should be a priority area (core area) for some negotiated form of inclusion in the coastal protection zone or conservancy.

One possible biodiversity corridor runs along the cliff tops to the west of the estuary. The farming community proposed a large conservation area between the river and the De Hoop missile testing range some time ago. This option should be re-visited. CapeNature officials identified some farming areas for stewardship options. During discussions with officials, there was general consensus that the estuary as well as the bay must be part of the greater marine protected area. Ecological corridors, both east-west as well as north-south should be identified and secured. The GIS system in conjunction with aerial photography will assist in determining the final viable corridors. Identified highly sensitivity areas must be demarcated clearly to exclude any utilization. No take zones for bait and Kob should be identified, clearly and indicated with signage. An environmental education/information campaign should be implemented to ensure that knowledge of the positions and reasons for these zones are widely distributed.

As part of the protected area, the air space over head the proposed protected area should also be controlled. This should be managed as a three-dimensional boundary to protect the important avifauna associated with the estuary. The close proximity of the De Hoop missile range is already a special rules area for aviation. This could be changed to include the estuary with special rules regulating aviation activities overhead the estuary. A minimum altitude for aircraft operations should be instituted (1500 ft amsl).

3.13.2 Restoration and Rehabilitation

The main restoration actions required for the Breede River estuary is the long-term improvement of estuarine habitats, freshwater requirements, and the creation of a buffer zone around the estuary. It should be recognized that some of the restoration actions would be long term, while others may be achievable in the shorter to medium term.

The following are restorations actions that can immediately be started:

- Erosion control measures to be implemented at priority sites;
- Prohibit taking out and excessive cutting of reeds;
- Urgent identification and implementation of no-take/no disturbance zones as identified on the GIS map; and
- Allowing only 'catch and release' of Kob.

In the Breede River Estuary, the following conservation actions will also start addressing these aspects:

- A buffer area around the estuary to conserve ecological ecotone areas (1 km buffer around perimeter). This is also required in terms of the National Environmental Management: Integrated Coastal Management Amendment Act (Act No. 36 of 2014);
- Prevention of excessive bank erosion;
- Protection of sensitive habitat types like: Eel grass –*Zostera* beds, sand and mud banks, and transitional areas between salt and fresh water habitat;
- Alien vegetation control and management in riparian zone and buffer area - Land owners can play an important role in prioritizing the clearing of these on the banks of the estuary and in the Green Belt area;
- Control and management of alien macrophytes (Water Hyacinth- *Eichhornia crassipes*);
- Control and management of jetties and slipways;
- Protection of reed beds (*Prionium serratum*, *Phragmitesaustralis*, *Juncus* spp., *Typha capensis*);
- Determination and enforcement of a coastal 'setback'/ management line for development;
- Control and management of boating and other wake producing water activities;
- Control of airspace for aircraft to protect birds and other estuarine users. Investigate a possible "special flight rules area" to protect air space infringements affecting avifauna on the Breede River Estuary;

- Protection of fish populations and catch sizes; and
- Prevention of excessively nutrient rich or polluted water entering system from up river.

3.13.3 Rehabilitation needs

At first glance, the Breede River is still in good health. After a brief research on the history of the Breede River as well as comments from participants during the first public participation meetings, it is clear that the river has been impacted negatively by erosion in the catchment. Large amounts of silt and sand had been deposited in the river over the last couple of years.

There is a very active angling community utilizing the fish population of the Lower Breede River, indicating that fish are still utilizing the River for feeding and breeding. Discussions with boat owners and local managers of the Conservancy brought out the fact that there are moving sand banks in the river, making safe navigation difficult. Historically, fairly large sailing boats were able to sail upriver as far as Malgas to pick up loads of wheat. Nowadays it is no longer possible to use the river with large vessels with deeper draft. It is therefore clear that the source of erosion and siltation should be addressed as soon as possible and that more information is needed to come to a satisfactory rehabilitation programme regarding this particular aspect.

3.13.4 Local Economic Development

During the 2007 stakeholder meetings, the following list of values was identified by consultants together with input from key stakeholders and authorities (Table 2). These values can be translated into tangible opportunities for local economic development in support of the green economy, i.e. providing for sustainable economic development while preserving (and maximising) the estuary's values.

Table 2. Value opportunities provided by stakeholders during public meetings undertaken for the development of the Breede River Estuarine Management Plan

CATEGORY	VALUES	
Recreational Activities	Water sports: • Fishing • Boating • Skiing • Windsurfing • Diving • Swimming	Other: • Bird watching • Whale watching • Wild animal (game) viewing • Scenic walks/ nature trails • Cycling
Spiritual / Cultural	• Spiritual upliftment and wellbeing • Peace and quiet • Relaxation, recuperation and stress relief • Physical exercise and fitness • Family bonding	

CATEGORY	VALUES
Tourism, Hospitality & Conferencing	• Guest houses and farming community hospitality • Guided tours of region • Events Management and Conferencing • Small Local Business and Job Opportunities • Farm /Cultural/Trading Stalls • Hire and sale of activity equipment • Tour guides for the estuary • Bait supply • Fish and oyster supply • Construction, property maintenance, including jetties and slipways
Education and Awareness and Knowledge Enhancement	• School tours • Underprivileged tours • International Delegations • Historical museum • Tertiary education projects • Scientific Research • Formal research and monitoring of whole estuary environment.

In addition to the above, there are additional opportunities for employment through environmental management initiatives for the estuary. For example, the removal of alien plants under an eradication programme, replanting of indigenous plans, clearing of the water way and beaches of debris, and the instatement of estuary nature wardens.

4 VISION & OBJECTIVES

The Vision for an estuary should be inspirational, representing a higher level of strategic intent and aligned with the strategic objectives of the Protocol and the greater Cape Floristic Region (CFR). The National Vision and Vision of the Estuaries of the CFR 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 following Vision for the Breede River Estuary was developed and agreed upon at a meeting of relevant stakeholders held at Witsand in 2008.

The Breede River Estuary is the pristine pride of South African Estuaries. It is beautiful, rich in plants and animals, attracts visitors, sustains our livelihoods and uplifts our spirits. Its bountiful rewards are the fruits of our love and dedication to its wellbeing now and for future generations

This Vision essentially captures the need to conserve the **functioning** and **biodiversity** of the Breede River Estuary, which ultimately supply the ecosystem goods and services referred to in the Vision. Therefore, this Vision needs to be translated into objectives that address securing the appropriate water reserve (and hence hydrological, biophysical and ecological functions), biodiversity conservation and development needs, as well as the management objectives required in achieving these higher objectives, i.e. co-management, effective governance, and stakeholder support.

The following key objectives have been identified as the corner stones to the achievement of the Vision developed at the stakeholder workshop mentioned above.

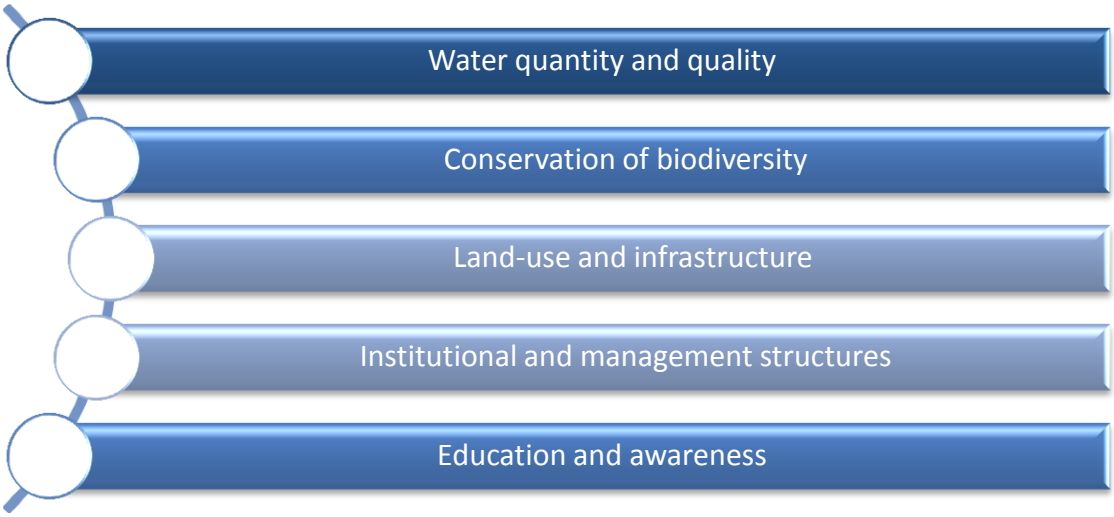

Figure 2: Strategic Objectives for the Breede River Estuarine Management Plan

4.1 Water quantity and quality

The objective in terms of water quantity and quality is to ensure that the Breede River Estuary retains its present Ecological Reserve Category (ERC) status as a Category "B" estuary, by securing both the Reserve for Water Quantity and the Reserve for Water Quality as defined in the Intermediate Determination of Resource Directed Measures (Taljaard, 2003).

4.2 Conservation of biodiversity

The biodiversity of the Breede River Estuary (e.g. species, populations, communities, habitats, functioning, ecological processes and ecosystem services) should be protected from over-exploitation and other negative impacts, whether they are direct, indirect and/or cumulative.

4.3 Land-use and infrastructure

All developments, including infrastructural and agricultural, which impact or could impact on the Breede River Estuary, should be controlled in terms of sustainability, biodiversity conservation and aesthetics.

4.4 Institutional and management structures

Ensure co-operative management of the Breede River Estuary in terms of the involvement of the Swellendam and Hessequa local municipalities, Eden and Overberg district municipalities, the BGCMA, the LBRCT facilitated by the RMA (DEADP), through the effective functioning of the BREAF.

4.5 Education and awareness, and knowledge enhancement

Enhance public awareness of the ecosystem services that the Breede River Estuary delivers, the legislation that affords protection of its integrity, and hence the reasons for compliance management.

5 MANAGEMENT OBJECTIVES

The vision and key objectives should be achieved through the implementation of the following management objectives (Figure 2).

5.1 Water quantity and quality

- Ensure that the Reserves for Water Quantity and Water Quality, as identified by the Intermediate Determination of the Resource Directed Measures for the Breede River Estuary are maintained, through ongoing interaction between the BREAF and the BGCMA, including active representation of BGCMA on BREAF;
- Identify and address activities that lead to bank de-stabilization, erosion and other activities that reduce water quality, e.g. detrimental agricultural activities such as ploughing and grazing in the riparian zone[1], certain types of water-based recreation, and removal of reed beds[3];
- Identify and address activities that lead to water pollution, e.g. siltation, agricultural chemicals and sewerage run-off[4]; and
- Control the spread and densification of both aquatic and terrestrial invasive alien plant species that negatively impact on water quantity and quality and have knock-on effects for aquatic life[2].

5.2 Conservation of biodiversity

- Ensure the conservation of the full suite of existing habitats, especially those that fulfil the role of zones of primary production, fish nurseries, wader feeding grounds (e.g. Zostera beds, salt marshes, etc.), and bank stabilization (e.g. Reed beds);
- Ensure sustainable resource use through effective compliance under the Marine Living Resources Act (Act18 of 1998), in terms of fish and bait species, e.g. quotas, closed seasons, size limits, collection methods; and
- Regulate recreational use in and around the estuary, including water-based activity and aviation activity, through effective compliance management to reduce habitat degradation and disturbance to fauna and flora.

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[3] Cross links with appropriate land use and infrastructure planning

[4] Cross links with conservation of biodiversity

5.3 Land-use and infrastructure

- Implement an estuary zonation plan that directs infrastructural development and other land use practices (e.g. agriculture) within the coastal management lines, flood lines, buffer zones as defined in the relevant environmental legislation, e.g. Integrated Coastal Management Act (Act 24 of 2008, as amended), National Environmental Management Act (Act No. 107 of 1998), National Water Act (Act No. 36 of 1998) and the Conservation of Agricultural Resources Act (Act No. 43 of 1983), in terms of the Coastal Protection Zone, 100 m buffer, 32 m buffer, 100 year flood line, and 5 m contour;
- Facilitate equitable access for both pedestrian and vehicular access. This entails ensuring boat launch sites are licensed and access is not restricted;
- Ensure that all proposed developments within the development buffer zones, adhere to the EIA process in terms of the full suite of relevant environmental legislation;
- Ensure the incorporation of the EMP into the Integrated Development Plans and Spatial Development Frameworks of the Swellendam and Hessequa local municipalities, as well as of those of the Eden and Overberg district municipalities.

5.4 Institutional and management structures

- Maintain a fully functional estuary advisory forum (the **Breede River Estuary Advisory Forum)** that will facilitate **co-management and effective governance** between Local and National government agencies, DEADP as the designated RMA, the two conservation agencies (CapeNature and SANParks), and the full suite of relevant private stakeholders (See Section 8).
- Ensure that **appropriate funding** and **legal support** is secured for the execution of the various management actions and attainment of the objectives set out in this EMP.

