



**Western Cape  
Government**  
Environmental Affairs and  
Development Planning



# **Kaaimans River Estuarine Management Plan**

2019

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## DOCUMENT DESCRIPTION

**Document title and version:**

Kaaimans River Estuarine Management Plan \_final delivered

**Project Name:**

Western Cape Estuarine Management Framework and Implementation Strategy

**Client:**

Western Cape Government, Department of Environmental Affairs and Development Planning

**Royal HaskoningDHV reference number:**

MD1819

**Authority reference:**

EADP 1/2015

**Developed by:**

Coastwise Consulting & Royal HaskoningDHV

**Acknowledgements:**

Western Cape Government Environmental Affairs & Development Planning

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**Date:**

2019

**This document should be referenced as:**

Western Cape Government (2019). Kaaimans River Estuarine Management Plan. Western Cape Department of Environmental Affairs and Development Planning.

**Disclaimer**

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



## EXECUTIVE SUMMARY

The National Environmental Management: Integrated Coastal Management Act (Act 24 of 2008) (ICMA) was developed to facilitate the sustainable use and management of South Africa's coastline and coastal and estuarine resources. The ICMA requires that estuaries within South Africa are managed in a co-ordinated and efficient manner, and in accordance with the 2013 National Estuarine Management Protocol (NEMP), the National Coastal Management Programme (CMP) and the Western Cape CMP, which lay out specific objectives for management of the South African coastline, including estuaries. This document represents the first-generation Estuarine Management Plan (EMP) for the Kaaimans River estuary developed under the auspices of the Western Cape Estuarine Management Framework and Implementation Strategy (EMFIS) a strategic project emanating from the provincial CMP, specifically priority area 7.

The purpose of this EMP is to provide the Vision of the future desired state of the Kaaimans River estuary and guide the management of human activities in and around the system by setting out strategic objectives, management priorities and detailed management strategies with actions/activities. The co-ordination of the implementation of the EMP vests with the responsible management authority (RMA) as per the 2013 NEMP.

### Geographical Boundaries

The Kaaimans River estuary is a small, predominantly open estuary, located within the warm temperate biogeographic region on the southern Cape coastline, approximately 1.8 km east of Victoria Bay and 1 km west of Wilderness within the George Local Municipality (LM), Garden Route District. The size of the estuary, as defined by the estuarine functional zone (EFZ), is approximately 21 ha, extending over a length of approximately 2 km.

### Vision and Objectives

The following Vision for the Kaaimans River estuary was adopted after input received during an initial public meeting held in November 2017 and again in August 2018, both in George.

*The captivating Kaaimans-Swart river system and estuary is a healthy and thriving ecosystem that maintains its natural attributes and tranquil sense of place, where nature is protected and there is sensitive and sustainable use for the enjoyment of current and future generations*

The strategic objectives for the Kaaimans River estuary are as follows:

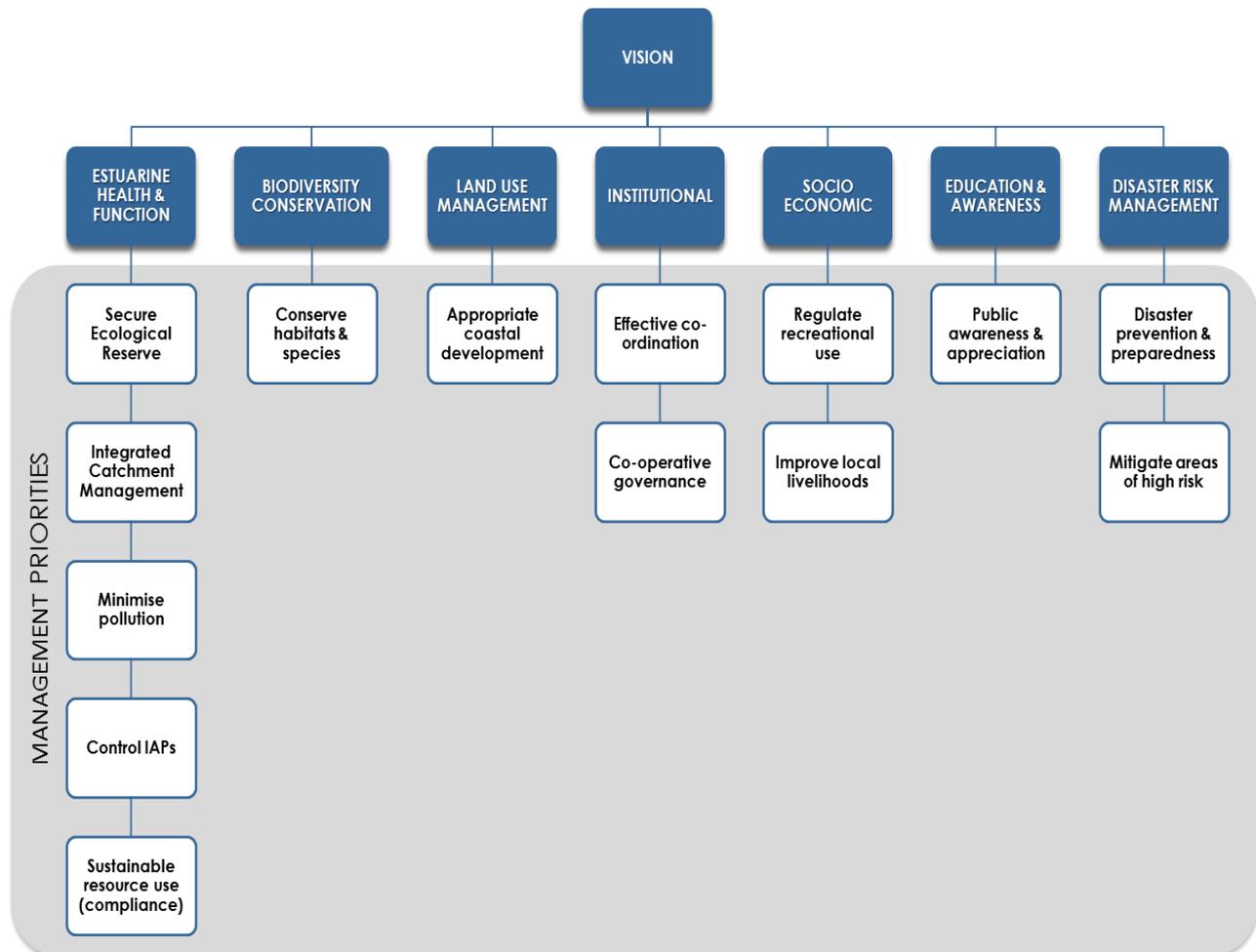
Sector / Category	Strategic Objective	Performance Indicator(s)	Priority
1 Estuarine Health and Function	The ecological health and natural functioning of the Kaaimans River estuary maintained and safeguarded, catchment impacts reversed, living resources	<ul style="list-style-type: none"><li>• Improve the ecological condition from B to A/B</li><li>• Ecological reserves for water quantity and quality are secured</li><li>• Estuary requirements are integrated into catchment processes</li></ul>	<b>HIGH</b>

		are sustainably managed and estuary nursery function protected	<ul style="list-style-type: none"> <li>• Pollution to the estuary is prevented</li> <li>• Water quality programme is in place</li> <li>• Invasive alien plant species are controlled</li> <li>• No-take zone(s) established</li> <li>• Mouth Management Plan (MMP) developed</li> <li>• Scientifically sound, effective and sustainable estuary mouth manipulation (if recommended in the MMP)</li> <li>• Ecological monitoring programme is in place</li> <li>• Resources utilised within legal limits and illegal activities controlled</li> <li>• Ecological integrity of estuary improved and maintained</li> <li>• Increase in number of research and monitoring projects</li> </ul>	
2	Biodiversity Conservation	The biodiversity of the Kaaimans River estuary is conserved	<ul style="list-style-type: none"> <li>• EMP incorporated into the George IDP, SDF and municipal CMP</li> <li>• Environmental custodianship secured</li> <li>• Level of conservation status obtained</li> </ul>	<b>HIGH</b>
3	Land-use and Infrastructure Planning and Development	Impacts associated with developments and proposed changes in land-use, including infrastructure and agriculture, are minimised	<ul style="list-style-type: none"> <li>• All development and land use changes surrounding and within the EFZ comply with environmental legislation and environmental best practice / risk aversion approach</li> <li>• Spatial zonation plan is adopted and enforced</li> <li>• Further transformation of estuary prevented</li> <li>• Reduced negative impacts from urban, agricultural and industrial activities</li> </ul>	<b>MEDIUM</b>
4	Institutional and Management Structures	The Kaaimans River estuary is managed well through effective co-operative governance	<ul style="list-style-type: none"> <li>• Designated RMA</li> <li>• EMP is seamlessly incorporated into the George IDP and SDF</li> <li>• Regional estuary advisory forum is established and effective and meets regularly</li> <li>• Estuarine bylaws are drafted by the George Municipality</li> <li>• Mandated authorities and participating agencies are well capacitated, actions are fulfilled</li> <li>• Critical management networks are established</li> </ul>	<b>HIGH</b>
5	Socio-economic Considerations	Socio-economic benefits are enhanced and regulated to ensure sustainable use of the Kaaimans River estuary and its resources	<ul style="list-style-type: none"> <li>• Status and future of boat launching resolved</li> <li>• Regulated recreational activities</li> <li>• Illegal activities controlled</li> <li>• Increased livelihood opportunities</li> </ul>	<b>MEDIUM</b>

			<ul style="list-style-type: none"> <li>Environmental Protection and Infrastructure Programmes (EPIP) implemented and effective</li> </ul>	
6	Education & Awareness	Members of society are sensitive to, and aware of, the value and importance of the Kaaimans River estuary	<ul style="list-style-type: none"> <li>Increase in number of research projects</li> <li>Signage erected and information disseminated</li> <li>Awareness programme developed and successfully implemented on an on-going basis</li> </ul>	<b>MEDIUM</b>
7	Disaster Risk Management	Potential risks that could impact the Kaaimans River estuary are reduced (inclusive of climate change impacts)	<ul style="list-style-type: none"> <li>No further development in high risk areas</li> <li>Flood disaster management plan developed</li> <li>Contingency plans in place for high risk areas / activities</li> <li>Disaster impacts are timeously and effectively mitigated</li> </ul>	<b>MEDIUM - HIGH</b>

### Priority management objectives and associated activities

An illustrative overview of the priority management objectives is provided below. Detailed action plans were developed for each of these priority areas.



### Proposed Zonation of activities

In general, spatial zonation of activities on an estuary is used to prevent user conflict and to guide sustainable utilization of resources without degradation of the estuarine environment. Given the small size of the system, the low number of users and limited user conflict, it was agreed during stakeholder consultation, that the Kaaimans River estuary should be zoned as a Low-Intensity Recreational Use zone. This is to limit the type and intensity of recreational use of the system. The objectives of this zone are to actively manage and direct use and mitigate visitor impacts, and provide additional protection to sensitive or threatened habitats, species or habitats.

While the Kaaimans River estuary is a national priority estuary in terms of the 2012 National Estuarine Biodiversity Plan (Turpie *et al* 2012) and is to be designated a full, no-take system, only partial no-take status is now recommended, due to deteriorating water quality and limited contribution to fish productivity (Lara van Niekerk, pers. comm.)<sup>1</sup>. Public willingness to support this notion is already in play, such that the area above access road is already managed as a no-take conservation area by the local community. The Swart River arm is also recommended to be zoned the same. Compliance and enforcement of these no-take areas vests with the Department of Environmental Affairs, Forestry and Fisheries (DEFF) in terms of the Marine Living Resources Act (MLRA).



**Proposed zonation of the Kaaimans River estuary, indicating the no-take conservation areas (orange) and water body (blue)**

<sup>1</sup> Lara Van Niekerk, Senior Scientist, Council for Scientific and Industrial Research, including comment on behalf of Dr Steve Lamberth, Dept. of Environment, Forestry and Fisheries, 2019.

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### Integrated monitoring plan

Monitoring is a crucial aspect of the adaptive estuarine management planning process as the generated data will be used to inform and update management decisions. Three broad categories of monitoring are incorporated into an integrated monitoring plan, namely resource monitoring, compliance monitoring and performance monitoring.

Currently the Department of Water and Sanitation (DWS) performs water level monitoring through the use of an installed water level recorder and the Breede-Gouritz Catchment Management Agency (BGCMA) performs basic water chemistry testing. There are no known ecological monitoring or research programmes (e.g. invertebrates, fish or birds, etc.) currently being undertaken for the Kaaimans River estuary.

There is no known compliance monitoring taking place on the Kaaimans River estuary in respect to marine living resources. In respect of boating, launching activities at the private boat launch site are reportedly monitored by the George Skiboat club in respect to the South African Maritime Safety Authority (SAMSA) regulations.