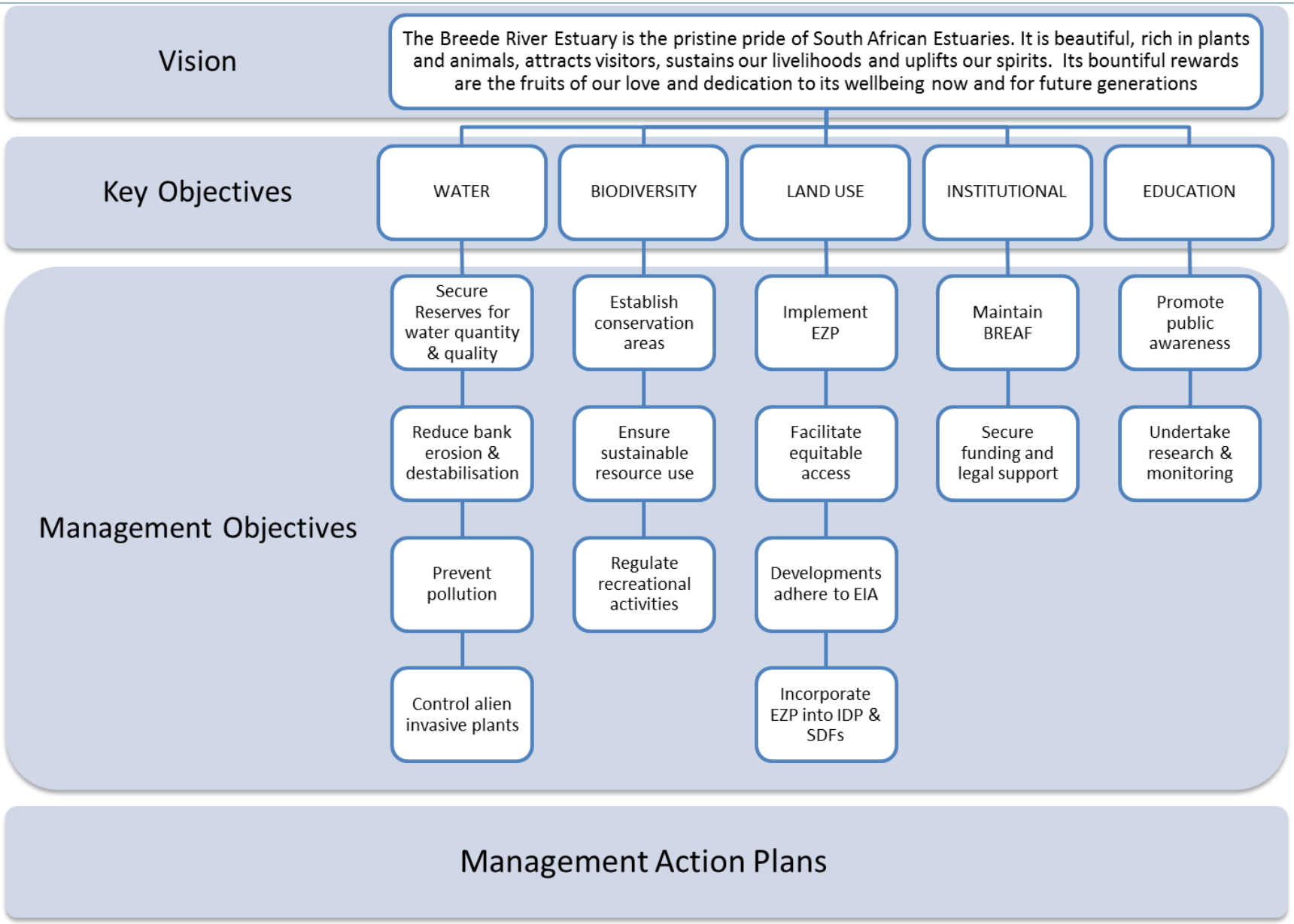

Figure 3: Vision, Key Objectives, Management Objectives, and Action Plans

5.5 Education and awareness, and knowledge enhancement

- Promote high levels of public awareness and appreciation of the ecosystem services provided by the Breede River Estuary, threats posed to its integrity, and compliance management; and

- Enhance our scientific knowledge, through research and monitoring, to:
    - Improve the confidence of the Intermediate Determination of RDM of the Breede River Estuary;
    - Estimate more accurate carrying capacity thresholds, and
    - Identify, understand and mitigate indirect and/or cumulative impacts of human activities, both within the estuarine zone, as well as those beyond its boundaries.

6 SPATIAL ZONATION

6.1 Introduction

The management objectives identified in the previous section have been translated into an estuary zonation plan (EZP) (Figure 7). The EZP (and applicable management objectives) is the blueprint against which all development, and any other activities which impact on the estuary, should be tested for compliance.

The zonation of any estuary is necessary to guide sustainable utilization without degradation of the estuarine environment (Clark 1977). Zonation should therefore, essentially demarcate:

a) the geographical boundaries of the estuary (see Figure 8)(e.g. the 5m amsl contour, river-estuarine interface, coastal protection zone, coastal management line, or flood lines);
b) the conservation of biodiversity[5] through the setting aside of conservation areas/protected zones;
c) appropriate buffers in which land use and development is strictly controlled and monitored; and
d) appropriate recreational activities and carrying capacities thereof.

[5] which is also addressed in terms of compliance under the MLRA

6.2 Estuarine boundaries

The C.A.P.E Estuaries Programme considered the National Water Act (NWA) definition of an estuary as the most appropriate definition, i.e. "*a partially or fully enclosed water body that is open to the sea permanently or periodically, and within which the seawater can be diluted, to an extent that is measurable, with freshwater drained from land*".

For the purposes of determining the Resource Directed Measures (RDM), the then Department of Water Affairs defined 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 the furthest upstream, with the five meter above mean sea level (amsl) contour defined as the lateral boundaries*".

The ICM Act further 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*".

This 5 m topographic contour encapsulates the Estuarine Functional Zone, which in turn is defined by 2014 EIA Regulations (GNR 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 Breede River Estuary is approximately 52 km long, i.e. from the mouth at Witsand to the extent of the tidal influence about 10 km upstream of Malagas at the mouth of the Napkuys River. According to Government Notice No. R. 727 dated 16 September 2011 (in terms of the Marine Living Resources Act, Act 18 of 1998), which addresses regulations for fishing in the estuary of the Breede River, the estuary of the Breede River is officially defined as the tidal portion of the Breede River that lies between the longitudes E20°51'342 and E20° 51'.000, as the western and eastern boundaries respectively. More specifically, the boundary lines denoting the Breed River Estuary's extent are as follows:

To the west, the official land surveyor's mark as the official extent of the tidal reach placed at position 34°15'0495" latitude and 20°30'4945" longitude. To the east, the eastern boundary line be denoted by the line of latitude east 20°15, whereby the existing beacon on the buttress of the southern bank is anticipated as being in the correct position. The mouth shall then extend from that point, relevant to its variable extent, to the approximate end of the beach adjacent to the buildings of the beach restaurant and ablution block.

Figure 4 to Figure 6 illustrate the boundaries of the Breede River Estuary, including the River-Estuarine Interface (REI) and the Coastal Protection Zone.

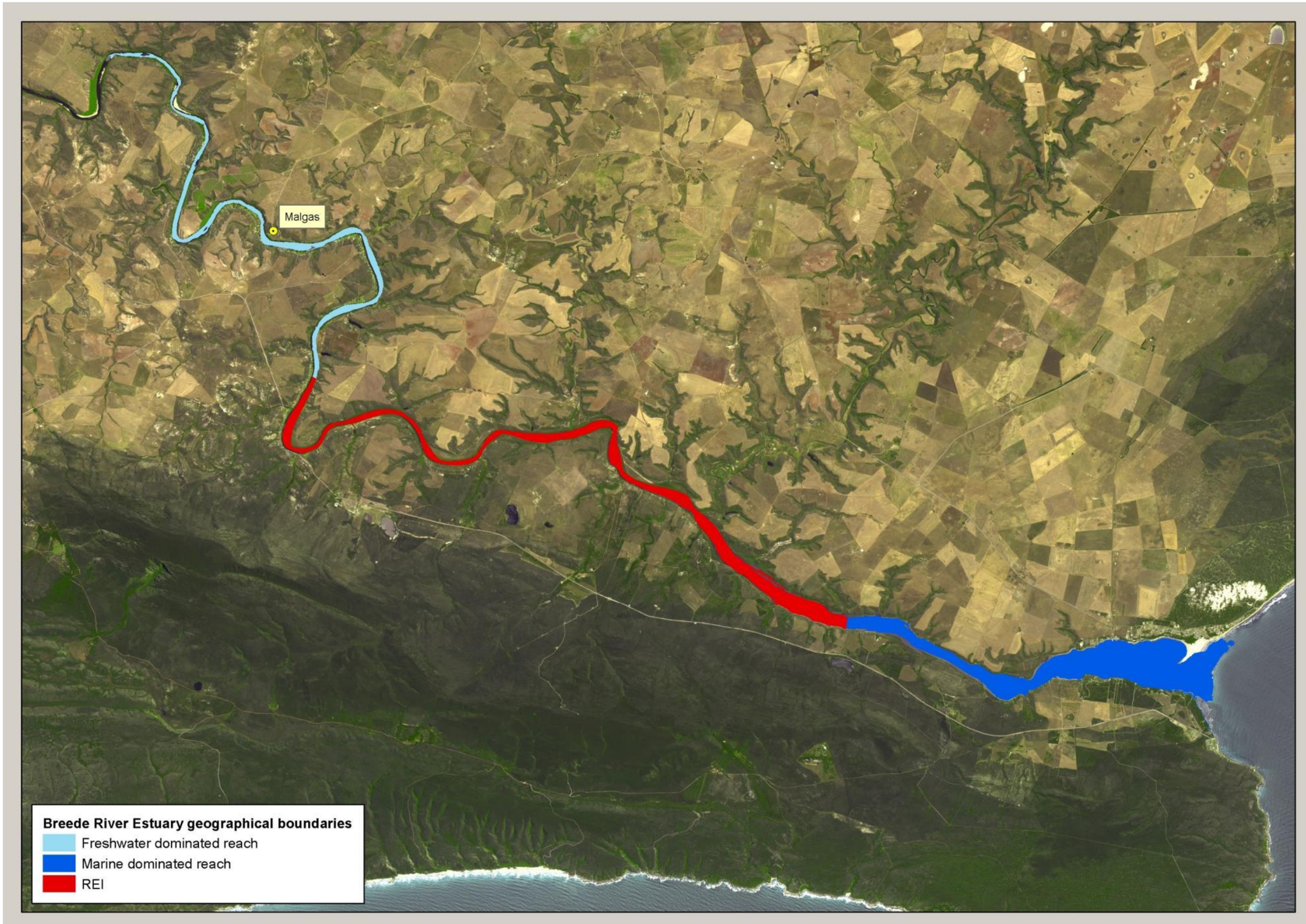

Figure 4: Geographical boundaries of the Breede River Estuary, showing different biophysical regions

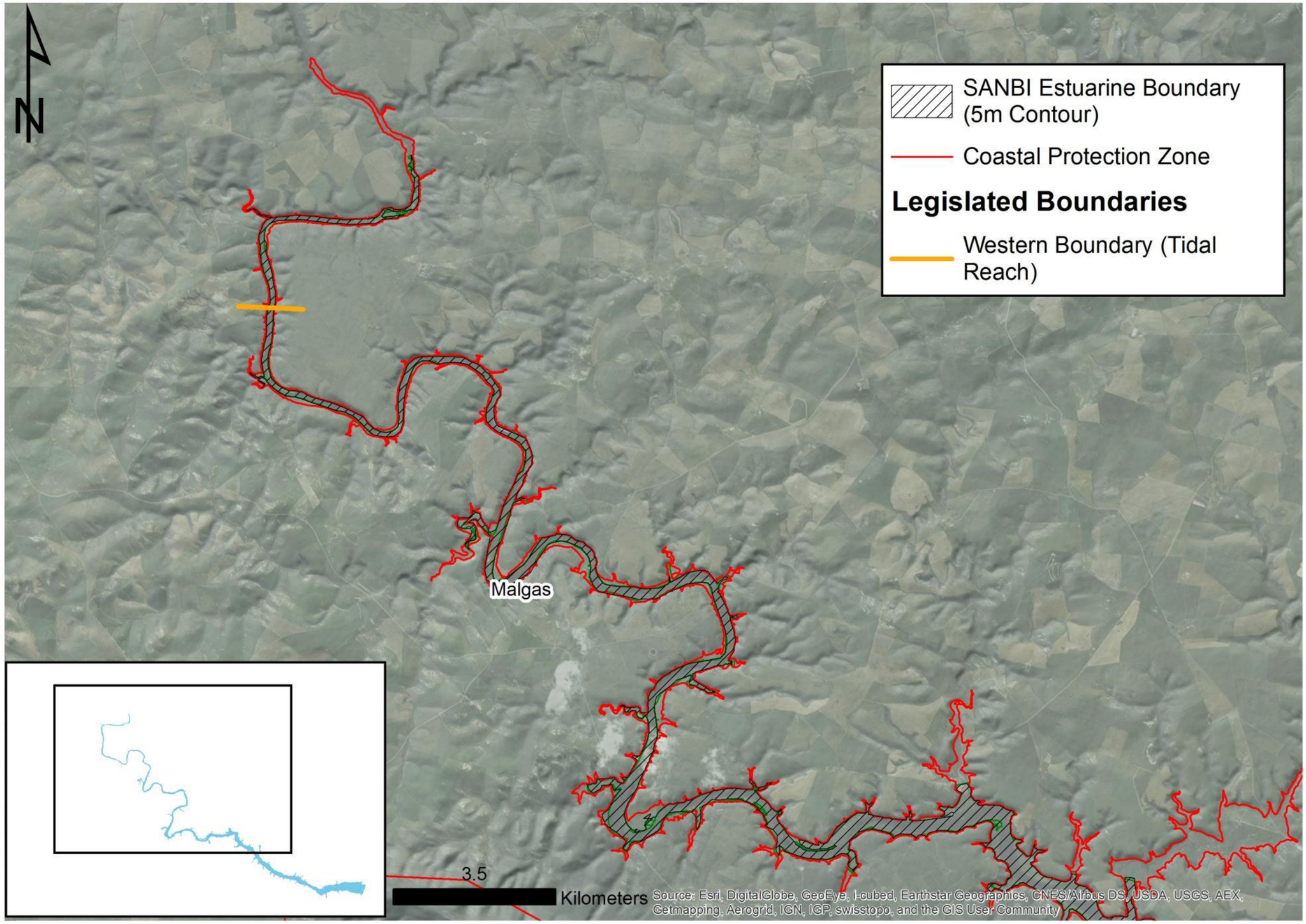

Figure 5: Geographical boundaries of the Breede River Estuary – upper estuary

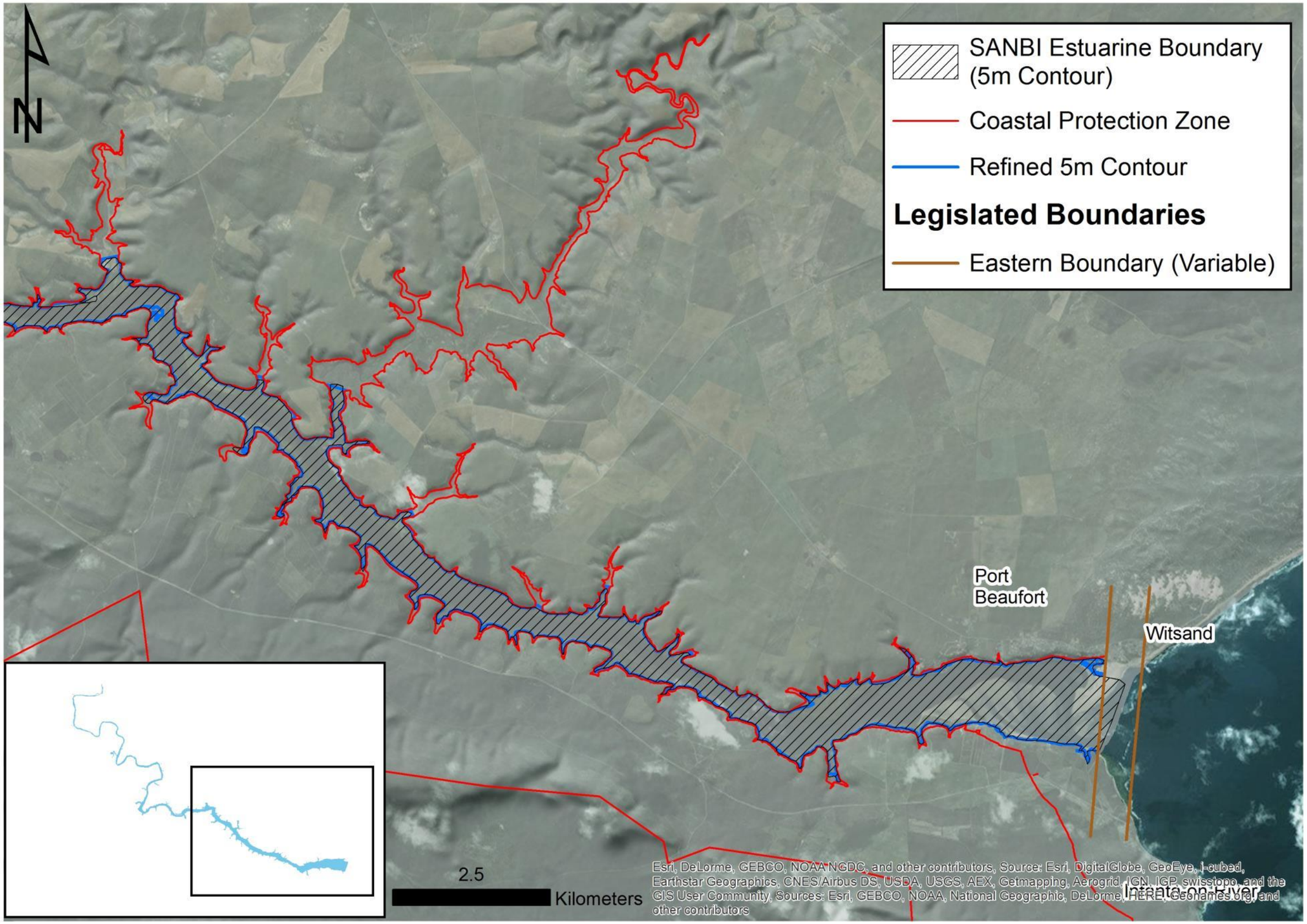

Figure 6: Geographical boundaries of the Breede River Estuary – lower estuary

6.3 Proposed Zonation Plan

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.

The habitat map developed by Bornman (cf. SSI, 2008), was used as the baseline for the identification of sensitive estuarine habitats on the Breede River Estuary (see Figure 7 and Figure 8). The zonation proposed in the first draft of the EMP, was mainly derived from a habitat perspective, but was deemed too complex, and therefore, from a compliance management perspective, too impractical to enforce (see Proceedings of Review Workshop; CSIR, 2009).

In this review, an attempt has been made to simplify the zonation, and consequently a total of three broad zones were then proposed:

- Conservation/protection zones;
- Development buffer zones; and
- Recreation-based zones.

6.3.1 Conservation/protection zones

OPERATIONAL OBJECTIVES:

- Identify priority areas for conservation/protection
- Estimate Thresholds of Potential Concern in terms of loss of habitat and species population dynamics
- Identify an appropriate suite of conservation measures for each priority area
- Maintain high levels of compliance in respect to conservation measures through the full suite of compliance management methods, e.g. awareness, legal support, law enforcement, etc.
- Rehabilitate disturbed sites
- Control of invasive alien plants
- Aircraft altitude restrictions
- Prevent encroachments

The identification of conservation/protected zones should be based on studies such as Carter (1983) and Taljaard (2003) (in conjunction with Bornman's habitat map), wherein the ecological importance of habitats that fulfil the role of zones of primary production, fish nurseries, wader feeding grounds (e.g. Zostera beds, salt marshes, freshwater tributaries mud banks, etc.), and bank stabilization (e.g. Reed beds), are highlighted (Figure 9 and Figure 10).

An inherent problem with defining conservation/protected zones in the Breede River Estuary is the spatial configuration of developments (both infrastructural and

agricultural) and the levels of water-based recreation that already exist on this estuary. The sensitive habitats that should be afforded some level of conservation management, are also spread along the length of the estuary, often as fragmented units, whilst the main forms of recreation (e.g. boating and fishing) and associated activities (e.g. skiing and bait collection), are also practiced along extensive stretches of the estuary. This is exacerbated by two development nodes being spaced almost at opposite ends of the estuary, i.e. Witsand at the mouth and Malagas near the upper reach of the estuary. This makes it not only difficult from a compliance management perspective, but also in the identification of the priority areas for conservation (as per National and Provincial Protected Area Expansion Strategy).

Furthermore, some of the habitats can be transient, both spatially and temporally, e.g. episodic flooding events influence the spatial dynamics of the habitats in terms of geographical position and size. The challenge will therefore, with the assistance of estuary experts, be to identify the high priority sites and adequate representation thereof. Only then can different levels of compliance management be afforded to these areas in terms of how much disturbance, if any, is permissible. Conservation measures could include regulation of activities such as bait collection, anchoring, beaching of boats, access by boat, grazing and trampling, whilst the more sensitive/irreplaceable areas, that are indeed locally threatened, could be protected by a total restriction of any direct human activity. Innovative forms of compliance management will be required to afford adequate conservation of representative areas of these habitats. It will probably be necessary to enact any restrictions in by-law, to assist in conserving/protecting these zones.

In the initial EMP review workshop (CSIR, 2009), it was noted that the freshwater input sites (tributaries) which provide refuge areas and ecotones in terms of salinity and therefore biodiversity, should be protected in terms of conservation. These sites are considered important fish nursery refuges. Salt marsh areas (supratidal, intertidal and floodplain salt marshes), *Zostera capensis* beds and mudflats have also been identified as ecologically important habitats in the estuary, which are sensitive to disturbance and require conservation (Carter, 1983; Taljaard, 2003). Zostera beds are important as they provide sheltered rich habitats for many estuarine invertebrates and juvenile fish, and feeding grounds for invertebrate feeding waders. Zostera beds are easily disturbed by bait digging, trampling and the beaching of boats. Once the root and rhizome system have been disturbed, the plants may take years to recover. The plants are also sensitive to increases in turbidity as a result of boating activities that stir up bottom sediments and reduce light available for photosynthesis. These habitats are reported to have decreased in area (Taljaard, 2003).

6.3.2 Development buffer zones

OPERATIONAL OBJECTIVES:

- To ensure that all proposed developments within the development buffer zones, adhere to the EIA process in terms of the full suite of relevant environmental legislation, e.g. ICMA, NEMA, NWA, CARA, WMA, NHRA, NPRDA etc.
- To ensure that the relevant development buffer zones are captured into the municipal IDPs and SDFs
- To register BREAF as an Interested and Affected Party (I&AP)
- To ensure that the BREAF are timeously aware of all proposed developments and are afforded adequate opportunity to make comment
- To empower the implementing agent(s) to monitor compliance with Environmental Authorisations
- To take into consideration the possible implications of the 5m contour line and the determined flood lines, in terms of existing and proposed developments and activities.

Four development buffer zones are identified in the existing environmental legislation, e.g. the ICM Act (Act No. 24 of 2008, amended 2014), the National Environmental Management Act (Act No. 107 of 1998) (NEMA) , etc. (see Figure 11 and Figure 12).

6.3.2.1 Coastal Overlay Zone and Coastal Protection Zone

Under the ICM Act, the default Coastal Protection Zone (CPZ) is a continuous strip of land at extending from the coastal and estuarine high water mark to at least 1 000 m inland in rural areas, and 100 m in urban areas, covering all areas not already zoned for residential or industrial development. The relevant municipalities are required to incorporate the default CPZ and coastal management lines and proposed coastal overlay zones, once adopted, within their spatial development frameworks and land use management systems in order to manage and regulate the use of land at the coast and ensure an adequate buffer for the estuary.

6.3.2.2 32 m river and wetland buffer

A buffer area of 32 m from the edge/bank of all rivers, water bodies and wetlands/salt marsh is a buffer zone intended to protect the ecological functioning of the riparian system. Any activities within this area are controlled by the EIA regulations of NEMA. This 32 m zone is listed in terms of the new EIA regulations (2014). An environmental authorization is required for activities within this zone. The area is proposed as a development setback line along the estuary in order to facilitate the protection of river banks and the sensitive vegetation along these banks. It is also proposed as a rehabilitation priority area where current agricultural/development encroach into this buffer zone. In such areas (e.g. wherever ploughing is occurring within this 32 m buffer) the priority is to discourage such activities and rehabilitate existing disturbed areas.

6.3.3 Recreation-based zones

OPERATIONAL OBJECTIVES:

- To enforce by-laws in terms of the current suite of water-based activities, e.g. skiing and non-skiing zones, speed limits, etc.
- To investigate the environmental impacts of the existing water-based activities and to identify measures to mitigate these impacts (see also conservation zones)
- To identify and demarcate zones for other activities such as kite-surfing, windsurfing and catamarans
- To estimate the carrying capacity for recreational boating activities in terms environmental impacts

The main activities on the Breede River Estuary are boating, recreational fishing, and skiing. Other uses include wind-surfing, kite-surfing, wake-boarding and catamarans. Skiing is perhaps the activity which conflicts with more other activities, than any other individual activity, and for this reason, a "No-skiing" zone and a "Skiing" zone, have already been enacted in by-law (Province of the Western Cape: Provincial Gazette 6697, 12/02/2010) (Figure 13), i.e. no skiing below the confluence of the Slangrivier mouth.

Kite-surfing, windsurfing and catamarans are however, also activities that could potentially conflict with recreational fishing and boating. The lower estuary is recognised internationally, as a world class kite-surfing site. However, this of course, is also a high boating hazard area, and for this reason, it is proposed that a kite-surfing /wind surfing/catamaran zone be identified, designated and enacted in by-law, in terms of human safety and user conflict. It has been suggested that the kite surfing and wind surfing zone should be below the government jetty to the ocean. It is worth noting that the ideal conditions for kite-surfing are strong winds, which are usually conditions that discourage recreational fishing. The potential for conflict is therefore, perhaps less than anticipated.