In respect to the implementation of this EMP and the proposed closed/ no-take status, compliance monitoring will be the responsibility of the Department of Environment, Forestry and Fisheries (DEFF) in terms of the Marine Living Resources Act (MLRA) and will be undertaken according to legislation and policies applicable and by means of law enforcement and compliance monitoring protocols.

A performance monitoring plan is used by the RMA, and/or identified implementing agents, to assess the effectiveness with which planned management activities contained in the EMP are being performed and ultimately to gauge progress in achieving the vision and objectives. This component utilises the performance indicators included for the various actions, specifically the management priorities, and includes a temporal scale or the frequency of the collection of the performance data and the targets that should be achieved.

### Institutional Capacity and Arrangements

This EMP should be regarded as a strategic plan that can guide the detailing of management actions and identification of implementing agents. It does not specify the required resources (human and financial) required for effective management of the estuary it does provide for their prioritisation. Co-management and effective governance are vital aspects to the efficient and effective estuarine management and key role players in the management of the Kaaimans River estuary are identified.

The 2013 NEMP identifies the George LM, or its assigned representative, as the RMA, responsible for the co-ordination of the implementation of the Kaaimans River EMP. However, portions of the river/estuary margin fall within private nature reserves (namely, the Kaaimans River Gorge Private Natures Reserve and the Kleinbaai Private Nature Reserve). While the management of the Kaaimans River estuary remains the responsibility of the George LM, there must be a joint agreement with the respective landowners and the conservation authority. **It is noted that proposed amendments to the 2013 NEMP allocate such responsibilities to the provincial environmental department unless agreement, or until agreement, is reached with the respective municipality, or conservation authority, to**

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**undertake the coordination of the implementation process.** Ultimately, the role of RMA must be designated through formal signed agreement.

While the establishment of an Estuary Advisory Forum (EAF) for each estuary is no longer a requirement in the 2013 NEMP, the Western Cape Government still support their establishment and recommend that private entities and non-government organisations continue to play a supporting role in the implementation of this EMP. While an individual EAF is not recommended, the establishment of a regional EAF is proposed, incorporating the Kaaimans, Gwaing and Maalgate estuaries.

Key government departments and organs of state are identified and a template provided for the conversion of the priority actions into detailed project plans, which must be prepared and adopted into the respective departmental implementation strategies.

In conclusion, the following items/issues are considered critical towards the ultimate achievement of the vision and should be immediately addressed and/or receive greatest effort in respect to human/financial resources:

- Restoration of baseflows, in line with ecological reserve recommendations;
- No take zone established and implemented;
- Invasive alien plant species eradicated via effective implementation of EPIP programme and other measures;
- Status of current private launch site resolved;
- Mouth management plan developed and execution of science based artificial breaching / mouth manipulation, only if specified in the MMP; and
- The DEA&DP to consider the appointment of a Regional estuarine management co-ordinator/champion within either DEA&DP or CapeNature, to support the RMA.

## TABLE OF CONTENTS

<b>1</b>	<b>INTRODUCTION</b>	<b>1</b>
1.1	BACKGROUND	1
1.2	PURPOSE OF THE EMP	2
1.3	MANDATE AND RESPONSIBILITIES OF THE RMA	2
1.4	STRUCTURE OF REPORT	4
<b>2</b>	<b>GEOGRAPHICAL BOUNDARIES</b>	<b>5</b>
<b>3</b>	<b>SYNOPSIS OF THE SITUATION ASSESSMENT</b>	<b>6</b>
<b>4</b>	<b>LOCAL VISION &amp; OBJECTIVES</b>	<b>9</b>
4.1	VISION	9
4.2	STRATEGIC OBJECTIVES	10
<b>5</b>	<b>PRIORITY MANAGEMENT OBJECTIVES AND ASSOCIATED ACTIVITIES</b>	<b>13</b>
<b>5.1</b>	<b>ESTUARINE HEALTH AND FUNCTION</b>	<b>15</b>
<b>5.2</b>	<b>BIODIVERSITY CONSERVATION</b>	<b>21</b>
5.3	LAND-USE AND INFRASTRUCTURE PLANNING AND DEVELOPMENT	23
5.4	INSTITUTIONAL AND MANAGEMENT STRUCTURES	25
<b>5.5</b>	<b>SOCIO-ECONOMIC CONSIDERATIONS</b>	<b>29</b>
<b>5.6</b>	<b>EDUCATION &amp; AWARENESS</b>	<b>32</b>
<b>5.7</b>	<b>DISASTER RISK MANAGEMENT</b>	<b>33</b>
<b>6</b>	<b>PROPOSED SPATIAL ZONATION</b>	<b>35</b>
6.1	INTRODUCTION	35
6.2	HABITAT ZONES	35
6.3	LEGISLATED COASTAL BOUNDARIES AND BUFFER ZONES	36
6.3.1	Estuarine Functional Zone	36
6.3.2	Coastal Protection Zone and proposed Coastal Management Line	37
6.3.3	Environmental Impact Assessment (EIA) regulatory line	38
6.4	ZONATION OF ACTIVITIES	39
6.4.1	<b>Current zonations and uses</b>	<b>39</b>
6.4.2	Proposed spatial zonation	42
6.4.3	Areas requiring rehabilitation	44
<b>7</b>	<b>INTEGRATED MONITORING PLAN</b>	<b>46</b>
7.1	RESOURCE MONITORING	46
7.1.1	Current Resource Monitoring	46
7.1.2	Recommended Resource Monitoring Programmes	46
7.1.3	Resource Quality Objectives / Ecological Specifications	47
7.2	COMPLIANCE MONITORING	47
7.2.1	<b>Current Compliance Monitoring</b>	<b>47</b>
7.2.2	<b>Recommended Compliance Monitoring</b>	<b>47</b>
7.3	PERFORMANCE MONITORING (REVIEW & EVALUATION)	48
<b>8</b>	<b>INSTITUTIONAL CAPACITY &amp; ARRANGEMENTS</b>	<b>50</b>
8.1	KEY ROLE PLAYERS	50
8.2	RESPONSIBLE MANAGEMENT AUTHORITY	51

8.3	ESTUARY ADVISORY FORUM	51
8.4	GOVERNMENT DEPARTMENTS AND ORGANS OF STATE	52
8.4.1	Project Plans for Implementation	53
<b>9</b>	<b>RECOMMENDATIONS AND CONCLUSION</b>	<b>54</b>
<b>10</b>	<b>REFERENCES</b>	<b>55</b>
	<b>APPENDIX 1: RECOMMENDED MONITORING PROGRAMMES</b>	<b>57</b>
	<b>APPENDIX 2: ECOLOGICAL SPECIFICATIONS</b>	<b>63</b>
	<b>APPENDIX 3: PERFORMANCE MONITORING PLAN</b>	<b>66</b>
	<b>APPENDIX 4: PROJECT PLAN TEMPLATE</b>	<b>71</b>

## TABLE OF FIGURES

Figure 1:	Location of the Kaaimans River estuary within the George Local Municipality	1
Figure 2:	A framework for integrated estuarine management in South Africa	2
Figure 3:	Geographical boundaries of the Kaaimans River estuary EFZ showing the 5 m amsl contour and the 2018 NBA EFZ boundary	5
Figure 4:	Sectors or categories of issues relevant to the management of the Kaaimans River estuary	10
Figure 5:	Summary of priority management objectives per management sector	14
Figure 6:	Habitats identified in the Kaaimans River estuary	36
Figure 7:	Coastal boundaries of the Kaaimans River estuary and risk projections (WCG, 2015)	38
Figure 8:	Extract from the George Municipal Town Planning Scheme (George LM, 2018)	40
Figure 9:	Proposed spatial zonation of Kaaimans River estuary, indicating the no-take conservation areas (orange) and water body (blue)	43
Figure 10:	Key role players for the management of the Kaaimans River estuary	50

## LIST OF TABLES

Table 1:	The geographical boundaries of the Kaaimans River estuary	5
Table 2:	Strategic Objectives for management of the Kaaimans River estuary, their indicators and level of priority	11
Table 3:	SWOT Analysis	13
Table 4:	Management Objectives and Actions for Estuarine Health and Function (includes water quantity and quality as well as utilisation of living resources)	15
Table 5:	Management Objectives and Actions for Conservation	21

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Table 6: Management Objectives and Actions for Land-use and Infrastructure Planning and Development	23
Table 7: Management Objectives and Actions for Institutional and Management Structures	25
Table 8: Management Objectives and Actions for Socio-economic Considerations	29
Table 9: Management Objectives and Actions for Education & Awareness	32
Table 10: Management Objectives and Actions for Disaster Risk Management	33
Table 11: Current zonations and activities occurring in and/or adjacent to the Kaaimans River estuary (George LM 2017)	40
Table 12: Zonation prescriptions for the Kaaimans River estuary	44
Table 13: Recommended compliance monitoring requirements	48
Table 14: Generic baseline surveys to improve confidence in the preliminary reserve determination of estuaries (Priority components are highlighted) (DWS, 2015)	57
Table 15: Recommended long-term monitoring programme for the Kaaimans River estuary (priority components are highlighted) (DWS, 2015)	60
Table 16: EcoSpecs and Thresholds of Potential Concern for the Kaaimans River estuary (Category A/B) (DWS, 2015; 2018)	63
Table 17: Recommended Performance Monitoring Plan for the management of Kaaimans River estuary	66

## ACRONYMS AND ABBREVIATIONS

amsl	Above mean sea level
BGCMA	Breede-Gouritz Catchment Management Agency
BLS	Boat Launch Site(s)
CARA	Conservation of Agricultural Resources Act (Act No. 43 of 1983)
CBA	Critical Biodiversity Area
CFR	Cape Floristic Region
CMA	Catchment Management Agency
CML	Coastal Management Line
CMP	Coastal Management Programme
CMS	Catchment Management Strategy
CSIR	Council for Scientific and Industrial Research
DAFF	Department of Agriculture, Forestry and Fisheries (now DALRRD/DEFF)
DALRRD	Department of Agriculture, Land Reform and Rural Development
DEA	Department of Environmental Affairs (now DEFF)
DEA&DP	Western Cape Government's Department of Environmental Affairs & Development Planning
DEFF	Department of Environmental Affairs, Forestry and Fisheries (formerly DEA)
DEFF: WftC	Department of Environmental Affairs, Forestry and Fisheries: Working for the Coast
DEFF: WfW	Department of Environmental Affairs, Forestry and Fisheries: Working for Water
DIN	Dissolved Inorganic Nitrogen
DIP	Dissolved Inorganic Phosphorous
DM	District Municipality
DMA	Disaster Management Act (Act No. 57 of 2002)
DO	Dissolved Oxygen
DST	Department of Science and Technology
DWS	Department of Water and Sanitation (formerly DWAF)
EAF	Estuary Advisory Forum
EcoSpecs	Ecological Specifications
EFZ	Estuarine Functional Zone
EIA	Environmental Impact Assessment
EMFIS	Estuarine Management Framework and Implementation Strategy
EMP	Estuarine Management Plan(s)
EPIP	Environmental Protection and Infrastructure Programmes
GRBR	Garden Route Biosphere Reserve
HWM	High Water Mark
I&APs	Interested and Affected Parties
IAPs	Invasive Alien Plants
ICMA	National Environmental Management: Integrated Coastal Management Act (Act No. 24 of 2008)
IDP	Integrated Development Plan
LM	Local Municipality
LUPA	Land Use Planning Act
MEC	Member of the Executive Council
MLRA	Marine Living Resources Act (Act No. 18 of 1998) as amended
MOU	Memorandum of Understanding
MSA	Municipal Systems Act (Act No. 32 of 2000)
NBA	National Biodiversity Assessment
NEM: BA	National Environmental Management: Biodiversity Act (Act No. 10 of 2004)
NEM: PAA	National Environmental Management: Protected Areas Act (Act No. 57 of 2003)
NEM: WA	National Environmental Management: Waste Act (Act No. 59 of 2008)
NEMA	National Environmental Management Act (Act No. 107 of 1998)
NEMP	National Estuarine Management Protocol
NTU	Nephelometric Turbidity Units
NWA	National Water Act (Act No. 36 of 1998)

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PAES	Protected Area Expansion Strategy
PLS	Public Launch Site
PES	Present Ecological State
RDM	Resource Directed Measures
REC	Recommended Ecological Category
RMA	Responsible Management Authority
RQO(s)	Resource Quality Objectives
SAHRA	South African Heritage Resources Agency
SAMSA	South African Maritime Safety Authority
SANParks	South African National Parks
SAR	Situation Assessment Report
SDF	Spatial Development Framework
SUDS	Sustainable Drainage Systems
SWOT	Strengths, Weaknesses, Opportunities and Threats analysis
TPC	Threshold of Potential Concern
TPS	Town Planning Scheme
WC PAES	Western Cape Protected Areas Expansion Strategy
WQ	Water Quality
WRC	Water Research Commission
WUA	Water Users Association
WUL	Water Use Licence
WWTW	Waste Water Treatment Works

# 1 INTRODUCTION

## 1.1 Background

The National Environmental Management: Integrated Coastal Management Act (Act 24 of 2008) (ICMA) was developed to facilitate the sustainable use and management of South Africa's coastline and coastal and estuarine resources. The ICMA requires that estuaries within South Africa be managed in a co-ordinated and efficient manner, and in accordance with the 2013 National Estuarine Management Protocol (hereafter referred to as the NEMP), the National Coastal Management Programme (CMP) and the Western Cape CMP, which lay out specific objectives for management of the South African coastline, including estuaries.