Wake-boarding is an activity that may only take place in the "Skiing" zone. It has potential for environmental impacts, particularly in terms of bank erosion, and hence, may not, according to the existing by-law, take place closer than 30 m to the banks of the estuary. It has also been proposed that the existing by-law be changed to state that in areas where the river is less than 60 m wide, as well as opposite any development nodes, e.g. Lemoentuin, Malagas, and Riverine, etc. that wake-boarding should also not be permitted.

It is important to note, that the proposed zonation plan will be refined by means of a study dedicated to assessing the carrying capacity of the estuary relative to the various uses and consequently establishing a balance between biodiversity conservation and control of user groups. This study is currently in progress by the LBRCT, facilitated by DEADP.

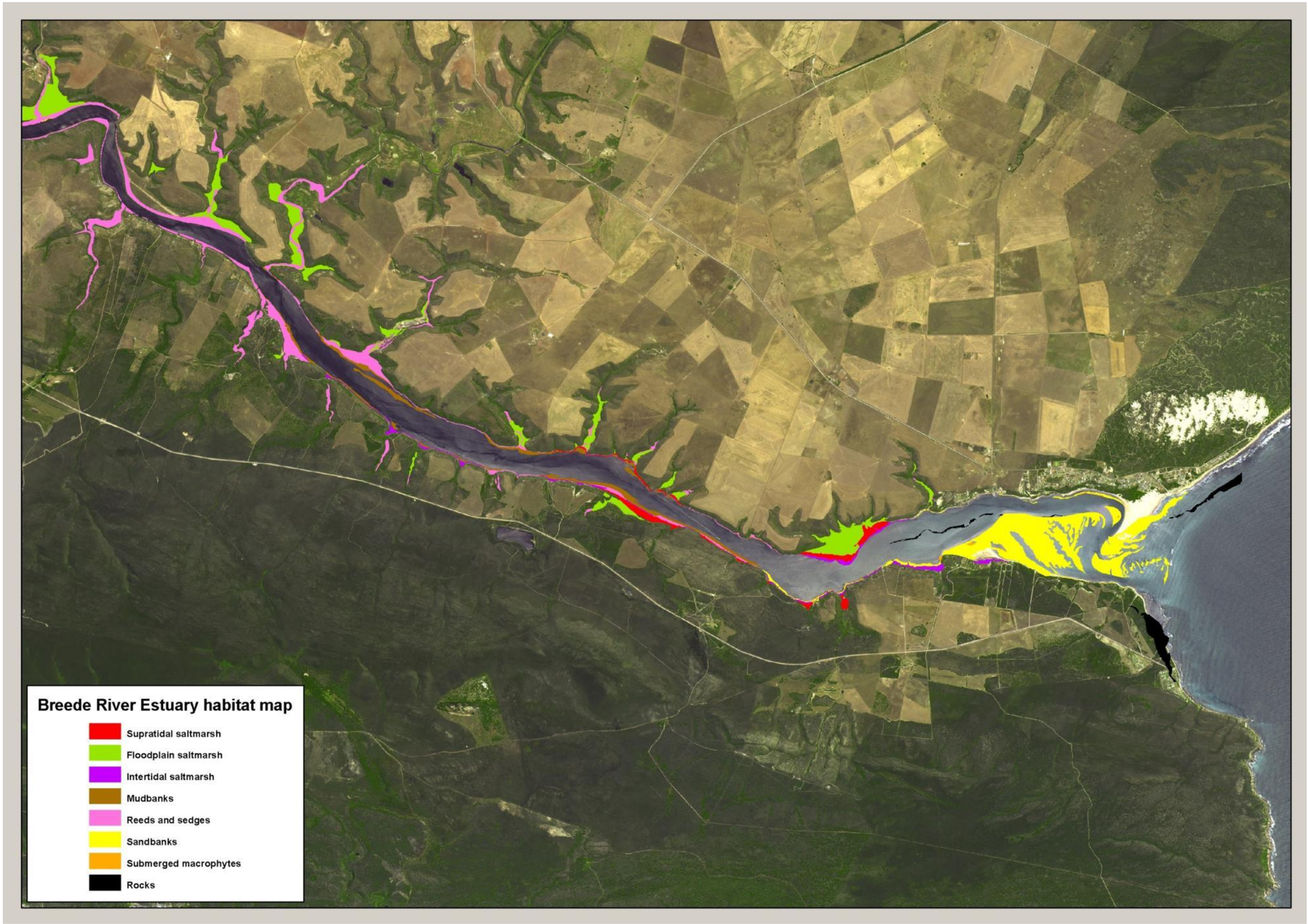

Figure 7: Habitats of the Breede River Estuary (lower section)

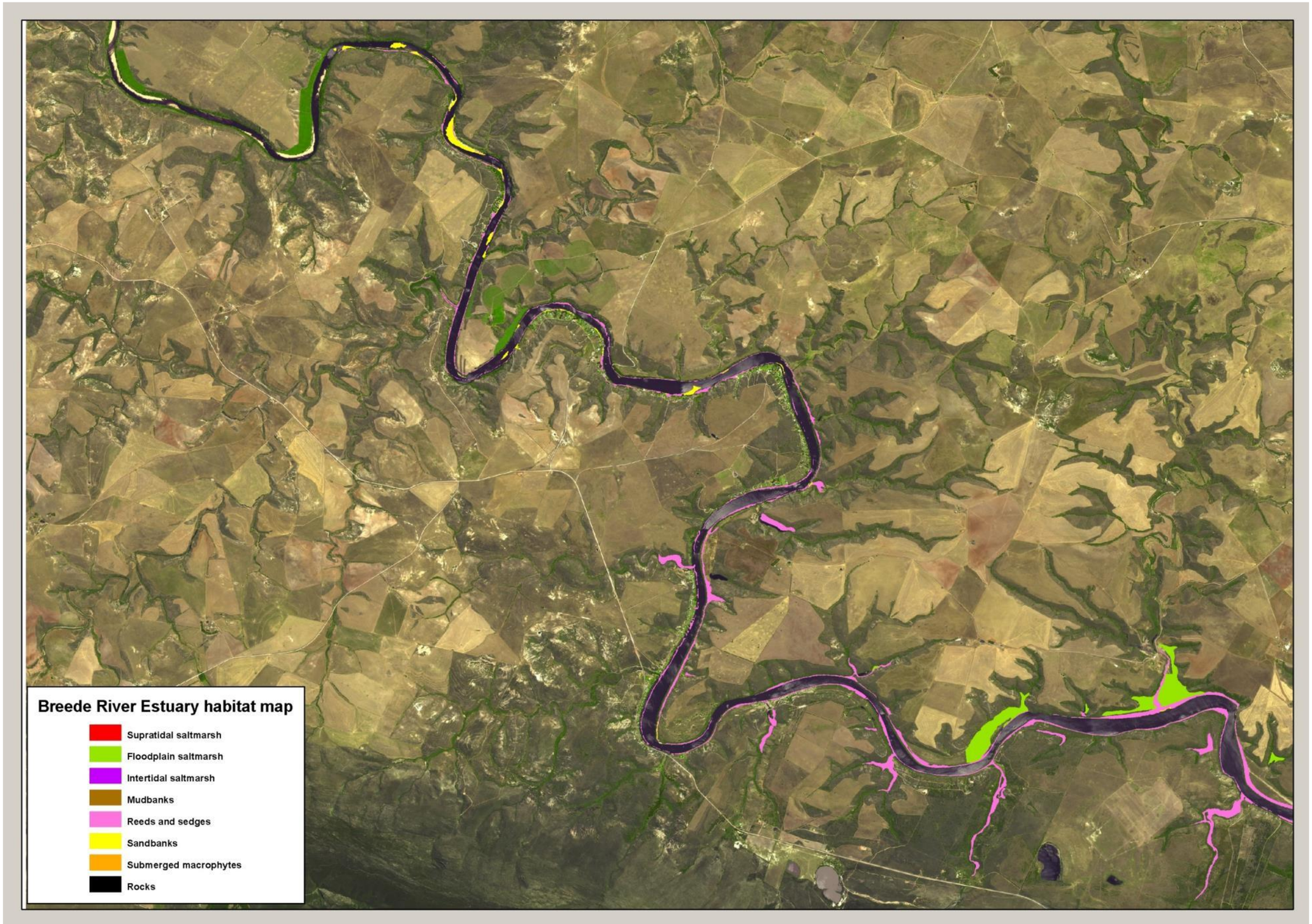

Figure 8: Habitats of the Breede River Estuary (upper section)

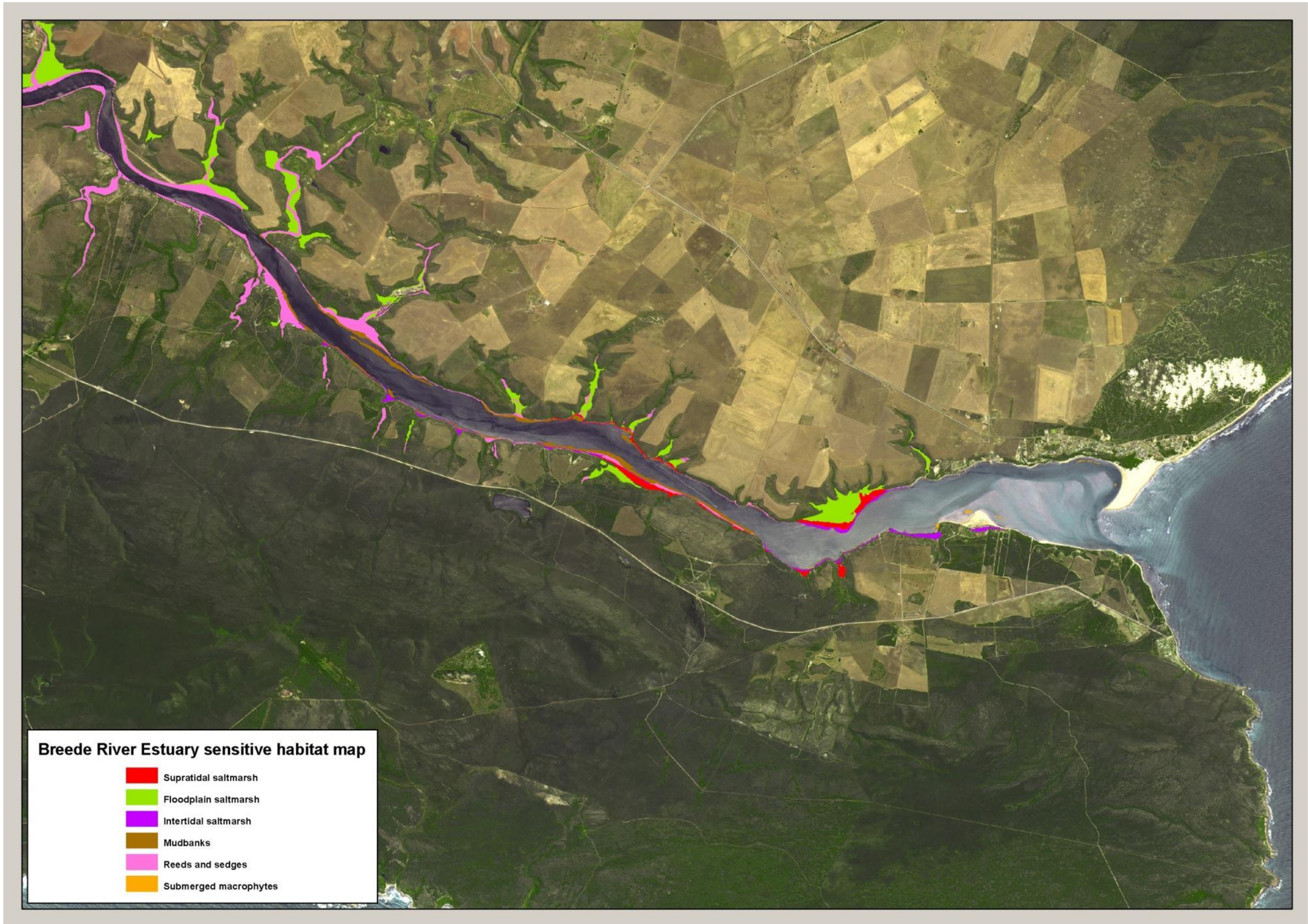

Figure 9: Conservation/protected zones proposed for the Breede River Estuary (lower section)

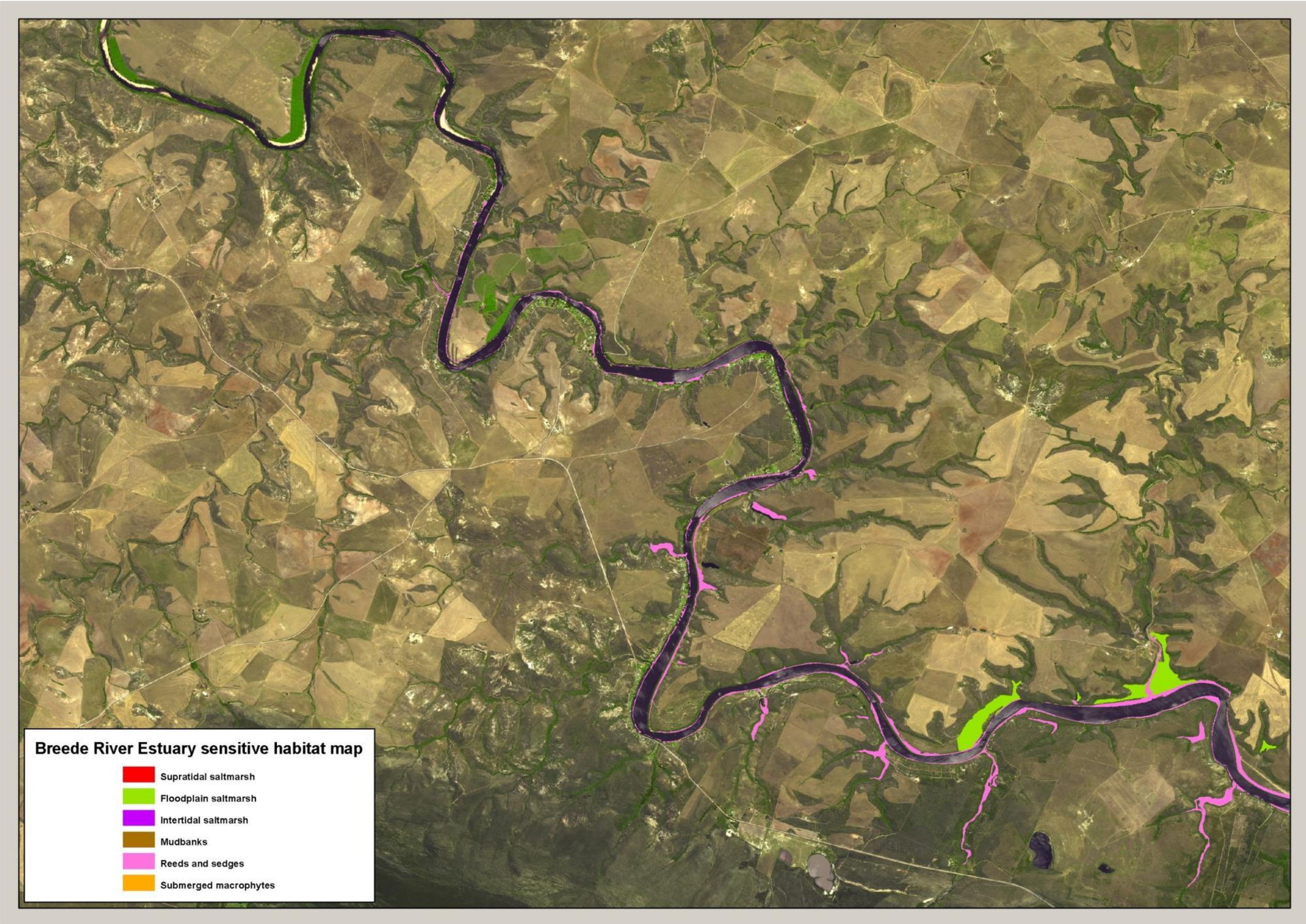

Figure 10: Conservation/protected zones proposed for the Breede River Estuary (upper section)

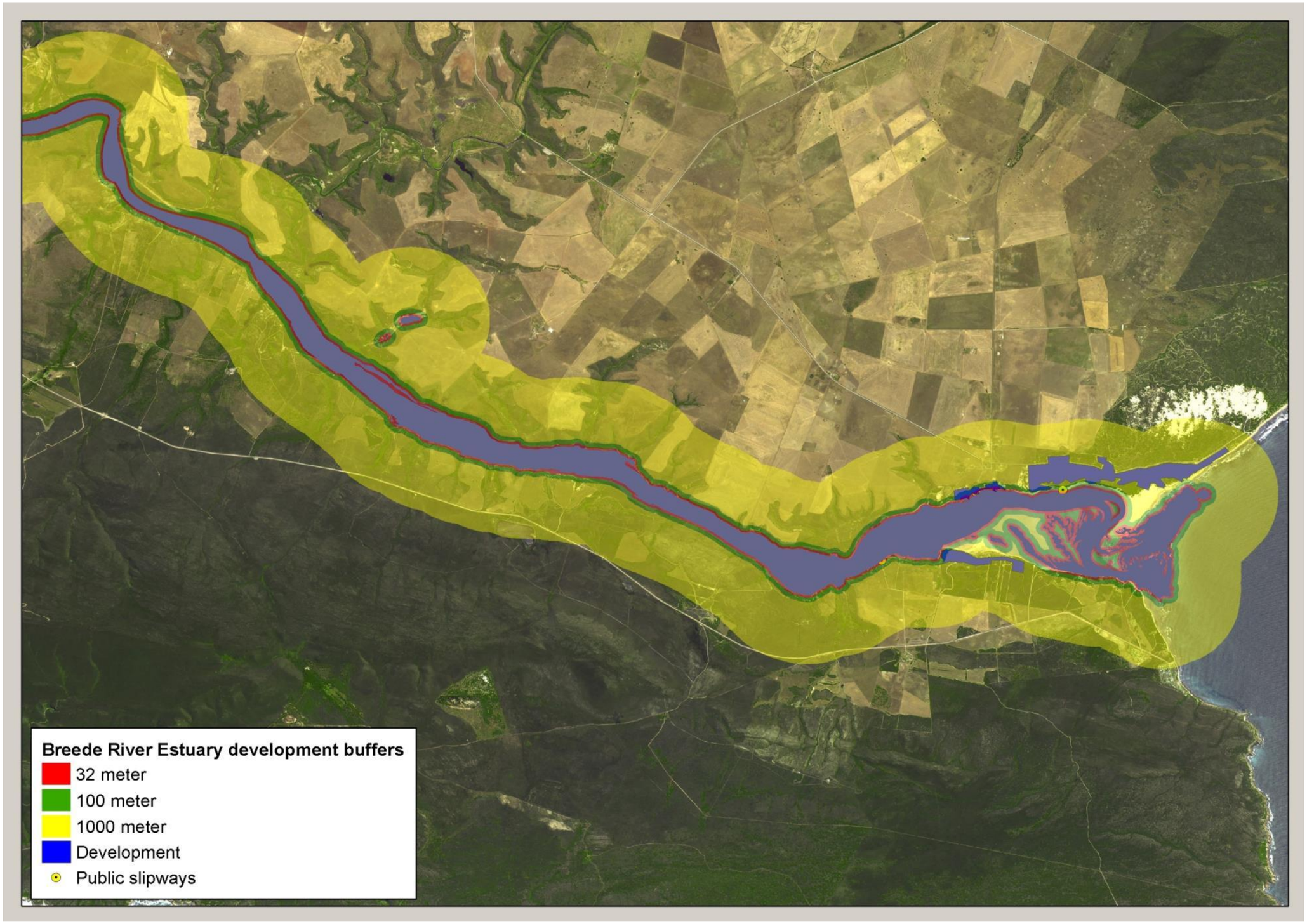

Figure 11: Development buffer zones for the Breede River Estuary (lower section)

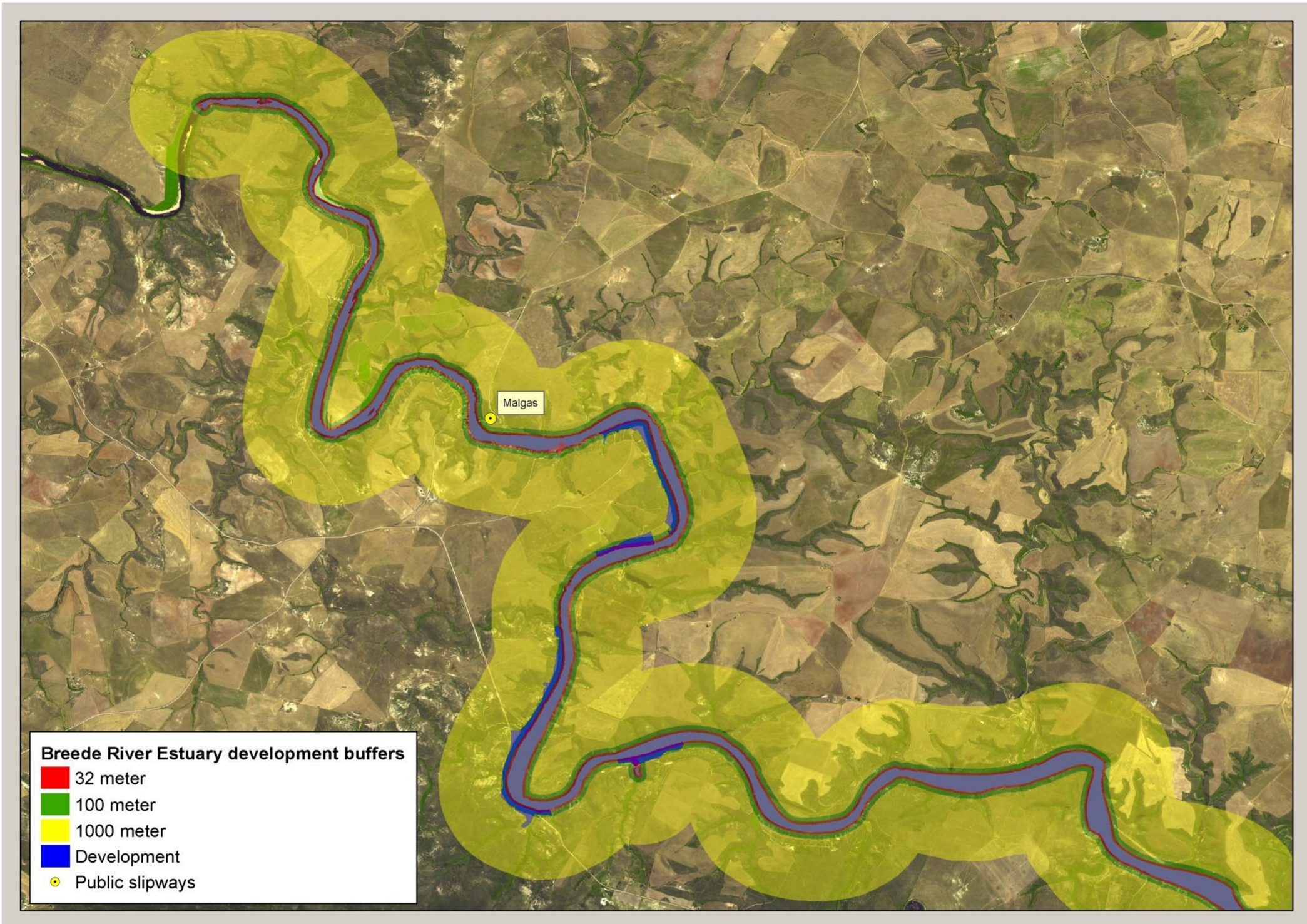

Figure 12: Development buffer zones for the Breede River Estuary (upper section)

Figure 13: Recreation-based zones for the Breede River Estuary – existing and proposed (kite surfing)

7 RECOMMENDED MANAGEMENT PRIORITIES

The project plans discussed hereunder, give effect to the various management objectives and the EZP by identifying the priority management interventions that are required to ensure their realisation.

Five project plans have been compiled for the efficient and effective management of the Breede River Estuary. Each plan corresponds to a key objective and contains applicable management actions, supporting regulations, level of priority, responsible institution(s), and required resources if such information is available. These are arranged in general order of priority, but nevertheless recognize that the neglect of any leg will compromise overall success:

- Co-management and effective governance;
- Sustaining water quality & quantity;
- Conservation of biodiversity;
- Sustainable development; and
- Public education and awareness and knowledge enhancement

It should be noted that there is some interconnectedness between the plans and some management actions, as they all ultimately contribute to the conservation of ecosystem function and patterns of biodiversity, which in turn leads to the conservation of a sustained supply of ecosystem goods and services delivered by the estuary.

7.1 Institutional and Management Structures

Co-management and effective governance is the keystone for achieving the vision set by the stakeholders for the Breede River Estuary, and therefore attainment of the overall strategic objective of conserving its ecological functioning and biodiversity. Without well-structured and efficient institutional and management arrangements, integrated environmental management of the estuary may be no more than a series of uncoordinated reactions to immediate problems. Ensuring co-management and effective governance is therefore probably the most important objective to be achieved. To this end, DEADP is in the process of developing the Western Cape Estuarine Framework and Implementation Strategy to set criteria for conformance with respect to establishing institutional and management structures for estuarine management within the province.

Regarding the Breede, three main 'institutions' will be in effect regarding the management of activities in and around or relating to the Breede River Estuary. These are: the **Responsible Management Authority (DEADP)**; the **BREAF**, which is a collection of stakeholders with vested interest in the estuary and the vehicle through which the implementation of the EMP can be monitored; and the **implementing agent on behalf of DEADP, the LBRCT,** who can be designated by DEADP to implement certain priorities on behalf of the Management Authority in respect of the EMP (See Section 8 for more detail).