In response to the directive issued under the ICMA and the 2013 NEMP, the Western Cape Government, and specifically the Provincial Department of Environmental Affairs and Development Planning (DEA&DP), commissioned the development of the Western Cape Estuarine Management Framework and Implementation Strategy (EMFIS), a strategic project emanating from the provincial CMP, specifically priority area 7, to facilitate the consistent development and implementation of Estuarine Management Plans (EMPs) in the Western Cape Province.

This document represents the first generation EMP for the Kaaimans River estuary (Figure 1) developed under the auspices of the Western Cape EMFIS.

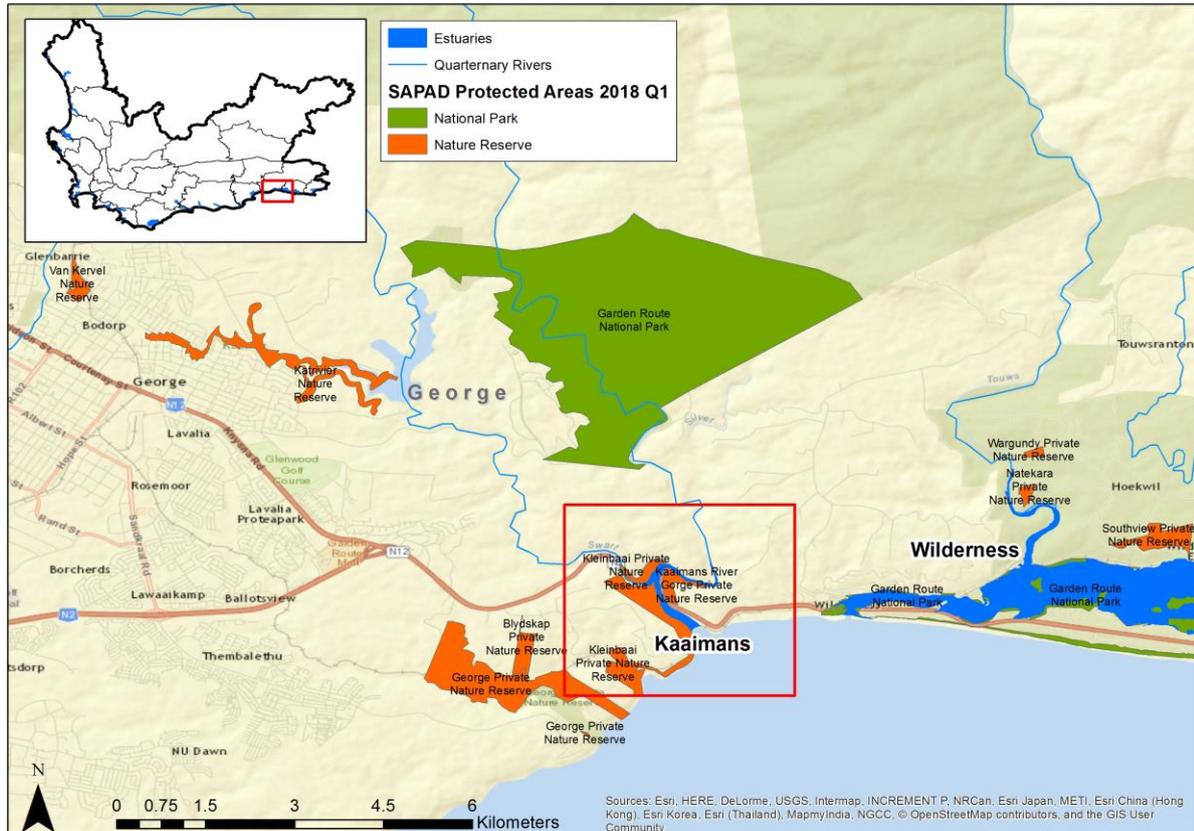
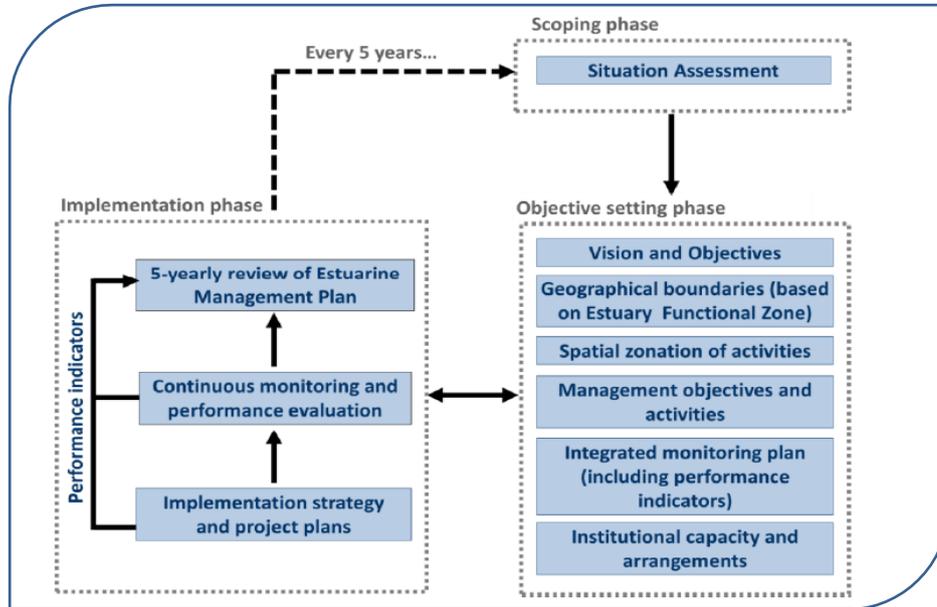


Figure 1: Location of the Kaaimans River estuary within the George Local Municipality

## 1.2 Purpose of the EMP

The development of an EMP is a three-phase process, as illustrated in Figure 2, comprising an initial scoping phase, followed by an objective setting phase, and finally an implementation phase. An adaptive management approach should be adopted during the latter phase with detailed reviews being conducted at five-yearly intervals.



**Figure 2: A framework for integrated estuarine management in South Africa**

This report constitutes the second objective and core component of the estuarine management planning process, namely the EMP. The purpose of this component is to provide the Vision of the future desired state of the Kaaimans River estuary and guide the management of human activities in and around the system by setting out strategic objectives, management priorities and detailed management strategies with actions/activities.

Estuarine management is by definition not only focused on the Estuarine Functional Zone (EFZ) but inclusive of coastal hinterland and marine influences, shoreline status, catchment management, climate change and human development impacts such as tourism, recreation and agriculture, amongst many others. This EMP is the primary document for use by the identified responsible management authority (RMA) to facilitate coordination of the identified management interventions to ultimately ensure the longevity of the estuarine system concerned. This is also the critical reference document for the incorporation of estuarine management into the municipal Integrated Development Planning (IDP) and Spatial Development Framework (SDF) and municipal CMP processes.

## 1.3 Mandate and responsibilities of the RMA

The co-ordination of the implementation of the EMP vests with the RMA as per the 2013 NEMP. One of the strategic objectives of this EMP is to promote and facilitate the

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cooperative governance relationship between the RMA and an existing or new estuary advisory forum (EAF), or any other supporting structures or organisations with estuarine-related duties and functions.

The designated RMA is responsible for the development of the EMP and the overall coordination of the actions of other implementing agencies, and not necessarily the implementation actions themselves. Section 7.3 of the 2013 NEMP indicates that:

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

Specifically, the RMA responsibilities are described by the 2013 NEMP as:

Section 5: *“...authorities are **responsible for the development of EMPs and coordination of the implementation process...**”*

Section 5(7)(e): *“The identified responsible management authority to develop the EMP needs to **budget accordingly for the development of these plans.**”*

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

Section 9.1(1) and 9.2: *“...it **must obtain formal approval** for the EMP...” and “Once approved...the EMP shall be formally adopted by the responsible management authority and signed by the head of the responsible management authority.”*

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

- a) follow a public participation process in accordance with Part 5 of Chapter 6 of the ICMA;
- b) ensure that the EMP and the process by which it is developed are consistent with:
  - i) the 2013 NEMP; and
  - ii) the National CMP and with the applicable provincial CMP and CMP referred to in Parts 1, 2 and 3 of Chapter 6 of the ICMA;
- c) If applicable, ensure that relevant legislation is enacted to implement the EMP; and
- d) Submit an annual report to the Minister on the implementation of the EMP, the legislation and any other matter.

Coordination of the implementation actions by the RMA and its strategic partners can be supported by an EAF representing all key stakeholder groups on the estuary.

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## 1.4 Structure of Report

This report is structured as follows:

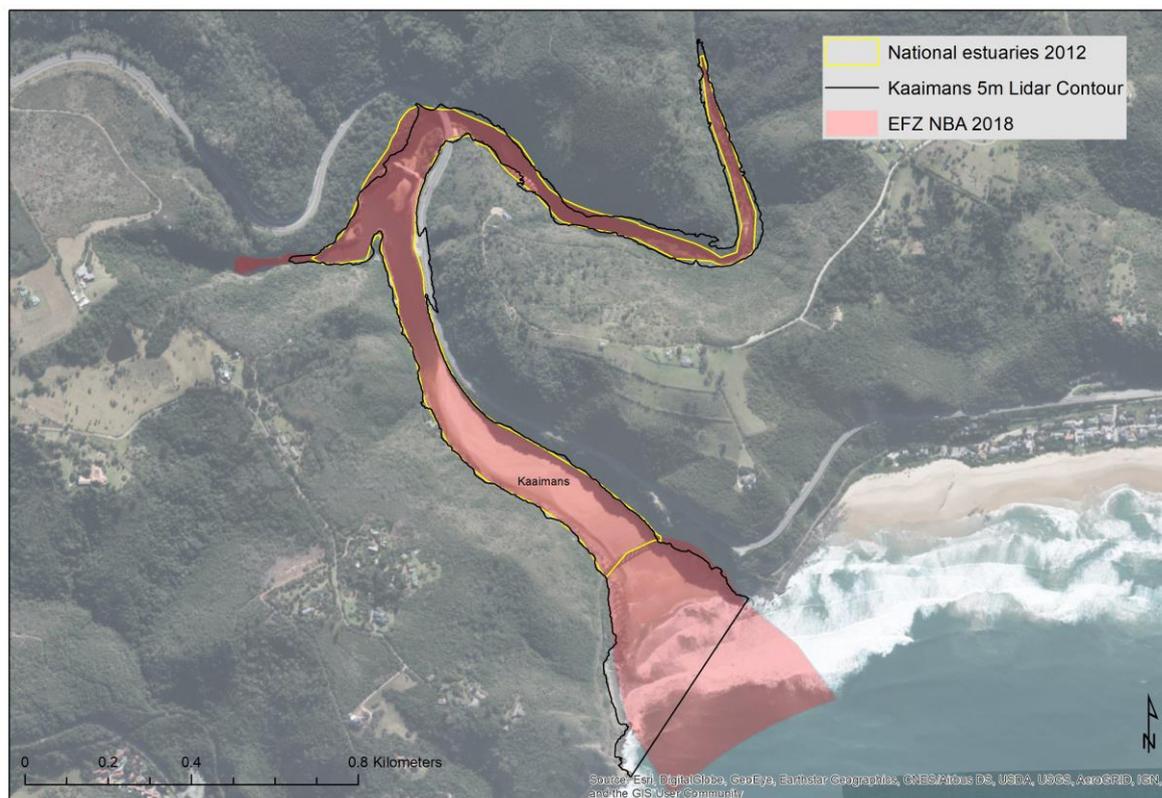
- **Section 2** introduces the estuary and details the **geographical boundaries** of the estuary, i.e. the management area to which this EMP applies;
- **Section 3** provides a synopsis of the **situation assessment**, thereby providing context to the vision, strategic objectives and management objectives and management priorities;
- **Section 4** presents the **local vision and strategic objectives** as informed by the stakeholders, for the management of the Kaaimans River estuary. They collectively describe the desired future state and provide the overarching logical framework for the action plans;
- **Section 5** prescribes the **management priorities and associated activities**, i.e. the required actions to be undertaken within the next 5 years, captured as individual action plans. This EMP contains refined or detailed management objectives accompanied by action plans to facilitate implementation, and in this manner, serves to mobilise and co-ordinate all relevant government departments, institutions and other role players to undertake specific actions within their mandate or sphere of influence;
- **Section 6** describes the various components and zones included in the proposed **spatial zonation** of the estuary;
- **Section 7** set out the **integrated monitoring plan** encompassing resource monitoring, compliance monitoring, as well as performance monitoring in respect to achieving the objectives of the EMP;
- **Section 8** details the **institutional capacity and proposed arrangements** that are required to implement the actions contained in the plan, including key role players and participating institutions, and the recommended projects provided for in the action plans; and
- **Section 9** details key **recommendations** and **concludes** the plan.