Table 3: Management Actions for institutional and management structures

ACTION	RELEVANT LEGISLATION	PERFORMANCE INDICATOR	WORK PLAN	
			TIMING	RESPONSIBILITY
Management Objective 1: Maintain a fully functional estuary advisory forum (the BREAF) that will facilitate co-management and effective governance*				
Review of roles and responsibilities of BREAF and LBRCT in light of the Protocol	ICM Act/The Protocol	Roles and responsibilities agreed	2016-	DEADP BREAF LBRCT
Finalise institutional arrangements for the BREAF	ICM Act/The Protocol	Confirmed establishment of BREAF Implementation protocols confirmed with relevant organs of state	2016-	DEADP BREAF
Active collaboration of BREAF with other institutions through shared responsibilities and active representation on Municipal Coastal Committee(s)	ICM Act	Representation on municipal coastal committees; Breede estuary issues raised on agendas; Minutes of meeting	2016-	DEADP BREAF DEA
Active participation and collaboration from relevant government departments and organs of state on BREAF	ICM Act Water Act Municipal Systems Act IDP	Representation at BREAF by provincial & municipal coastal officers; Minutes of meetings indicating completed actions	2016-	DEADP BREAF
Management Objective 2: Secure appropriate funding and legal support for implementation of the Breede River EMP				
Develop long-term financing plan		Action plan for future funding developed;	2016--	DEADP BREAF

ACTION	RELEVANT LEGISLATION	PERFORMANCE INDICATOR	WORK PLAN	
			TIMING	RESPONSIBILITY
	ICM Act/The Protocol MSA	Implementation Protocol signed; Sufficient & effective use of funding; Project plans implemented; Income generated from key partners		Implementing agent (e.g. LBRCT)
Secure funding for applicable project plans			2017	DEADP DEA BREAF Swellendam Hessequa Overberg Eden
Investigate income generation opportunities (e.g. access fees, competition fees)			2017	BREAF Implementing agent (e.g. LBRCT)

* Cross cutting with water quantity & quality in terms of cooperative governance with BGCMA

7.2 Water quantity and quality

Securing an appropriate quantity and quality of freshwater input into the Breede River Estuary, is the primary action that must be taken to conserving functioning and biodiversity of this unique system. Other conservation management activities aimed at sustaining the integrity of patterns and processes, is the rehabilitation of degraded areas, (e.g. bank erosion, trampling, etc,) as well as effective control of invasive alien plant species. The latter is cross cutting in terms of preserving biodiversity. An affiliation between BGCMA and BREAF will facilitate securing and maintaining the Reserves for Water Quality and Water Quantity for the Breede River Estuary. A representative from BGCMA should be a member of BREAF.

Table 4: Management Actions for water quantity and quality

ACTION	RELEVANT LEGISLATION	PERFORMANCE INDICATOR	WORK PLAN	
			DURATION	RESPONSIBILITY
Management Objective 1: Ensure that the Reserves for Water Quantity and Water Quality are maintained through ongoing interaction between the BREAF and BGCMA				
BREAF to participate and provide input and comment into catchment management planning and classification	NWA	Recorded attendance at catchment meetings; Report back to BREAF meetings; Estuarine matters included in agenda of BGCMA	2016-	BREAF DWS DEADP
Active representation of BGCMA on BREAF		Recorded attendance at BREAF meetings; Catchment related matters included in agenda of BREAF Signed membership of BGCMA on BREAF Minutes of BREAF meetings	2016-	BREAF BGCMA DEADP

ACTION	RELEVANT LEGISLATION	PERFORMANCE INDICATOR	WORK PLAN	
			DURATION	RESPONSIBILITY
Develop and implement a Disaster Management Plan for the Breede Estuary, including early warning and reaction protocols in response to for e.g. riverine flooding, sea-level rise, storm events.	Disaster Management Amendment Act (Act No. 16 of 2015)	Estuary-specific disaster management Early warning and reaction protocols developed Database of disasters and emergency events created and maintained Findings of flood line determination study	2016-	Western Cape: Department of Local Government: Disaster Management Centre (WCDMC)
Management Objective 2: Reduce bank de-stabilization and erosion, and degradation				
Identify, estimate costs, prioritise and rehabilitation areas of bank erosion, trampling, disturbed riparian vegetation (priority areas and hot spots)etc.	ICM Act CARA	Fine scale GIS map generated; Site-specified rehabilitation methods identified; Funding secured for priority areas; Implementation of rehabilitation Lidar data	2017-	Local municipalities DWS: WfWetlands Implementing agent (e.g. LBRCT)
Management Objective 3: Minimise water pollution				
Identify sources & types of pollution & prioritise mitigation measures	NWA NEM:WA	Pollution sources identified; Mitigation measures devised; Database of offenders developed	2016	DWS DEADP DEA Implementing agent (e.g. LBRCT)

ACTION	RELEVANT LEGISLATION	PERFORMANCE INDICATOR	WORK PLAN	
			DURATION	RESPONSIBILITY
Establish water quality monitoring programme within the estuary		Water quality monitoring programme developed & maintained; Database & analyse of results	2016-	DWS DEADP DEA
Management Objective 4: Control the spread and densification of both aquatic and terrestrial invasive alien plant species				
Identify, prioritise and control invasive alien plant infestation	CARA NEMA	Fine scale GIS map generated; Priority infestations identified; Long term budget estimated; Funding sourced; Staff employed; Volume/ weight/ ha of areas cleared	2017	Landowners DWS: WfW LBRCT DEA: Working for Coast Local municipalities DEADP DAFF

7.3 Conservation of Biodiversity

Conservation of the functional attributes and biodiversity patterns and processes of the Breede River Estuary is obviously crucial to securing the environmental goods and services that the estuary provides. In terms of conserving biodiversity, more specific actions relate to preserving and affording protection to vital estuarine habitats and species, and compliance management, both in terms of sustainable consumptive use (e.g. fishing, bait collecting) as well as non-consumptive use (e.g. minimizing damage caused by boating-related activities in sensitive habitats, building of jetties, altitude restrictions etc.).

Table 5: Management Actions for conservation of biodiversity

ACTION	RELEVANT LEGISLATION	PERFORMANCE INDICATOR	WORK PLAN	
			TIMING	RESPONSIBILITY
Management Objective 1: Ensure the conservation of an optimal representation of vital estuarine habitats and associated species				
Workshop with key role players to identify conservation measures	ICM Act	• Identify high priority areas for active conservation; • Identify Thresholds of Potential Concern (TPCs) for habitats & species; • Identify conservation measures for each zone; • Identify appropriate special conservation measures for individual species where deemed necessary, e.g. Dusky kob lure restrictions & Zambezi shark	2017	DEA DAFF Implementing agent (e.g. LBRCT)
Identify conservation important areas: – Obtain PAES from CapeNature / DEADP – Discuss overlay proposed areas with	Protected Area Expansion Strategies	Areas of conservation importance identified and protection motivated and	2019	DEADP CapeNature

ACTION	RELEVANT LEGISLATION	PERFORMANCE INDICATOR	WORK PLAN	
			TIMING	RESPONSIBILITY
CapeNature Land-Use Planning; – Establish where the area in question complies PAES criteria or whether it has any conservation worth important features – Submit application – Request to biodiversity task team to consider – Implement recommendations		applied for under PAES		
Enact conservation zones and associated measures	Municipal By-laws	By-laws enacting conservation zones& associated measures compiled	2017	Local municipalities
Management Objective 2: Ensure sustainable resource use through effective compliance management				
Maintain existing compliance management system to enforce conservation measures for living and non-living resources (including fish & bait species related quotas, closed seasons, bag limits, collection methods)	CARA NWA ICM Act MLRA Sea Birds & Seals Protection Act Seashore Act NEM:BA MPRDA MSA Municipal By-laws	Habitat surface area & health maintained; Healthy populations of all species; Low levels of non-compliance Record (database) of non-compliance	2016-	DEA DAFF CapeNature Implementing agent (e.g. LBRCT)

ACTION	RELEVANT LEGISLATION	PERFORMANCE INDICATOR	WORK PLAN	
			TIMING	RESPONSIBILITY
Management Objective 3: Regulate recreational use in and around the estuary, including water-based and aviation activities, to reduce habitat degradation and disturbance to fauna and flora				
Maintain existing compliance management system pertaining to water-based activities, e.g. skiing and non-skiing zones, speed limits, wake-boarding etc.	Municipal By-laws	Compliance management system effective, well maintained & ongoing; Number of infringements reduced	2016-	Municipalities Implementing agent (e.g. LBRCT)
Identify, enact & demarcate zones, and access, for other activities such as kite-surfing, windsurfing and catamarans	Municipal By-laws	Beacons erected; Monitoring & compliance enforcement regularly undertaken; By-laws developed & enforced	2016-	Municipalities Implementing agent (e.g. LBRCT)
Determine carrying capacities for each water based activity using the 'Recreational Water Use Manual' (DWA, RW GP2.2) in consultation with relevant organs of state	Municipal By-laws	Carrying capacities set for each activity; Carrying capacities enacted into by-laws	2017	Municipalities Implementing agent (e.g. LBRCT) DWS
Regulate water-based competitions by maintaining an application database	Municipal By-laws	Database developed to manage & analyse historical data, fee collection, scheduling, no. of participants, boats, zoning	2016-	Municipalities Implementing agent (e.g. LBRCT)
Negotiate with Civil Aviation Authority to investigate the possibility of a 'special flight rules area' for the air space over the CPZ	CAA Section NEM:PAA	Special flight rules area of 1500 ft amsl enacted for Breede CPZ	2018	Civil Aviation Authority BREAF Implementing agent (e.g. LBRCT)

7.4 Land-use and infrastructure

The Swellendam and Hessequa municipalities are required, in terms of the ICM Act, to incorporate the proposed coastal management line and updated Coastal Protection Zone within their spatial development frameworks. The BREAF should champion the integrating of the coastal management line and the EMP as a whole into the Integrated Development Plans (IDPs) and Spatial Development Frameworks (SDFs) of the four municipalities. Additional special planning regulations, in terms of style and sustainability, should also be identified and adhered to.

Table 6: Management Actions for sustainable development

ACTION	RELEVANT LEGISLATION	PERFORMANCE INDICATOR	WORK PLAN	
			DURATION	RESPONSIBILITY
Management Objective 1: Implement an estuary zonation plan that directs infrastructural development and other land use practices (e.g. agriculture) within the various flood lines, coastal management lines, buffer zones and overlay zones				
Workshop with key role players to identify and enact "no-go areas" for development and vegetation transformation based on habitat sensitivity and irreplaceability	ICM Act NEMA CARA MSA	"No-go" areas enacted in relevant legislation	2017	CapeNature Implementing agent (e.g. LBRCT)DEADP DAFF
Identify appropriate development setback/ coastal management line(s) & obtain legal status	ICM Act MSA NEMA	Coastal management lines determined Coastal management line gazetted in relevant legislation Coastal management lines integrated into IDPs & SDF	2017	DEA DEADP Municipalities Implementing agent (e.g. LBRCT)
Management Objective 2: Facilitate equitable access for both pedestrian and vehicular access				
Development & maintenance of spatially-explicit database on which existing jetties and slipways are capture	Seashore Act Section	Database of jetties and slipways developed & maintained	2017	CapeNature Implementing agent (e.g. LBRCT)

ACTION	RELEVANT LEGISLATION	PERFORMANCE INDICATOR	WORK PLAN	
			DURATION	RESPONSIBILITY
Surveys/patrols to monitor for new structures being built without authorisation	Seashore Act Section	Low incidence of new unauthorised structures built	2016-	DEA
Efficient authorisation & licensing system	NEMA	All structures licensed; Systematic & efficient collection of license fees	2016-	DEA
Investigate/negotiate merits of authorisation/licensing function becoming the function of the Implementing Agent	NEMA	All structures licensed; Systematic & efficient collection of license fees	2017	BREAF,LBRCT, DEA DEADP, CapeNature
Management Objective 3: Ensure that all proposed developments within the development buffer zones, adhere to the EIA process in terms of the full suite of relevant environmental legislation				
Register BREAF / LBRCT as an I&AP for all developments & rezoning applications	ICM Act NEMA NWA CARA NEM:WA EIA Regulations MPRDA	Database of all new developments & comment made by LBRCT through EIA process Developments tabled at BREAF meetings	2016-	DEADP DWS DAFF Implementing agent (e.g. LBRCT) BREAF
Develop & maintain database to monitor adherence to building plan system	Municipal By-laws	Data with current information i.t.o. applications, designs & approvals	2017-	Local municipalities Implementing agent (e.g. LBRCT)
Management Objective 4: Ensure the incorporation of the estuarine management plan into the Integrated Development Plans and Spatial Development Frameworks				
Ensure capturing of zonation & associated recommendations into the SDFs	ICM Act MSA	EZP & recommendations appearing in all four relevant IDPs and SDFs	2017 Timing depends on when IDPs & SDFs are revised	BREAF Swellendam & Hessequa local municipalities, Eden & Overberg district munic.