## 2 GEOGRAPHICAL BOUNDARIES

The Kaaimans River estuary is defined in the 2018 National Biodiversity Assessment (NBA) (SANBI, 2018) as a small, predominantly open estuary, located within the warm temperate biogeographic region on the southern Cape coastline, approximately 1.8 km east of Victoria Bay and 1 km west of Wilderness within the George Local Municipality (LM), Garden Route District. The size of the estuary, as defined by the estuarine functional zone (EFZ), is approximately 21 ha, extending over a length of approximately 2 km. The geographical boundaries of the Kaaimans River estuary, delineating the EFZ, are provided in Table 1 and illustrated in Figure 3.

**Table 1: The geographical boundaries of the Kaaimans River estuary**

<b>Downstream boundary:</b>	-33.997767° S, 22.557102° E (Estuary mouth)
<b>Upstream boundary:</b>	-33.987001° S, 22.559260° E (Head of estuary)
<b>Lateral boundaries:</b>	Approximated by the 5 m above Mean Sea Level (amsl) contour along each bank



**Figure 3: Geographical boundaries of the Kaaimans River estuary EFZ showing the 5 m amsl contour and the 2018 NBA EFZ boundary**

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## 3 SYNOPSIS OF THE SITUATION ASSESSMENT

### **Catchment Characteristics**

The Kaaimans River estuary falls within the George Local Municipality (LM), which experiences a warm and temperate climate. Average daily temperatures range from 18.2°C in winter to 27.6°C in summer. Highest rainfall occurs during the month of March (average 78 mm), while the lowest rainfall occurs in June (average 36 mm). The underlying geology of the Kaaimans River estuary comprises Kaaimans Group quartz schists of the Sandkraal member. Toward the middle reaches of the river gritty quartzites, phyllites and schists of the Skaapkop member and phyllites, schists, hornstones and quartzites of the Soetkraal member dominate. The lower reaches of the river are characterised by feldspathic quartzites of the Victoria Bay member, whilst the estuary mouth is dominated by Maalgaten gneissic granites and granodiorites.

Land use in the broader municipal area include fertile farmlands and timber plantations along the coastal plain, fruit orchards in the Langkloof and arid grazing areas in the Little Karoo. Almost half (49.5%) of the George LM has been transformed, of which 22.9% is under intensive agriculture and 14.2% consists of plantations. Land use within the vicinity of the estuary includes urban developments, the N2 highway, a railway bridge across the mouth of the estuary, and agriculture and forestry in the catchment.

### **Abiotic Function**

The catchment of the Kaaimans River estuary is estimated at about 130 km<sup>2</sup>. Due to the presence of two large dams within the catchment, the Mean Annual Runoff (MAR) to the estuary has been reduced by 19% compared to its Reference Condition. Very little biophysical information is available on the estuary.

The estuary is highly incised and experience large floods, which results in a naturally unstable sediment regime. Rocky banks at the mouth keep the system (nearly) permanently open. Estuary conditions vary between free tidal exchange to a very constricted mouth (when the sand bar is raised). The estuary is generally protected from wave action, resulting in a low berm at the mouth (due to a lack of sediment), allowing regular overwash and the ingress of salt water. However, reduced baseflows have resulted in more constricted mouth conditions.

The Kaaimans River estuary is a typical black water oligotrophic, acidic system but little information is available on its water quality. Nutrient enrichment, solid waste pollution and heavy metal pollution are reported on.

### **Biotic Function**

There is limited information available on the biotic functioning of the estuary. A desktop assessment of the macrophytes noted stands of intertidal marsh vegetation, particularly in the upper reaches. Filamentous brown macroalgae was also present in the estuary. The development of the N2 highway and a private estate development has removed some habitat, likely forest. The N2 highway has also resulted in the narrowing of the lower reaches. Some invasive *Eucalyptus* trees are present surrounding the estuary. Almost no information is available on the microalgae and birds of the estuary.

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### **Ecological Health Status, Importance, and Recommended Future State**

The health condition (also referred to as the Present Ecological State (PES)) of an estuary is typically defined based on the similarity of its current condition to an estimated natural condition. Both biotic and abiotic variables are considered in this process. The health condition is then described using six Ecological Categories, ranging from natural (A) to critically modified (F). The overall ecological health of the Kaaimans River estuary is in a B Category.

Although it has a low to average biodiversity importance (27.9), the Kaaimans River estuary forms part of the core set of priority estuaries in need of protection to achieve biodiversity targets, specifically in respect to fish. The Recommended Ecological Condition (REC) of the Kaaimans River estuary as defined by DWS is a Category A/B. However, it is noted that the 2018 National Biodiversity Assessment (SANBI, 2018) suggests a Category B.

### **Important Ecosystem Goods and Services**

Estuaries are recognised as some of the most productive types of ecosystems worldwide, and provide a wide range of opportunities and benefits, contributing both indirectly to the economy as well as providing social benefit. Estuarine habitats and the species they support provide a host of important ecosystem services. Due to its small size, the services supplied by the Kaaimans River estuary are generally rated as low.

### **Impacts and Potential Impacts**

Impacts on the estuary include a reduction in water quantity due to forestry and water abstraction for domestic use. The estuary has also been impacted on by the development of the N2 highway and railway bridge across its mouth, as well as a low access road across the upper reaches to access the boat launch site on the opposite bank. Limited agricultural activity (most notably dairy farming) and plantations within the area has also impacted on the water quality

### **Socio-economic Context**

The George LM is one of seven local municipalities situated within the Garden Route District Municipality (DM). It has an estimated total population of 208 238 people and has an average growth rate of 2.59%. Population density is an estimated 40.1 persons/km<sup>2</sup>. Approximately 79 554 people are economically active (both employed and unemployed but looking for work), with an overall unemployment rate of 20.7%, and a youth unemployment rate is 27.6%. The Kaaimans River estuary falls on the border of ward 11 and 4 of the George LM. Ward 11 is large (417.8 km) and includes Victoria Bay, and has a total population of 8 353 persons at a density of 20 persons/km<sup>2</sup>. Ward 4 is relatively small (61.3 km<sup>2</sup>) and includes the town of Wilderness and has a total population of 6 334 persons at a density of 103.3 persons/km<sup>2</sup>.

The George LM contributed 30% (R10.3 billion) to the Garden Route District's Gross Domestic Product (GDP) in 2013, making it the largest economy in the District. The largest economic sector within the George LM is the tertiary Commercial Services Sector. The sector contributed R7.144 billion (60.2%) to the Municipality's GDP in 2015, the sector is also the largest employer, employing 51.8% of the Municipality's workforce.

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Locally, estuaries are recognised to play an important role in the management of water quality and quantity, controlling erosion and providing wildlife habitat within the George LM, amongst others. Based on a number of facets, including biodiversity importance, economic contribution, scenic beauty, tourism, subsistence value, remoteness and size, the Kaaimans River estuary was rated as 24<sup>th</sup> out of 40 estuaries in terms of its existence value (Turpie, 2012).

Coastal access is a key socio-economic factor impacting on this system as is the current private launch site and proposed public launch site linked to the proposed reinstatement of the access track to the mouth. Other key issues reported on include the existing and proposed additional custodianship of the system as well as potential employment opportunities.

### ***Legislative Instruments and relevant Strategies, Plans and Policy Directives***

The legislative framework specific to estuarine management is the Integrated Coastal Management Act and the accompanying 2013 NEMP. The 2013 NEMP provides national policy and ensures alignment by providing a national vision and objectives for achieving effective integrated management of estuaries, amongst other things. The 2013 NEMP identifies the RMA per estuary, in this instance the George Local Municipality. Key legal instruments that are applicable to estuarine management are then described, and include national, provincial and local management documents.

### ***Opportunities and Constraints***

Based on the available information for the Kaaimans River estuary, the current strengths, weaknesses, opportunities and threats assessment was undertaken. One of the strengths of the Kaaimans Estuary is that it is in a fairly pristine condition with limited surrounding development. Other strengths include fish abundance, current custodianship as well as its recognition as an ecological corridor linking the existing network of protected areas.

The Kaaimans River estuary forms part of the core set of national priority estuaries in need of formal protection and it was rated as an extremely important system. Opportunities exist to formalise adventure tourism and other opportunities as well as take advantage of the historical and ecological value of the system. Feasible and reasonable coastal access should, however, be improved.

Constraints included the reduction in mean annual runoff by 19%, with geological slips and unstable land preventing further development. Other weaknesses include the risk of back-flooding, current sedimentation of the system and continued pressure to artificially breach the system, continued abstraction, invasive alien plant infestations and finally, further upgrades to the N2 and the resultant implications.

### ***Information Gaps and Recommendations***

There is very limited water quality data available for the catchment. There are also significant information gaps with regard to baseline information available on the biophysical aspects of the Kaaimans River estuary.

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## 4 LOCAL VISION & OBJECTIVES

### 4.1 Vision

The Vision for an estuary should be inspirational, representing a higher level of strategic intent and aligned with the strategic objectives of the 2013 NEMP, Western Cape CMP 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 2016 Western Cape Provincial Coastal Management Programme (PCMP), which identifies estuarine management as one of its nine priority areas and sets out the goal for the Western Cape as:

**Co-ordinated and integrated estuarine management which optimises the ecological, social and economic value of these systems on an equitable and sustainable basis**

The following Vision for the Kaaimans River estuary was adopted after input received during a public meeting held in November 2017<sup>2</sup> and again in August 2018<sup>3</sup>, both at Conville, George.

***The captivating Kaaimans-Swart river system and estuary is a healthy and thriving ecosystem that maintains its natural attributes and tranquil sense of place, where nature is protected and there is sensitive and sustainable use for the enjoyment of current and future generations***

The vision highlights the following aspects of the estuary that are valued and need to be preserved or enhanced:

- The sense of place and beauty of the estuary that is appreciated by the local community and transient visitors;

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<sup>2</sup> Minutes of the stakeholder meeting for the Kaaimans River estuary estuaries, 14 November 2017, Conville Community Centre, Conville, George

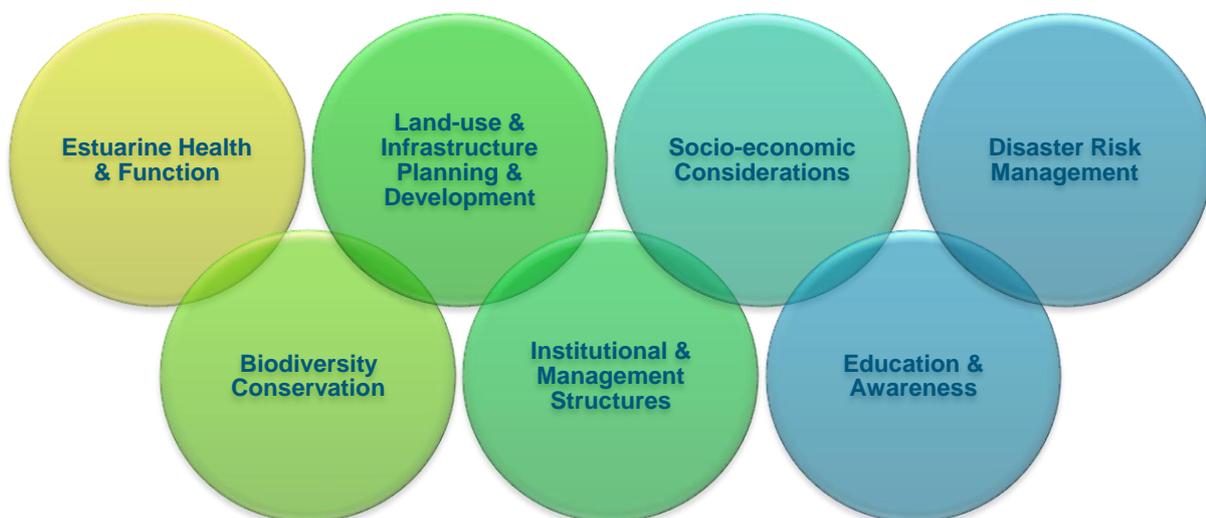
<sup>3</sup> Minutes of the stakeholder meeting for the Kaaimans River estuary estuaries, 28 August 2018, Conville Community Centre, Conville, George

- The desire to preserve the estuary and its associated river system in a healthy and functional state;
- The understanding that both the Kaaimans and Swart River courses play a role in the state of the estuary, where they meet;
- The desire to conserve/protect the biodiversity ('nature') of the system;
- The value of the estuary as a place of recreation and enjoyment for the community and transient visitors; and
- The need to manage activities and sustainable use in and around the estuary to ensure the longevity of the system.