7.5 Public education and awareness, and knowledge enhancement

Raised public appreciation in terms of the environmental goods and services provided by the estuary, and the compliance management rules and regulations necessary to protect these resources, is a crucial. The LBRCT has already developed a website (www.breede-river.org) that provides a valuable platform for the dissemination of all relevant information in terms of conservation on the Breede River Estuary, including compliance issues, monitoring and research results, and general values of the estuary. The LBRCT also produces a newsletter than deals with topical issues. Educational and compliance signage has also been provided at strategic points. These existing efforts must be sustained on the long term, through funding secured from the local municipalities.

Table 7: Management Actions for public education and awareness and knowledge enhancement

ACTION	RELEVANT LEGISLATION	PERFORMANCE INDICATOR	WORK PLAN	
			DURATION	RESPONSIBILITY
Management Objective 1: Promote high levels of public awareness and appreciation of the ecosystem services provided by the Breede River Estuary, threats posed to its integrity, and compliance management				
Raise and maintain public awareness of the values of the estuary, threats & compliance measures		Strategically placed signage; Dissemination of information via website, newsletters, pamphlets etc., relating to both compliance awareness & environmental education	2017	BREAF Implementing agent (e.g. LBRCT)
Promote public involvement in data collection and estuary monitoring (through Citizen science and Adopt-a-Beach initiatives)		Number of public events held Number of participants Annually updated database maintained by BREAF	2017-	BREAF Implementing agent (e.g. LBRCT)
Management Objective 2: Enhance our scientific knowledge, through research and monitoring				
Establish a comprehensive monitoring programme (as per Appendix 1 Resource		Research projects and publications;	2016-	DEADP DWS

ACTION	RELEVANT LEGISLATION	PERFORMANCE INDICATOR	WORK PLAN	
			DURATION	RESPONSIBILITY
Monitoring Protocol)		Specific bio-indicators identified to monitor the state of the estuary; Monitoring database produced & maintained; Monitoring reports; Active research network		Implementing agent (e.g. LBRCT) BREAF DAFF
Investigate carrying capacity (i.r.t. resource use, users, boat numbers, etc.)	MLRA , NWA, ICM Act, NEM:BA			DEADP Implementing agent (e.g. LBRCT) BREAF DST
Engage Dept of Science and Technology, academic and research institutions to undertake scientific research				
Investigate the environmental impacts of the existing water-based activities and identify mitigation measures	NEMA			DEADP Implementing agent (e.g. LBRCT) BREAF DEA

8 IMPLEMENTATION

8.1 Key role players

It is essential that this EMP is regarded as a strategic plan that can guide the detailing of implementation 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 action plans and the implementation thereof. Ways of empowering historically disadvantaged individuals with regards to the local management of the Breede River Estuary must be explored and implemented.

Co-management and effective governance has already been identified as the keystone to the efficient and effective management of the Breede River Estuary.

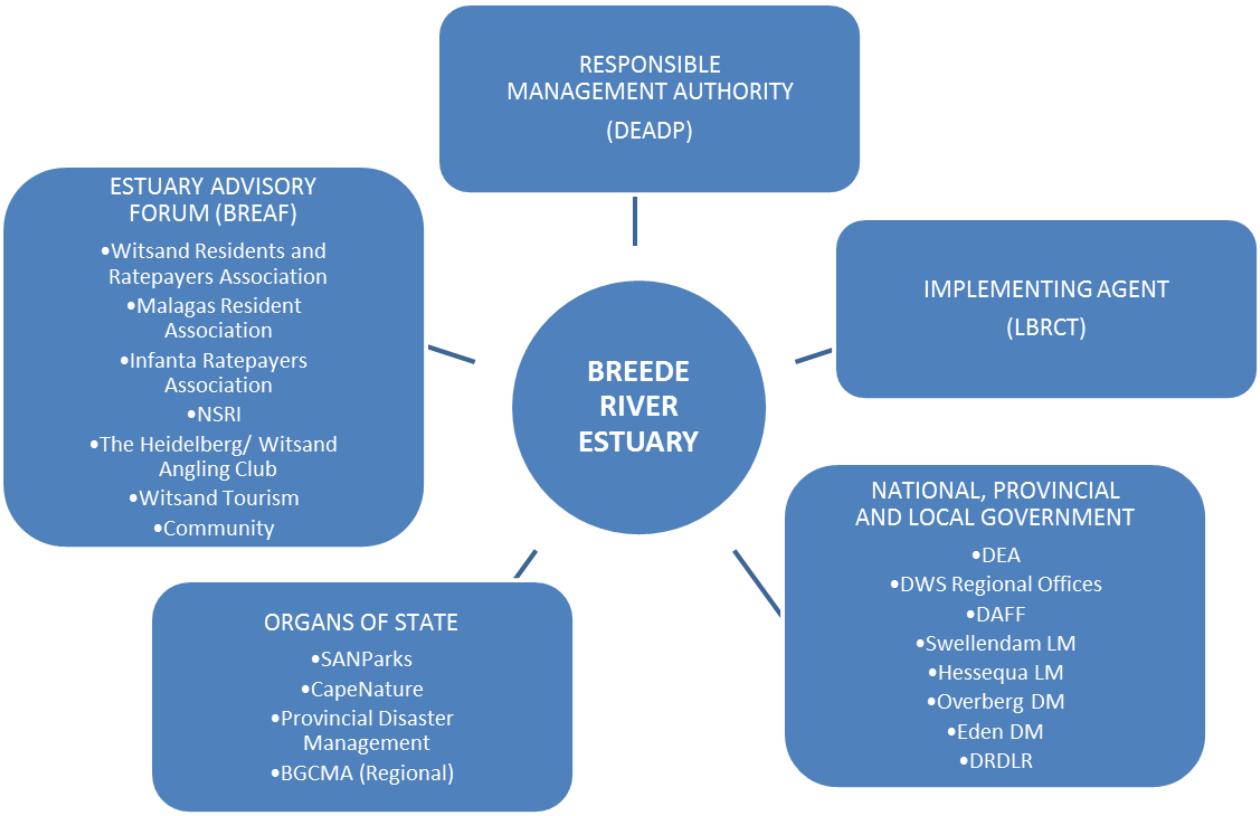

Figure 14: Key role players for the management of the Breede River Estuary

8.1.1 Estuary Management Authority

The Protocol identifies the **Western Cape DEADP**, or its assigned representative, as the **Responsible Management Authority** responsible for the development of the Breede River EMP as well as being responsible for the co-ordination of its implementation. This implementation function can be effected through a range of different forums and actors.

8.1.2 Lower Breede River Conservancy Trust

The **Lower Breede River Conservancy Trust (LBRCT)**, established in 1996, was originally contracted as service provider to the municipalities of Hessequa and Swellendam as well as the then Marine and Coastal Management (the Department of Environmental Affairs through the Swellendam Municipality), to implement specific activities mandated by relevant legislation pertaining to the Breede River Estuary from the mouth upstream for approximately 56 km to Nuyshoek. A similar arrangement has since been entered into between LBRCT and DEADP focussing however on a different mandate.

Management of the LBRCT's operations is directed and supervised by an executive committee comprising of elected voluntary LBRCT members who perform their assigned executive duties without any monetary or material reward.

The LBRCT is responsible for compliance management in terms of recreation- related by-laws and historically was also responsible for the implementation of the Marine Living Resources Act on behalf of Marine and Coastal Management, as well as fulfilling important functions in conservation management, monitoring development, ecological research and monitoring, water quality monitoring and public awareness.

8.1.3 BREAF

According to the Protocol, the **role of BREAF** 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 (see Appendix II: Draft Constitution of the Breede River Estuary Advisory Forum). The broader **community** will be able to voice concerns and raise issues via the BREAF.

8.1.4 Government Departments and organs of state

The successful implementation of the EMP may be seen as also 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;
- **Municipalities, including Hessequa and Swellendam Local Municipalities, and Eden and Overberg District Municipalities**: Responsible for legislative support and funding;
- Relevant **National government departments**, especially Department of Environmental Affairs, Department of Water and Sanitation (via the regional office), Department of Rural Development and Land Reform;
- Organs of State (SANparks, CapeNature, BGCMA).

The National Department of Environmental Affairs is generally responsible for national standardisation of estuarine management and approval of provincially-compiled estuarine management plans. Direct involvement in individual estuaries, such as the

Breede, will occur via existing forums for intergovernmental coordination. These forums will have the management of the Breede River estuary on their agendas from time to time, and include:

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

8.2 Research and monitoring

8.2.1 Resource monitoring

Although a considerable amount of ecologically-based research and monitoring has been undertaken on the Breede River Estuary, there are nevertheless gaps in knowledge that should be addressed to contribute to the effective management of this ecosystem. Research and monitoring should focus on abiotic and biotic components, as well as on the impacts of resource utilisation (see Appendix I), to evaluate the health of the estuary, achievement of biodiversity targets and for compliance monitoring purposes. Taljaard (2003) also identified future monitoring requirements to (a) improve the confidence in the data required by the Intermediate determination of the RDM, for the estuary, (b) to meet the requirements of a Comprehensive Determination of RDM, and (c) to validate the predictions made during the allocation of Reserve and Resource Quality Objectives. The collection of data for the projects identified in Appendix I should be aligned with the requirements of the RDM studies.

8.2.2 Review and evaluation

This EMP should be reviewed and updated on a five-yearly from the date it was approved and adopted to ensure that objectives and targets are being achieved. An audit should be undertaken alongside the review and evaluation to determine and grade the success and failures with the implementation of the management plan according to the specified performance indicators (Appendix 2). The audit should ultimately be the responsibility of the RMA or its assigned representative and the BREAF.

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.

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APPENDIX 1: RECOMMENDED RESOURCE MONITORING PROTOCOLS

The following table provides a list of recommended abiotic and biotic parameters that should be monitored for the Breede River Estuary to assess compliance with the recommended freshwater reserve for the estuary (see Taljaard, 2003). Additional recommendations have been included for monitoring estuarine usage.

COMPONENT	OBJECTIVES	INDICATORS	SPATIAL SCALE	TEMPORAL SCALE	Sampling/analytical techniques
Biota: • Microalgae • Zooplankton • Macrophytes • Macrobentos • Ichthyofauna • Birds • Inter- and sub-tidal vegetation	To assess population trends of the different organism types associated with the Breede River Estuary to inform management actions	Population dynamics • Growing • Shrinking • Population structure – age and sex ratios	Designated sites (existing and new ones to be identified)	Quarterly	• Water column chlorophyll • Map using aerial photos • Surveys
Exploitation of living resources • Fish • Bait	To assess extent of living resources exploitation to inform management actions	Relate exploitation of fish and bait to population dynamics • Amount of permits issued • Amount of non-compliance documented	Throughout estuary for fish Lower part of estuary for bait (sand- and mud banks)	Quarterly	Permits issued Non-compliance data
Water quality: • Freshwater reach • Marine reach	To assess water quality in each of the river reaches	Physical and chemical: • Nitrate • Ammonium	Sampling sites in each respective reach	Quarterly	Collect water quality samples according to laboratory specifications and

COMPONENT	OBJECTIVES	INDICATORS	SPATIAL SCALE	TEMPORAL SCALE	Sampling/analytical techniques
• REI reach		• Phosphate • pH • EC/Salinity • Oxygen • Temperature			sending it for analysis pH, EC, salinity, Temp and Oxygen measured *in situ*
Bacteriological monitoring	To pick up bacteriological pollution as an early warning system of pollution to inform recreational use	Bacteriological concentrations: • Total coliform bacteria • Faecal coliform bacteria • Must be less than 100 per 100ml for full contact recreation	Sampling at problem sites where full-contact recreation is exercised	Quarterly	Collect water quality samples according to laboratory specifications and sending it for analysis
Sedimentation	To assess sedimentation at problem sites and monitor efficiency of management actions	Increasing or stable sedimentation/sandbanks: • Fixed photo points • Landsat imagery • Bathymetry	At pre-selected sites	Quarterly	Secchi measurements as at water quality sites – filter and weigh Fixed photo monitoring (annually) Landsat interpretation Bathymetric measurements
Groundwater: • quality • water level	To assess groundwater quality and water levels To inform management interventions and	Groundwater quality: • EC • pH	Groundwater usage within CPZ and within 10 km thereof	Quarterly	Collect water quality samples according to laboratory specifications and sending it for analysis

COMPONENT	OBJECTIVES	INDICATORS	SPATIAL SCALE	TEMPORAL SCALE	Sampling/analytical techniques
	effectiveness	• Hydro-geochemistry • Aquifer "type" characteristics Groundwater level data: • Rising • Declining • Rainfall relation			pH and EC can be measured *in situ*
Chemical pollution	• To assess level of chemical pollution at problem sites • To intervene with management where appropriate	Chemical compound & concentration: • Concentration • Possible source	At pre-selected sites only (*ad hoc*)	Quarterly	Collect water quality samples according to laboratory specifications and sending it for analysis
1: 100 year flood line	To record the level of the 1: 100 year flood line	Data captured into a GIS	Entire estuary	July 2011	Capture waypoints into a GPS and download into a GPS
Estuarine usage: • Angling • Bait collection • Water skiing • Kite surfing • Boating • Swimming • Public slipways	• To assess level of estuarine use by different user groups • To relate estuary use to all of the above • To inform management interventions where appropriate	Number of boats registered Numbers of permits issued Number of non-compliance documented Number of organized events and participants Number of reported	Through-out estuary: Access points (public slipways, boat permits etc.)	Quarterly	Permits issued Non-compliance data for each respective activity *Ad hoc* counts

COMPONENT	OBJECTIVES	INDICATORS	SPATIAL SCALE	TEMPORAL SCALE	Sampling/analytical techniques
• Jetties		incidents			

To improve the confidence of the Intermediate determination of RDM of the Breede River Estuary, in particular, the following monitoring surveys are recommended (Taljaard, 2003):

Abiotic components:

1. Atypical rain patterns during the study period, prevented specialists from measuring the extreme extent of saline intrusion typically encountered during low flow periods in the Breede River Estuary. To improve confidence, particularly for the low flow period, salinity distribution patterns, as well as water quality conditions at such times still need to be monitored.

2. The levels of water quality variables, such as suspended solids and toxic substances (e.g. pesticides and herbicides) in inflowing river water need to be established for the Present State.

3. Reference Conditions for water quality variables need to be established for inflowing river water needs to be established.

Biotic Components:

1. To improve confidence of the predictions that need to be made in RDM determinations requires more data on the relationships between different biotic and abiotic variables. This requires in-depth research – a cross-sectional analysis across different states or systems to determine these relationships. Some of these issues are being addressed in a Water Research Commission Project aimed at improving information requirements and understanding in terms of determination of Resource Directed Measures.

2. The utilisation of microphytobenthos needs to be better established, i.e. "Who eats what" is not well understood.

3. Plant habitat monitoring: Area of intertidal flats should distinguish *Zostera* beds, and area of unvegetated sandflat versus mudflat.

4. The extent to which macrophytes in the Breede River Estuary rely on groundwater must be established.

5. Phytomicrobenthos species and biomass assays need to be conducted to determine the extent of species change with seasons.

6. Monitoring the distribution of fringing macrophytes along the banks of the estuary, particularly *Phragmites australis*. If average salinity increases in an upstream direction, dieback of macrophytes may occur as a consequence. Sampling during the wet and dry season.

7. Monitor distribution and abundance (hole counts) of intertidal macrobenthos, particularly large burrowing forms. If average salinity increases in an upstream direction, more suitable conditions provided by higher salinity values may allow colonization of new intertidal banks by some species. At the same time, subsurface sediment samples should be collected at high, mid and low tide levels for particle size analysis.

8. For fish, four sampling exercises at 25 sites from the mouth to 40 km upstream during spring, summer, autumn and winter need to be undertaken. At least one sampling exercise must be done over a complete weather cycle or 7 days to get some idea of the short-term responses of fish to changes in flow.

9. To improve confidence and to evaluate performance in the long term, the following would be required for birds: all water birds need to be counted in the different estuarine section described in this report during late summer (Feb-Mar) (essential), midwinter (Jun-Jul) (important), and spring (Sep) (could be important) at spring low tides. Also, birds in the lower estuary should be counted in one low tide period, upper estuary in one day (the following day at low tide), count on days of low human disturbance.

APPENDIX 2: RECOMMENDED PERFORMANCE MONITORING PLAN

MANAGEMENT OUTPUTS	PERFORMANCE INDICATOR	TIMING	LEGISLATION	RESPONSIBILITY
1. Institutional and Management Structures				
1.1 Maintain a fully functional estuary advisory forum (the BREAF) that will facilitate co-management and effective governance	Constituted BREAF Ongoing record of meetings held	Assess twice a year	ICM Act	BREAF LBRCT DEADP DEA
1.2 Secure appropriate funding and legal support for implementation of the Breede River EMP	Guaranteed annual allocation of funds Specific by-laws developed	Assess twice a year	ICM Act MSA	DEADP Municipalities BREAF Implementing agent (LBRCT)
2. Water Quantity & Quality				
2.1 Ensure that the Reserves for Water Quantity and Water Quality are maintained through ongoing interaction between the BREAF and BGCMA	Sustained estuarine health and function Sustained river flow Good water quality	Biannual for BGCMA	NWA: RDM	DWS DEADP BGCMA BREAF CSIR
2.2 Reduce bank de-stabilization and erosion, and habitat degradation	Number of degraded areas rehabilitated and secured	Ad hoc visual monitoring during normal daily activities or responsibilities	ICM Act CARA	Implementing agent (LBRCT) Local municipalities DWS: WfW
2.3 Minimise water pollution	Number and volume of sources of pollution reduced	Annually for DWS Monthly LBRCT	NWA NEM:WA	DEA DWS DEADP Implementing agent (LBRCT) Local

MANAGEMENT OUTPUTS	PERFORMANCE INDICATOR	TIMING	LEGISLATION	RESPONSIBILITY
				municipalities
2.4 Control the spread and densification of both aquatic & terrestrial invasive alien plant species	Increased number of tons removed/ hectares cleared	Annually for disturbed sites	CARA NWA	Implementing agent (LBRCT) DWS: WfW DEA:WfC Local municipalities Landowners
3. Conservation of Biodiversity				
3.1 Ensure the conservation of an optimal representations of vital estuarine habitats and associated species	Conservation areas secured through by-laws	Once a year	Municipal By-laws Protected Area Expansion strategies	DEA DAFF DEADP BREAF CapeNature Implementing agent (LBRCT) Local municipalities
3.2 Ensure sustainable resource use through effective compliance management under the Marine Living Resources Act	Reduction in infringement incidences	Ongoing for compliance and MLRA appointed personnel; daily patrols and inspections. BREAF & angling club members may assist.	MLRA	DEA DAFF CapeNature Local municipalities
3.3 Regulate recreational use in and around the estuary, including water-based	Reduction in infringement incidences	Ongoing for compliance monitors	Municipal By-laws	Local municipalities

MANAGEMENT OUTPUTS	PERFORMANCE INDICATOR	TIMING	LEGISLATION	RESPONSIBILITY
and aviation activities, through effective compliance management		and appointed personnel; daily patrols and inspections.		BREAF DWS Implementing agent (LBRCT)
4. Land-use and Infrastructure				
4.1 Implement an estuary zonation plan that directs infrastructural development and other land use practices (e.g. agriculture) within the various development setback lines/buffer zones	Reduction/cessation of inappropriate development in and around the estuary	Every 5 years	ICM Act MSA	BREAF DEADP DAFF Implementing agent (LBRCT)
4.2 Ensure the incorporation of the EMP into the Integrated Development Plans and Spatial Development Frameworks	Reduction in illegal development and operations of jetties & slipways	Every 6 months	Seashore Act NEMA	Implementing agent (LBRCT) CapeNature
4.3 Ensure that all proposed developments within the development buffer zones adhere to the EIA process	Each development lawfully constructed	Depends on number of developments and EA granted	NEMA ICM Act	BREAF DEADP DAFF DWS Implementing agent (LBRCT) Local municipalities
4.4. Ensure the incorporation of the EMP into the Integrated Development Plans and Spatial Development Frameworks	EMP is adopted into IDPs and SDF	Every IDP/SDF review cycle	MSA ICM Act	Swellendam, Hessequa, Eden & Overberg municipalities BREAF
5. Public Education and Awareness and Knowledge Enhancement				

MANAGEMENT OUTPUTS	PERFORMANCE INDICATOR	TIMING	LEGISLATION	RESPONSIBILITY
5.1 Promote high levels of public awareness and appreciation of the ecosystem services provided by the Breede River Estuary, threats posed to its integrity, and compliance management	Increase in number of newsletters; Sufficient number of public notice boards; Increase in number of conservancy members and voluntary monitors; Increase public participation in coastal/estuary/river clean ups and other initiatives eg. Breede Watch Increase in number of visiting school groups	Once year		BREAF Implementing agent (LBRCT)
5.2 Enhance our scientific knowledge, through research and monitoring	Increase in number of research projects and monitoring programmes	Once a year		BREAF DEADP DWS DAFF Implementing agent (LBRCT) DST

APPENDIX 3: THE DRAFT CONSTITUTION OF THE BREEDE RIVER ESTUARY ADVISORY FORUM

1. Mission

The Breede River Estuary, in all the beauty and bio-diversity of its eco-systems (flora, fauna, avifauna and aquatic life) ranks as the foremost estuary in South Africa, and, as such, it must be preserved as the rightful heritage of future generations.

2. Purpose

The purpose of the BREAF is:

2.1. To liaise with, and advise the RMA and any other of its members constituencies on any matter concerning the environmental management of the Lower Breede River Estuary, including the setting of objectives, how to achieve those objectives and the priorities for environmental governance;

2.2. To act as an effective communication channel between the RMA and relevant stakeholders, including all Government departments, both national and local, and in particular, to be a channel through which speedy and decisive action can be motivated in the best interests of the management of the Breede River Estuary;

2.3. To ensure that the Breede River Estuary is being managed in accordance with all applicable national and local legislation and in alignment with all prevailing policies;

2.4. To ensure that recreational activities, both consumptive and non-consumptive, are carried out and permitted within a framework that guarantees sustainability and the least amount of peripheral interference and negative effect to the system.

3. Forum Status

3.1. The Forum status shall be that of an advisory body, whose resolutions shall be taken into account by all relevant public bodies or authorities as shall be affected by same in regard to the stated mission and objectives, to the extent of the area of the estuary as determined by the Forum in consultation with its role players and the consultants.

4. The Estuary Extent

4.1. Subject to no further instruction being given to the Forum by any Legislated authority, the boundary lines denoting the Breede River estuaries extent shall be;

4.1.1. To the west, the official land surveyors mark as the official extent of the tidal reach placed at position 34°15'0495'' latitude and 20°30'4945'' longitude

4.1.2. To the east, the eastern boundary line be denoted by the line of latitude east 20°15, whereby the existing beacon on the buttress of the southern bank is anticipated as being in the correct position. The mouth shall then extend from that point, relevant to its variable extent, to the approximate end of the beach adjacent to the buildings of the beach restaurant and ablution block".

5. Membership

5.1. The BREAF shall consist of at least 12 but not more than 18 members.

5.2. Members shall represent stakeholder sectors and/or be such persons having appropriate experience, expertise and skills in order to enable the BREAF to carry out is functions.

5.3. Any member who represents any Government department NGO or any organization on the BREAF shall provide the BREAF with proof of their appointment on behalf of the appropriate organization.

5.4. With the agreement of its members, BREAF shall be entitled to co-opt ad hoc representation of individuals or representatives of bodies who it considers necessary to perform its duties in any matter from time to time.

5.5. The basic membership structure shall be as detailed in the final EMP.

6. Meetings and Procedures

6.1. The initial BREAF shall comprise of members identified via the Breede River EMP, who shall serve for an initial period of two years. Thereafter those members, who are not subject to nomination by Governmental Departments, shall resign, though may stand for re-election with other nominees by the remaining appointees, at a bi-annual General Meeting to be held within twenty six months of the inaugural and subsequent biennial General Meetings.

6.2. Members of the BREAF shall elect office bearers as determined by the BREAF from time to time, which as a minimum shall comprise a chairman and a vice-chairman, with a duly appointed secretary / treasurer.

6.3. The BREAF shall agree the frequency meetings, which shall be at least twice a year, and the venue of such meeting. The BREAF shall further agree the formalities to be followed at each meeting, including the option to hold meetings via email if necessary, and then the procedures to be followed.

6.4. The quorum shall consist of half of the members of the BREAF plus one, but which must include either the Chairman or the Vice Chairman.

6.5. In the event that a quorum is not achieved at a meeting where the required notice as determined by BREAF has been given, then such meeting shall be stood down for a period of seven days. On re-convention at the same time and the same place, those members present shall constitute a forum and in the event that neither

the Chairman nor the Vice Chairman is present, shall elect a Chairman from their number.

6.6. Should any member of the forum fail to attend two consecutive meetings such member shall be assumed to have resigned, and, in the event that it is a nominee of a Governmental Department, the department shall be advised accordingly.

6.7. Any member who is reasonably deemed incapable of fulfilling his duties for physical, mental, or practical reasons, or convicted of a felony, shall be required to resign.

6.8. In all instances the BREAF shall endeavour to reach decisions by consensus.

6.9. However the chairman may exercise the prerogative to determine that a resolution, on which consensus has not been achieved, should be put to the vote where a majority of 60% of positive votes shall cause it to be carried.

7. Liability

7.1. No forum member shall be liable to any other person whatsoever for any act of omission by himself, by the forum, or by its servants or agents.

8. Finance

8.1. The BREAF shall draft a budget for its financial requirements and endeavour to find a source / sources or party / parties that will undertake the funding thereof.

9. Amendments to the Constitution

9.1. From time to time members shall be entitled to amend the constitution subject to due notice thereof being given and such amendments being approved unanimously at any formal (BREAF) meeting.