## 4.2 Strategic Objectives

Objectives are qualitative statements of the values derived from the vision and typically reflect the overarching issues. They should answer the following question, “How will you know when you have achieved the Vision?”. The strategic objectives inform the development of the detailed management strategies that are carried forward as plans of action.

The strategic objectives for the Kaaimans River estuary were discussed at the public meeting held on the 13<sup>th</sup> of November 2017, and confirmed at the second public meeting held on the 28<sup>th</sup> of August, 2018<sup>4</sup>. Based on the feedback received from the participants, the strategic objectives for the Kaaimans River estuary align with the following identified sectors or categories of issues:



**Figure 4: Sectors or categories of issues relevant to the management of the Kaaimans River estuary**

<sup>4</sup> Minutes of the stakeholder meeting for the Maalgate, Gwaing and Kaaimans estuaries, 28 August 2018, Conville Community Centre, Conville, George

According to these categories, the strategic objectives for the Kaaimans River estuary are as follows:

**Table 2: Strategic Objectives for management of the Kaaimans River estuary, their indicators and level of priority**

Sector / Category	Strategic Objective	Performance Indicator(s)	Priority
1	Estuarine Health and Function	<p>The ecological health and natural functioning of the Kaaimans River estuary maintained and safeguarded, catchment impacts reversed, living resources are sustainably managed and estuary nursery function protected</p> <ul style="list-style-type: none"> <li>• Improve the ecological condition from B to A/B</li> <li>• Ecological reserves for water quantity and quality are secured</li> <li>• Estuary requirements are integrated into catchment processes</li> <li>• Pollution to the estuary is prevented</li> <li>• Water quality programme is in place</li> <li>• Invasive alien plant species are controlled</li> <li>• No-take zone(s) established</li> <li>• Ecological monitoring programme is in place</li> <li>• Mouth Management Plan (MMP) developed</li> <li>• Scientifically sound, effective and sustainable estuary mouth manipulation (if recommended in the MMP)</li> <li>• Resources utilised within legal limits and illegal activities controlled</li> <li>• Ecological integrity of estuary improved and maintained</li> <li>• Increase in number of research and monitoring projects</li> </ul>	<b>HIGH</b>
2	Biodiversity Conservation	<p>The biodiversity of the Kaaimans River estuary is conserved</p> <ul style="list-style-type: none"> <li>• EMP incorporated into the George IDP, SDF and municipal CMP</li> <li>• Spatial zonation plan is adopted and enforced</li> <li>• Environmental custodianship secured</li> <li>• Level of conservation status obtained</li> </ul>	<b>HIGH</b>

3	Land-use and Infrastructure Planning and Development	Impacts associated with developments and proposed changes in land-use, including infrastructure and agriculture, are minimised	<ul style="list-style-type: none"> <li>All development and land use changes surrounding and within the EFZ comply with environmental legislation and environmental best practice / risk aversion approach</li> <li>Further transformation of estuary prevented</li> <li>Reduced negative impacts from urban, agricultural and industrial activities</li> </ul>	<b>MEDIUM</b>
4	Institutional and Management Structures	The Kaaimans River estuary is managed well through effective co-operative governance	<ul style="list-style-type: none"> <li>Designated RMA</li> <li>EMP is seamlessly incorporated into the George IDP, SDF and municipal CMP</li> <li>Regional estuary advisory forum is established and effective and meets regularly</li> <li>Estuarine bylaws are drafted by the George Municipality</li> <li>Mandated authorities and participating agencies are well capacitated, actions are fulfilled</li> <li>Critical management networks are established</li> </ul>	<b>HIGH</b>
5	Socio-economic Considerations	Socio-economic benefits are enhanced and regulated to ensure sustainable use of the Kaaimans River estuary and its resources	<ul style="list-style-type: none"> <li>Status and future of boat launching resolved</li> <li>Regulated recreational activities</li> <li>Illegal activities controlled</li> <li>Increased livelihood opportunities</li> <li>Environmental Protection and Infrastructure Programmes (EPIP) implemented and effective</li> </ul>	<b>MEDIUM</b>
6	Education & Awareness	Members of society are sensitive to, and aware of, the value and importance of the Kaaimans River estuary	<ul style="list-style-type: none"> <li>Signage erected and information disseminated</li> <li>Awareness programme developed and successfully implemented on an on-going basis</li> </ul>	<b>MEDIUM</b>
7	Disaster Risk Management	Potential risks that could impact the Kaaimans River estuary are reduced (inclusive of climate change impacts)	<ul style="list-style-type: none"> <li>No further development in high risk areas</li> <li>Flood disaster management plan developed</li> <li>Contingency plans in place for high risk areas / activities</li> <li>Disaster impacts are timeously and effectively mitigated</li> </ul>	<b>MEDIUM - HIGH</b>

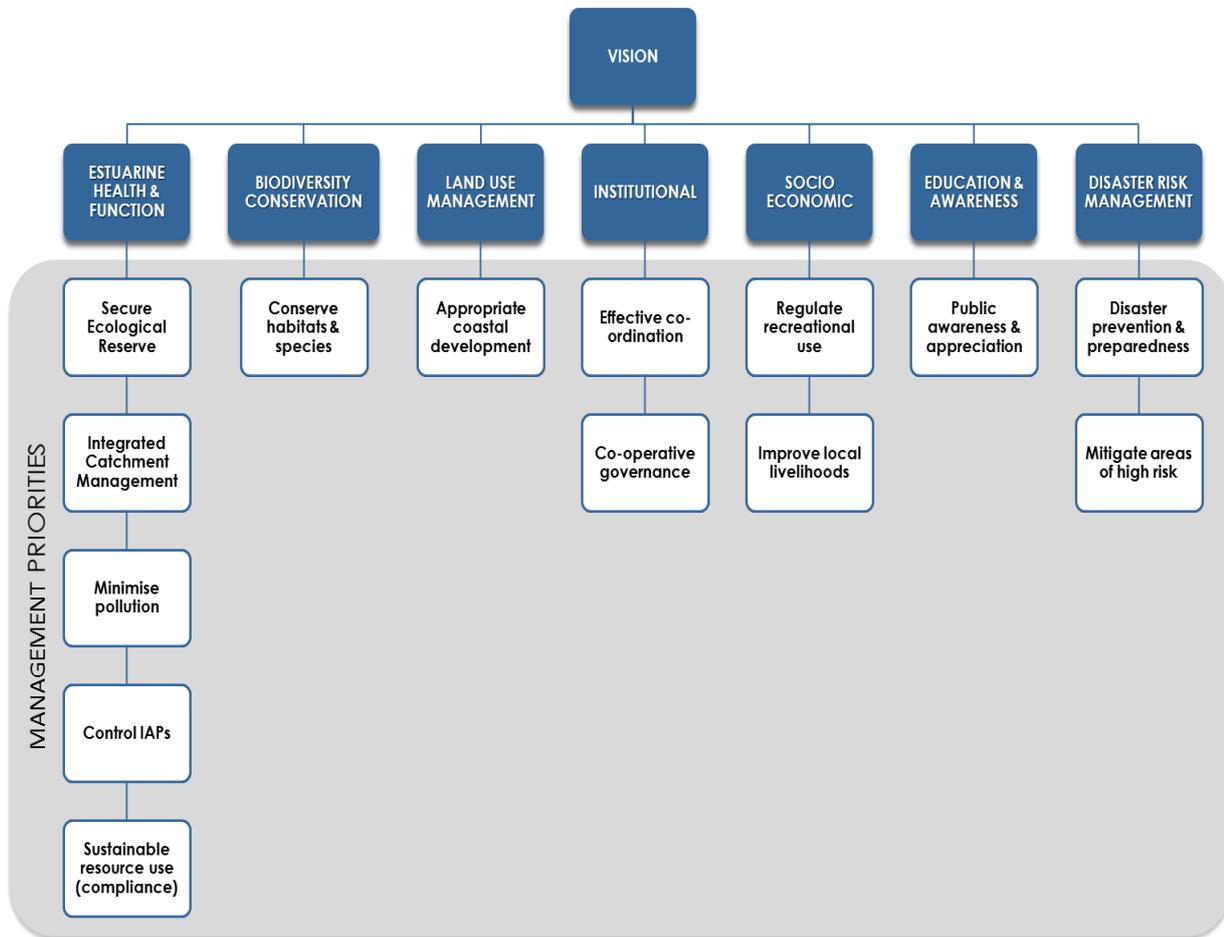
## 5 PRIORITY MANAGEMENT OBJECTIVES AND ASSOCIATED ACTIVITIES

After the review of the background information, as well as after conducting stakeholder engagement, a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis of the Kaaimans River estuary under the current management practices was prepared.

**Table 3: SWOT Analysis**

<b>STRENGTHS</b> <i>(highlights, uniqueness?)</i>	<b>WEAKNESSES</b> <i>(what could you improve?)</i>
<ul style="list-style-type: none"> <li>• Falls within the Outeniqua Sensitive Coastal Areas, which provides a further level of protection against development</li> <li>• Estuary and undeveloped surrounds identified as Critical Biodiversity Area and Priority Coastal Area in Garden Route Biodiversity Sector Plan</li> <li>• There is limited development around the estuary, and it is in a fairly pristine state</li> <li>• Fish abundance relatively high and system serves as a nursery for estuarine and marine species</li> <li>• PES of category B</li> <li>• Current custodianship of the system</li> <li>• Recognition as important by relevant planning and strategy documents and need to retain ecological corridors and linking to network of protected areas</li> </ul>	<ul style="list-style-type: none"> <li>• Information about the estuary is lacking / poor</li> <li>• Due to the presence of large dams the MAR has been reduced by 19% (water quantity)</li> <li>• Geological slips and unstable land (preventing additional development)</li> <li>• Risk of back-flooding low-lying developments within the EFZ</li> <li>• Potential agricultural (catchment) run-off impacting on water quality</li> <li>• Solid waste pollution emanating from both inland and marine sources</li> <li>• Alien invasive plants</li> <li>• Low to average biodiversity importance score</li> <li>• Current sedimentation has made launching at the mouth from the private launch impossible</li> <li>• Causeway, previously used for parking, closed for safety reasons</li> <li>• Previous economic opportunities closed due to road safety implications</li> <li>• Need to defend parking provided adjacent to the estuary</li> </ul>
<b>OPPORTUNITIES</b> <i>(Opportunities for positive change)</i>	<b>THREATS</b> <i>(what could prevent the EMP from working?)</i>
<ul style="list-style-type: none"> <li>• The estuary forms part of the core set of estuaries in need of protection in terms of the 2012 National Estuaries Biodiversity Plan</li> <li>• The Kaaimans River system is seen as extremely important from a socio-economic perspective for George, and has high tourism value</li> <li>• Formalised/additional adventure tourism opportunities (paragliding, abseiling)</li> <li>• Taking advantage of the historical as well as ecological value of the system</li> <li>• Development of a mouth management plan</li> <li>• Feasible and reasonable coastal access can be improved</li> <li>• Expanded custodianship of the system</li> <li>• Unsuitable land uses identified in Garden Route District Municipality SDF (urban development, septic tanks etc.)</li> </ul>	<ul style="list-style-type: none"> <li>• Continued abstraction</li> <li>• Further water resource development in the catchment</li> <li>• Climate change and loss of aquatic ecosystem</li> <li>• N2 high way and railway bridge across the estuary (and water quality related issues)</li> <li>• Road accidents and potential spillages as well as slippages (debris slides and surface slips)</li> <li>• Further upgrades to the N2</li> <li>• <i>Pinus pinesta</i> infestation</li> <li>• The estuary is a key fishing area which will be in conflict with its proposed conservation status</li> <li>• Continued pressure to artificially breach and/or dredge the system</li> <li>• Informal artificial breaching</li> </ul>

The management objectives detailed below were informed by the SWOT analysis and critical issues identified as part of the scoping phase. They represent the focus areas for the 5-year cycle of this EMP. An illustrative overview of the priority management objectives for the Kaaimans River estuary is provided in Figure 5 below.



**Figure 5: Summary of priority management objectives per management sector**

## 5.1 Estuarine Health and Function

**Strategic Objective 1:** The ecological health and natural functioning of the Kaaimans River estuary is maintained and safeguarded, catchment impacts reversed, living resources are sustainably managed and estuary nursery function protected

**Table 4: Management Objectives and Actions for Estuarine Health and Function (includes water quantity and quality as well as utilisation of living resources)**

Action	Relevant Legislation	Performance Indicator	Priority	Responsibility
<b>Management Objective 1.1: Secure adequate quantity and quality of freshwater input to improve and maintain ecosystem health and functioning</b>				
<b>a.</b> Lobby Department of Water and Sanitation (DWS) Minister to sign off the recommended freshwater reserves, ensuring that the minimum flow requirement (specifically baseflow) for the estuary is restored	National Water Act (NWA)	<ul style="list-style-type: none"> <li>• Meetings held and correspondence written</li> <li>• Recommended reserve(s) signed off</li> <li>• Baseflow is restored</li> <li>• Ecological condition improved from B to A/B</li> </ul>	HIGH	Breede-Gouritz Catchment Management Agency (BGCMA), Responsible management Authority (RMA)
<b>b.</b> Once classification study signed off, follow up on implementation of water resource classification process	NWA	<ul style="list-style-type: none"> <li>• Meetings held and correspondence written</li> <li>• Water resource classified</li> <li>• Baseflow is protected</li> </ul>	HIGH	BGCMA, RMA
<b>c.</b> Develop and implement a water resource utilisation plan for surface and groundwater resources (including registration and licensing)	NWA	<ul style="list-style-type: none"> <li>• Utilisation plan developed</li> <li>• Number of licensed users</li> <li>• Regulated water use/abstraction</li> </ul>	HIGH	DWS, Department of Agriculture, Land Reform and Rural Development (DALRRD)
<b>d.</b> Identify abstraction and discharge points – both legal and illegal – and implement compliance action against illegal operations	NWA	<ul style="list-style-type: none"> <li>• Register of abstraction and discharge points compiled</li> <li>• Legal status determined</li> <li>• Illegal operations prosecuted</li> </ul>	HIGH	DWS, Department of Environment, Forestry and Fisheries (DEFF), BGCMA

<b>e.</b>	Continuous monitoring of inflow at gauging weir in the catchment	NWA	<ul style="list-style-type: none"> <li>• Ongoing monitoring and generation of data</li> <li>• Data incorporated into EMP 5-year review</li> <li>• Annual report submitted to RMA and Estuary Advisory Forum (EAF)</li> </ul>	HIGH	DWS, BGCMA
<b>f.</b>	Continue with Catchment Management Strategy (CMS) implementation monitoring at strategic sites	NWA, ICMA, National Environmental Management Act (NEMA)	<ul style="list-style-type: none"> <li>• Ongoing monitoring and generation of data</li> <li>• Data incorporated into EMP 5-year review</li> <li>• Annual report submitted to RMA and EAF</li> </ul>	MEDIUM	Breede-Gouritz Catchment Management Strategy, DWS
<b>g.</b>	Catchment water quantity and quality to be summarised and reported on	NWA	<ul style="list-style-type: none"> <li>• Annual report submitted to RMA and EAF</li> </ul>	LOW	DWS, BGCMA, George Local Municipality (LM)
<b>h.</b>	Monitor natural mouth dynamics (in partnership with neighbouring land owners and other interested & Affected Parties (I&APs))	NWA (RDM)	<ul style="list-style-type: none"> <li>• Mouth state documented</li> <li>• Photographic database generated</li> </ul>	HIGH	RMA
<b>i.</b>	Assess the need for artificial breaching in accordance with an approved Mouth Management Plan (MMP) and develop Maintenance Management Plan (MaintMP) should it be considered a scientifically sound solution	ICMA	<ul style="list-style-type: none"> <li>• MMP developed</li> <li>• MaintMP developed and approved only if MMP indicates that artificial breaching is required.</li> <li>• Execution of science based artificial breaching / mouth manipulation (only if needed)</li> </ul>	HIGH	RMA, George LM, Department of Environmental Affairs and Development Planning (DEA&DP)
<b>j.</b>	Monitor and report on the status of the estuary annually (inclusive of estuarine stresses and impacts)	NWA	<ul style="list-style-type: none"> <li>• Estuary impacts identified</li> <li>• Mitigation measures established</li> <li>• Annual report submitted DEFF and EAF</li> <li>• Data incorporated into EMP 5-year review</li> </ul>	MEDIUM	RMA (supported by e.g. CapeNature, Department of Science and Technology (DST), Council for Scientific and

					Industrial Research (CSIR))
k.	Undertake seasonal (summer/winter) monitoring of fish and bird populations (including indicators species), taking resource quality objectives (RQOs) into account	NWA (RDM), National Environmental Management: Biodiversity Act (NEM:BA), Marine Living Resources Act (MLRA)	<ul style="list-style-type: none"> <li>Indicators species identified, and population trends analysed</li> <li>Species list and abundance data produced</li> <li>Databases developed</li> <li>Monitoring reports compiled and submitted</li> <li>Data incorporated into EMP 5-year review</li> </ul>	HIGH	RMA (supported by e.g. CapeNature, DST, CSIR, CBOs and NGOs)
l.	Undertake full Resource Directed Measures (RDM) monitoring of all estuary components every 3 years according to RDM methodology	ICMA, NWA	<ul style="list-style-type: none"> <li>Required monitoring undertaken</li> <li>Data produced and reported on</li> <li>Data incorporated into EMP 5-year review</li> </ul>	LOW	DWS, BGCMA, RMA (funding from Water Research commission (WRC), DST)
<b>Management Objective 1.2: Ensure estuary requirements are integrated into catchment processes to ensure healthy water quality</b>					
a.	Catchment land use map developed and updated annually	NWA, Conservation of Agricultural Resources Act (CARA)	<ul style="list-style-type: none"> <li>Updated land use map produced every year</li> <li>Potential sources of pollution identified</li> </ul>	HIGH	DALRRD (Land Care), DWS
b.	Land use and effluent management included in the CMS	NWA	<ul style="list-style-type: none"> <li>CMS identifies sources of pollution (land use and effluent) to the estuary and provides mitigation strategies</li> </ul>	HIGH	BGCMA
c.	Water use plan updated on an annual basis	NWA	<ul style="list-style-type: none"> <li>Updated water use plan produced every year</li> </ul>	HIGH	DWS (Resource protection)
d.	Municipal SDF and environmental overlay updated as and when required	Municipal Systems Act (MSA)	<ul style="list-style-type: none"> <li>Updated SDF and overlays produced</li> </ul>	HIGH	George LM

<b>Management Objective 1.3: Minimise pollution by addressing activities that lead to poor water quality</b>					
<b>a.</b>	Implement and document DEFF and DWS policy to not allow effluent discharge directly to the estuary (including Waste Water Treatment Works (WWTW), septic tanks, conservancy tanks, industrial & livestock effluent etc.)	NWA	<ul style="list-style-type: none"> <li>Discharge of effluent strictly prohibited</li> <li>Upstream discharges monitored</li> </ul>	HIGH	RMA, George LM
<b>b.</b>	Investigate clearing of septic/conservancy tanks of riverside properties and implement remedial interventions	NWA, NEMA, NEM:WA, MSA	<ul style="list-style-type: none"> <li>Service providers identified</li> <li>Schedule of clearing obtained and revised</li> <li>MOU signed with property owners</li> </ul>	HIGH	George LM, Garden Route DM
<b>c.</b>	Monitor water level and basic Water Quality (WQ) monitoring on a monthly basis, taking Resource Quality Objectives (RQOs) into account	NWA	<ul style="list-style-type: none"> <li>Estuary WQ database maintained to facilitate long term database</li> <li>Report compiled and provided to EAF</li> <li>EMP informed by monitoring results going forward</li> </ul>	HIGH	George LM
<b>d.</b>	Enforce best practice guidelines in respect to sustainable urban drainage systems	MSA, NWA, ICMA	<ul style="list-style-type: none"> <li>1-day training for officials convened and attended</li> <li>Sustainable Urban Drainage systems (SUDS) applied by building control and technical services</li> </ul>	MEDIUM	George LM
<b>e.</b>	Implement waste management plan, with a focus on peak visitor periods	NEM: Waste Management Act, MSA	<ul style="list-style-type: none"> <li>Appropriate preparation for peak periods</li> <li>Clean-up operations undertaken after peak visitor periods</li> </ul>	LOW	George LM, RMA, Department of Environment, Forestry and Fisheries: Working for the Coast (DEFF:WfC)

<b>Management Objective 1.4: Control the spread and densification of invasive alien plant species</b>					
<b>a.</b>	Identify and prioritise alien invasive plant species infested areas	CARA, NWA	<ul style="list-style-type: none"> <li>• Priority areas identified</li> <li>• Appropriate methods of control determined</li> </ul>	HIGH	RMA, Department of Environment, Forestry and Fisheries: Working for Water (DEFF: WfW)
<b>b.</b>	Develop and implement invasive alien species eradication programme	CARA, NWA	<ul style="list-style-type: none"> <li>• Invasive Alien Plants (IAPs) eradication programme implemented</li> <li>• Law enforcement options investigated and implemented</li> <li>• Increased area of IAPs removed</li> </ul>	HIGH	RMA, DEFF: WfW
<b>Management Objective 1.5: Ensure sustainable resource use through an effective level of compliance management</b>					
<b>a.</b>	Adopt, demarcate and enforce spatial zonation plan (specifically no-take zones)	ICMA	<ul style="list-style-type: none"> <li>• No-take zones established</li> <li>• EFZ controls enforced and offenders prosecuted</li> <li>• Reduced habitat loss/degradation and disturbance, and inappropriate behaviour</li> </ul>	HIGH	RMA, DEFF
<b>b.</b>	Determine status of fish and bait stocks in Kaaimans River estuary, including regular monitoring to determine recruitment patterns	MLRA	<ul style="list-style-type: none"> <li>• Research undertaken</li> <li>• Data generated and results reported on</li> <li>• Data incorporated into EMP 5-year review</li> </ul>	MEDIUM	DEFF (supported by e.g. CapeNature, DST, CSIR)
<b>c.</b>	Assess, quantify and regulate extractive resource use activities on the estuary through relevant monitoring programmes (e.g. roving creel surveys, compliance patrols)	MLRA	<ul style="list-style-type: none"> <li>• Monitoring programme developed and implemented</li> <li>• Monthly counts of number of harvesters</li> <li>• Ad hoc patrols and monitoring conducted</li> </ul>	MEDIUM	DEFF
<b>d.</b>	Deploy human resources for <i>ad hoc</i> compliance and enforcement in respect to MLRA	MLRA	<ul style="list-style-type: none"> <li>• Improved fish and invertebrate populations</li> <li>• Creel survey undertaken</li> </ul>	LOW	CapeNature/DEFF

			<ul style="list-style-type: none"> <li>• Research projects commissioned</li> <li>• Reports submitted to DEFF, RMA and EAF</li> </ul>		
<b>e.</b>	Investigate the number of subsistence users and subsistence resource use and feasibility of establishing a permitting system	MLRA	<ul style="list-style-type: none"> <li>• Subsistence users identified and counted</li> <li>• Feasibility study undertaken</li> </ul>	LOW	DEFF
<b>f.</b>	Informative signage, indicating zonation and allowable activities, to be placed at strategic points for all users/visitors	ICMA,	<ul style="list-style-type: none"> <li>• Key public spaces / access points identified</li> <li>• Signage created and erected</li> </ul>	LOW	RMA
<b>g.</b>	Develop and implement an effective communication strategy for users	ICMA, MLRA	<ul style="list-style-type: none"> <li>• Strategy developed</li> <li>• Effective network established</li> <li>• Cell phone link set up</li> <li>• Peak season patrols undertaken</li> <li>• Investigative surveys/ questionnaires undertaken</li> </ul>	LOW	RMA
<b>h.</b>	Initiate and enforce ban on night fishing	MLRA	<ul style="list-style-type: none"> <li>• <i>Ad hoc</i> patrols conducted</li> <li>• Incidents of poaching reduced</li> <li>• Transgressors prosecuted</li> </ul>	When adopted	DEFF

## 5.2 Biodiversity Conservation

**Strategic Objective 2: The biodiversity of the Kaaimans River estuary is conserved.**

**Table 5: Management Objectives and Actions for Conservation**

	Proposed Activity/Action	Relevant Legislation	Performance Indicator	Priority	Responsibility
<b>Management Objective 2.1: Ensure the conservation of estuarine habitats and indigenous species by obtaining Protected Area status</b>					
a.	Include Kaaimans River estuary as a Conservation Priority in CMS, Western Cape Protected Areas Expansion Strategy (WC PAES), DEFF management processes, and municipal environmental overlay	ICMA, NWA, NEM: PAA, MSA, LUPA	<ul style="list-style-type: none"> <li>Kaaimans River estuary included in key strategic documents</li> </ul>	HIGH	RMA, George LM, BGCMA, DEFF, CapeNature
b.	Investigate protection opportunities and mechanisms with CapeNature to encompass the EFZ (e.g. Protected Area, Municipal Nature Reserve, Special Management Area, Marine Protected Area, Memorandums of Understanding (MOUs), etc.)	NEM: PAA, MSA, Land Use Planning Act (LUPA), ICMA	<ul style="list-style-type: none"> <li>Meeting convened with principle authorities</li> <li>Conservation methods identified and investigated</li> <li>Resolution documented</li> </ul>	HIGH	RMA, CapeNature, DEFF, GRBR
c.	Implement protection status	NEM: PAA, ICMA, MSA, LUPA, WC BRA	<ul style="list-style-type: none"> <li>Estuary receives level of protection</li> <li>Management authority assigned</li> </ul>	HIGH	RMA, CapeNature, GRBR
d.	Engage with landowners and stakeholders to encourage environmental custodianship/ stewardship on adjacent properties (convey above resolution regarding protection)	NEM: PAA; NEMA (Duty of Care), MLRA	<ul style="list-style-type: none"> <li>Meeting with adjacent land owners convened (river and estuarine)</li> <li>Signed agreements with land owners</li> <li>Support received for protection and sanctuary status</li> <li>Degraded areas rehabilitated</li> <li>Integrity of estuary improved and maintained</li> </ul>	MEDIUM	RMA, CapeNature, DEFF, George LM,

<b>e.</b>	Identify all state-, municipality- and privately-owned land parcels that are suitable for inclusion into a conservation area network	NEM: PAA, ICMA	<ul style="list-style-type: none"> <li>• Land parcels identified</li> <li>• Methods for inclusion investigated</li> <li>• Agreements entered into</li> </ul>	MEDIUM	CapeNature, GRBR
<b>f.</b>	Incorporate Kaaimans EMP into GRBR Management Plan	ICMA, NEM: PAA, Western Cape Biosphere Reserves Act (WC BRA)	<ul style="list-style-type: none"> <li>• EMP and spatial zonation included in management plan for GRBR</li> </ul>	MEDIUM	RMA, CapeNature, GRBR
<b>g.</b>	Instate educational signage to indicate no-take/ sanctuary area	WC BRA, NEM: PAA, National Environmental Management: Biodiversity Act (NEM:BA)	<ul style="list-style-type: none"> <li>• Signage created and erected in key public spaces</li> </ul>	LOW	GRBR, CapeNature

### 5.3 Land-use and Infrastructure Planning and Development

**Strategic Objective 3:** Impacts associated with developments and proposed changes in land-use, including infrastructure and agriculture, are minimised.

**Table 6: Management Objectives and Actions for Land-use and Infrastructure Planning and Development**

Action	Relevant Legislation	Performance Indicator	Priority	Responsibility
<b>Management Objective 3.1: Ensure appropriate and sustainable coastal development in and around the Kaaimans River estuary, considering ecosystem services and sense of place</b>				
a. Incorporate Kaaimans EMP into GRBR Management Plan	ICMA, NEM: PAA, WC BRA	<ul style="list-style-type: none"> <li>• EMP and spatial zonation included in management plan for GRBR</li> </ul>	HIGH	RMA, CapeNature, GRBR
b. RMA to adopt and incorporate EMP and spatial zonation plan into all municipal and relevant government department planning documents and processes (e.g. municipal IDP, SDF, zoning scheme & overlay, Water Use Licence (WUL) Applications, Environmental Impact Assessments (EIA) Applications)	MSA, LUPA, NEMA, ICMA	<ul style="list-style-type: none"> <li>• EMP included in all relevant planning documents</li> <li>• EFZ respected as a no development area</li> </ul>	HIGH	George LM, All authorities
c. Develop and publish estuarine bylaws or regulations to support spatial zonation	MSA, ICMA	<ul style="list-style-type: none"> <li>• Bylaws developed and gazetted</li> </ul>	MEDIUM	George LM
d. Ensure that all proposed developments adhere to the full suite of relevant environmental legislation, specifically the coastal management line, coastal protection zone, and associated development controls	NEMA, LUPA, ICMA, etc	<ul style="list-style-type: none"> <li>• All developments comply with environmental legislation and environmental best practice / risk aversion approach</li> <li>• No further permanent development, expansions, infilling or land transformation of EFZ</li> <li>• Transgressors prosecuted</li> <li>• Corrective action undertaken</li> </ul>	HIGH	DEA&DP, George LM

			<ul style="list-style-type: none"> <li>• Reduced risk of degradation, transformation and disturbance to the estuary</li> </ul>		
<b>e.</b>	Implemented recommended degree of undeveloped margin (as per national Biodiversity Act (NBA))	ICMA, NEM:BA	<ul style="list-style-type: none"> <li>• No further permanent development, expansions, infilling or land transformation of EFZ</li> <li>• Impacts on the estuary are mitigated/prevented</li> </ul>	HIGH	George LM, DEA&DP
<b>f.</b>	Use EAF as source of I&APs for EIAs	MSA, LUPA, ICMA, NEMA	<ul style="list-style-type: none"> <li>• EAF partakes in development planning affecting the estuary</li> <li>• Impacts on the estuary are mitigated/prevented</li> </ul>	MEDIUM	RMA, George LM, Garden Route DM, DEA&DP

## 5.4 Institutional and Management Structures

**Strategic Objective 4:** The Kaaimans River estuary is well managed through effective co-operative governance.

**Table 7: Management Objectives and Actions for Institutional and Management Structures**

Action	Relevant Legislation	Performance Indicator	Priority	Responsibility	
<b>Management Objective 4.1: Ensure effective co-ordination of estuarine management responsibilities</b>					
a.	Determine and designate the RMA	ICMA, NEMP	<ul style="list-style-type: none"> <li>RMA determined</li> <li>MOU/IP signed</li> </ul>	HIGH	DEA&DP, George LM, CapeNature, SANParks
b.	RMA adopts and incorporates the EMP and the spatial zonation plan into planning documents	MSA, LUPA, NEMA, ICMA	<ul style="list-style-type: none"> <li>EMP and zonation plan adopted by RMA</li> <li>EMP included in all relevant planning documents</li> </ul>	HIGH	RMA
c.	Ensure incorporation of Kaaimans EMP into GRBR Management Plan to facilitate implementation of EMP	ICMA, NEM: PAA, WC BRA	<ul style="list-style-type: none"> <li>EMP included in management plans for the Garden Route Area</li> </ul>	HIGH	RMA, GRBR
d.	Undertake needs analysis and identify skills and equipment shortages	ICMA, WC BRA	<ul style="list-style-type: none"> <li>Needs and shortages identified</li> <li>Motivation for acquisition drafted and approved</li> <li>Equipment purchased and maintained</li> </ul>	HIGH	RMA, GRBR
e.	Implement skills development, ongoing training or co-opt additional members / secondment for estuarine management to ensure capacity	ICMA, WC BRA	<ul style="list-style-type: none"> <li>Motivation for training drafted and approved</li> <li>Staff attend relevant accredited training courses</li> <li>MOU to be developed for secondments</li> </ul>	HIGH	RMA, GRBR
f.	Develop good communication protocols and processes with implementing agents (The RMA to develop working relationships with	ICMA	<ul style="list-style-type: none"> <li>Project champions identified</li> <li>Networks established, and contacts database compiled</li> </ul>	HIGH	RMA

	mandated department & agreements need to be developed to address each management action)		<ul style="list-style-type: none"> <li>Regular email correspondence</li> </ul>		
<b>g.</b>	Ensure that EMP is maintained, enforced and budgeted for annually	ICMA, MSA, LUPA, NWA, WC BRA	<ul style="list-style-type: none"> <li>An action plan for securing future funding drafted and approved</li> <li>Funding secured for 5-year cycle</li> </ul>	HIGH	All authorities
<b>h.</b>	Constitute and maintain a fully functional, regional EAF (or utilise other applicable forum) to facilitate co-operative governance	ICMA, MSA, LUPA, NWA,	<ul style="list-style-type: none"> <li>EAF constituted (Membership includes representatives of government and stakeholders/civil society)</li> <li>Regional EAF meets on a quarterly basis</li> <li>Meetings are minuted</li> </ul>	HIGH	RMA
<b>i.</b>	RMA present on critical forums to ensure that estuarine issues are tabled, e.g. Catchment Management Agencies (CMA), Water Users Associations (WUA), Agriculture groups etc.	ICMA	<ul style="list-style-type: none"> <li>RMA attendance at critical forum meetings</li> <li>Meetings are minuted</li> </ul>	HIGH	RMA
<b>j.</b>	Monitor, review and report on the progress of EMP actions and achievements on annual basis	ICMA	<ul style="list-style-type: none"> <li>Feedback received from participating agencies</li> <li>Annual reporting to DEFF and EAF</li> <li>Action plans updated as and when required</li> </ul>	MEDIUM	RMA
<b>k.</b>	Undertake formal 5-year review as prescribed by the 2013 NEMP, with involvement of EAF	ICMA	<ul style="list-style-type: none"> <li>Motivation for updated drafted and approved</li> <li>Funding confirmed</li> <li>Terms of reference drafted</li> <li>Consultants appointed</li> <li>Plan updated</li> </ul>	LOW	RMA
<b>l.</b>	Provincial authority to intervene if RMA incapacitated and ineffectual	ICMA	<ul style="list-style-type: none"> <li>Needs and shortages identified</li> <li>Motivation for hand over</li> <li>Meeting with EAF</li> <li>MOU signed</li> </ul>	LOW	DEA&DP

### Management Objective 4.2: Define co-operative governance arrangements

<b>a.</b>	Identify and implement procedures to ensure cooperative governance between all gov. depts. with a mandate to act	ICMA, Inter-governmental relations Act (Act 13 of 2005)	<ul style="list-style-type: none"> <li>• Roles and responsibilities defined and accepted via MOUs signed between RMA and spheres of government and participating agencies, if required</li> <li>• Regional EAF meets on a quarterly basis</li> <li>• Meetings are minuted</li> <li>• Active collaboration of various implementing agents</li> </ul>	HIGH	All authorities
<b>b.</b>	EAF to monitor performance of RMA in respect to the implementation of plan	ICMA	<ul style="list-style-type: none"> <li>• Authorities to provide formal feedback on mandated activities</li> <li>• Regional EAF meets on a quarterly basis</li> </ul>	MEDIUM	All authorities, All stake-holders
<b>c.</b>	Individual agencies to identify and address training needs, with possible secondment to address training and capacity shortfalls	ICMA	<ul style="list-style-type: none"> <li>• Motivation for training drafted and approved</li> <li>• Staff attend relevant accredited training courses</li> <li>• MOU to be developed for secondments</li> </ul>	MEDIUM	All authorities
<b>d.</b>	Individual agencies to allocate resources, create and fill posts (including project champions), and acquire necessary infrastructure, resources and equipment of fulfil their mandates	MSA, NWA, ICMA, NEMA, WC BRA	<ul style="list-style-type: none"> <li>• Need and Desirability investigation undertaken</li> <li>• Motivation for acquisition drafted and approved</li> <li>• Equipment purchased and maintained</li> <li>• Project champion(s) for allocated management actions</li> <li>• Staff appraisals in terms of management actions and projects (performance management system implemented)</li> </ul>	MEDIUM	All authorities

e.	Mandated authorities and participating agencies to confirm budget allocations for mandated activities/actions	MSA, NWA, ICMA, NEMA, WC BRA	<ul style="list-style-type: none"> <li>• Formal feedback from authorities on mandated activities</li> <li>• Motivation for budget drafted and approved</li> <li>• Funding secured for 5-year cycle</li> </ul>	MEDIUM	All authorities
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## 5.5 Socio-economic Considerations

**Strategic Objective 5: Socio-economic benefits are enhanced and regulated to ensure sustainable use of the Kaaimans River estuary and its resources.**

**Table 8: Management Objectives and Actions for Socio-economic Considerations**

Action	Relevant Legislation	Performance Indicator	Priority	Responsibility
<b>Management Objective 5.1: Regulate recreational use of the Kaaimans River estuary</b>				
a. Adopt, demarcate and enforce spatial zonation plan to protect estuarine habitats and other users	ICMA, WC BRA	<ul style="list-style-type: none"> <li>• EFZ controls enforced and offenders prosecuted</li> <li>• Reduced habitat loss/degradation and disturbance, and inappropriate behaviour</li> </ul>	LOW	RMA, GRBR, CapeNature
b. Informative signage, indicating zonation and allowable activities, to be placed at strategic points	ICMA, WC BRA	<ul style="list-style-type: none"> <li>• Signage created and erected in key public spaces</li> </ul>	LOW	RMA, GRBR
c. Determine carrying capacities for each water-based activity in consultation with relevant organs of state	WC EMFIS Jetskis and Motorised	<ul style="list-style-type: none"> <li>• Carrying capacities determined</li> <li>• Revised boating bylaws</li> <li>• Notification gazetted</li> </ul>	MEDIUM	RMA
d. Develop clear regulations to manage each use and monitor users and impacts	Watercraft Guideline 2019	<ul style="list-style-type: none"> <li>• Regulations developed and gazetted</li> <li>• Regulations enforced</li> <li>• Counts of users recorded</li> <li>• Impacts recorded</li> <li>• Annual report submitted to EAF</li> </ul>	MEDIUM	RMA
e. Status and future of boat launching resolved	ICMA Public launch Site Regulations, ICMA	<ul style="list-style-type: none"> <li>• Future of boat launching in the Kaaimans estuary investigated</li> <li>• Meetings held and minuted</li> <li>• Application made for registration as a public launch site or launching discontinued/prohibited</li> </ul>	HIGH	George LM, DEA&DP

			<ul style="list-style-type: none"> <li>• Number of boats launching (should application be successful)</li> </ul>		
<b>f.</b>	Continue to monitor and regulate boat usage, including number of boats operating on the estuary or taking part in a specific activity (e.g. marine charter).	ICMA, WC EMFIS Jetskis and Motorised Watercraft Guideline 2019	<ul style="list-style-type: none"> <li>• Human resource deployed, and <i>ad hoc</i> patrols conducted</li> <li>• Counts of boats on the water recorded</li> <li>• Counts of boat licenses/users/ participants recorded</li> <li>• Carrying capacity enforced</li> <li>• Boat usage regulated</li> <li>• Reduced habitat loss/degradation and disturbance, and inappropriate behaviour</li> <li>• Annual report submitted to RMA/EAF</li> </ul>	MEDIUM	RMA
<b>g.</b>	Develop and implement an effective communication strategy for users	ICMA, MLRA	<ul style="list-style-type: none"> <li>• Strategy developed</li> <li>• Effective network established</li> <li>• Cell phone link set up</li> <li>• Peaks season patrols undertaken</li> <li>• Investigative surveys/ questionnaires undertaken</li> </ul>	MEDIUM	RMA
<b>h.</b>	Investigate the provision of public amenity and ablutions to accommodate beach goers and fishermen	ICMA, WC LUPA	<ul style="list-style-type: none"> <li>• Feasibility assessment undertaken</li> <li>• Budget and Environmental authorisation obtained</li> <li>• Amenity constructed</li> </ul>	MEDIUM	George Municipality
<b>Management Objective 5.2: Improve local livelihoods by promoting involvement of historically disadvantaged communities and individuals in the provision of tourism &amp; recreation services</b>					
<b>a.</b>	Investigate livelihood opportunities, promoting previously disadvantaged communities	ICMA, MLRA	<ul style="list-style-type: none"> <li>• Livelihood study completed</li> <li>• Opportunities identified, and feasibility determined</li> <li>• Viable options implemented – projects initiated</li> <li>• Initiatives compliant with all forms of legislation and planning frameworks</li> </ul>	MEDIUM	RMA

<b>b.</b>	Implement Environmental Protection and Infrastructure Programmes (EPIP) such as DEFF: WfW and DEFF: WftC	ICMA,	<ul style="list-style-type: none"> <li>• EPIP programmes adopted and implemented</li> <li>• Signed agreements</li> <li>• Increased employment opportunities</li> </ul>	MEDIUM	RMA/ South African National Parks (SANParks)
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## 5.6 Education & Awareness

**Strategic Objective 6: Members of society are sensitive to, and aware of, the value and importance of the Kaaimans River estuary.**

**Table 9: Management Objectives and Actions for Education & Awareness**

	Action	Relevant Legislation	Performance Indicator	Priority	Responsibility
<b>Management Objective 6.1: Promote high levels of public awareness and appreciation of the value of estuaries</b>					
a.	Develop and effective education and awareness programme for residents, visitors and farmers in the catchment	ICMA, WC BRA	<ul style="list-style-type: none"> <li>Education &amp; awareness programme developed and implemented at schools and through interest groups</li> <li>Increased educational opportunities at group gatherings, community meetings, conferences etc.</li> </ul>	MEDIUM	RMA, GRBR
b.	Source and/or commission educational and informative material including signage, posters, pamphlets and webpage design	ICMA	<ul style="list-style-type: none"> <li>Signage created, and erected Posters and pamphlets erected/ disseminated</li> <li>George estuaries webpage operational</li> </ul>	MEDIUM	RMA, George LM
c.	Engage and educate all estuary users	ICMA	<ul style="list-style-type: none"> <li>Reduction in illegal activities</li> <li>Reduced habitat loss/degradation and disturbance, and inappropriate behaviour</li> <li>Informative surveys/talks undertaken</li> </ul>	LOW	RMA

## 5.7 Disaster Risk Management

**Strategic Objective 7: Potential risks that could impact the Kaaimans River estuary are reduced (inclusive of climate change impacts).**

**Table 10: Management Objectives and Actions for Disaster Risk Management**

Action	Relevant Legislation	Performance Indicator	Priority	Responsibility	
<b>Management Objective 7.1: Disaster prevention and preparedness</b>					
a.	Conduct and maintain a risk assessment portfolio and identify areas and infrastructure of potential concern (catchment/marine pollution, flooding, erosion, etc.)	Disaster Management Act (DMA) (Act 57 of 2002), NEMA, ICMA, NWA,	<ul style="list-style-type: none"> <li>Risk assessment portfolio compiled</li> <li>High risk areas identified and included in relevant plans</li> </ul>	HIGH	RMA, George LM
b.	Develop an integrated flood disaster management plan (flooding, marine storm surge), including estuary early warning and monitoring system, and evacuation protocols, etc.	DMA, ICMA, DWA	<ul style="list-style-type: none"> <li>Integrated flood disaster management plan developed</li> <li>Estuary risks and early warning system compiled</li> <li>Emergency response networks established</li> </ul>	HIGH	RMA, George LM, BGCMA
<b>Management Objective 7.2: Mitigate areas of high risk</b>					
a.	Identify, estimate costs, prioritise and rehabilitate areas of bank erosion, trampling, disturbed riparian vegetation (priority areas and hot spots).	ICMA, NEMA	<ul style="list-style-type: none"> <li>Degradation profiles compiled</li> <li>Rehabilitation programme developed &amp; implemented</li> <li>Re-establishment of indigenous vegetation</li> <li>Priority degraded areas restored</li> </ul>	MEDIUM	George LM

<b>b.</b>	Identify areas and infrastructure at risk of flooding and erosion, and develop contingency plans	DMA	<ul style="list-style-type: none"> <li>• High risk areas identified</li> <li>• Risk areas included in regional disaster management plan</li> <li>• Relevant plans updated with early warning and monitoring systems and evacuation protocols, and contingency plans for high erosion and flood risk areas.</li> </ul>	HIGH	RMA, George LM
<b>c.</b>	Install appropriate flooding and erosion defence for critical infrastructure	ICMA, NEMA,	<ul style="list-style-type: none"> <li>• Appropriate defence methods identified</li> <li>• Infrastructure protected</li> </ul>	LOW	George LM

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## 6 PROPOSED SPATIAL ZONATION

### 6.1 Introduction

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

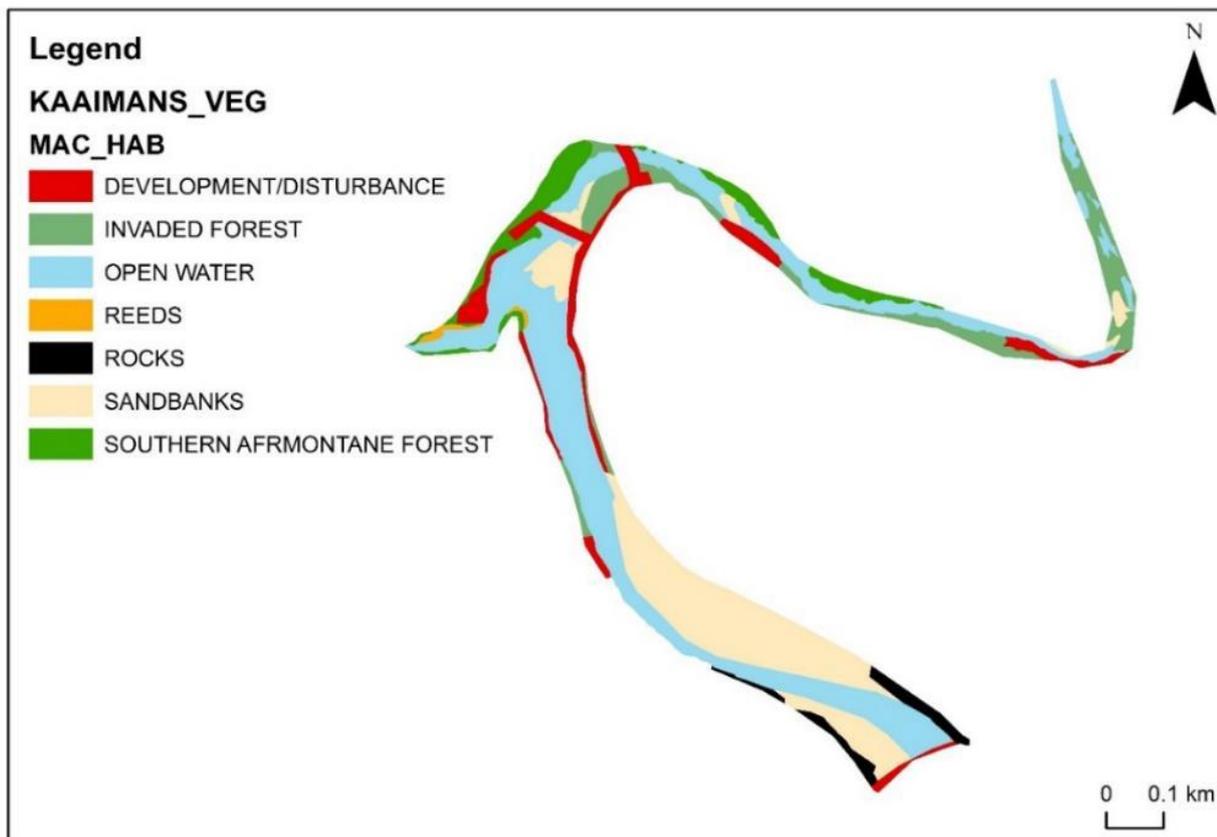
- The geographical boundary of the estuary also indicating important habitats (e.g. floodplain, open water, reed beds, sandflats, etc.);
- The surrounding land uses and existing infrastructure;
- Areas designated for the conservation and protection of biodiversity;
- Appropriate buffers in which land use and development are strictly controlled and monitored; and
- Zones where certain types of activities (recreational, commercial, industrial, harvesting etc.) are permissible and others not permissible.

### 6.2 Habitat zones

A habitat sensitivity analysis is the baseline which guides the differentiation of the various zones, specifically identifying:

- threatened, ecologically important habitats as no-take 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 shown in Figure 6 is used as the baseline for the identification of sensitive estuarine habitats.



**Figure 6: Habitats identified in the Kaaimans River estuary**

## 6.3 Legislated Coastal Boundaries and Buffer Zones

### 6.3.1 Estuarine Functional Zone

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

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

Similarly, the National Water Act (NWA) defines an estuary as “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”.

However, the 2018 National Biodiversity Assessment provides a more detailed definition of an estuary, that is: “a partially enclosed permanent water body, either continuously or periodically open to the sea on decadal time scales, extending as far as the upper limit of tidal action, salinity penetration or back-flooding under closed mouth conditions. During floods an estuary can become a river mouth with no seawater entering the formerly

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estuarine area or, when there is little or no fluvial input, an estuary can be isolated from the sea by a sandbar and become fresh or even hypersaline" (SANBI 2019).

The EFZ is defined by the 2014 Environmental Impact Assessment (EIA) Regulations (as amended in 2017) (GN 324) 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, as defined by the 5 m topographical contour (referenced from the indicative mean sea level)*". The 2013 NEMP acknowledges the EFZ as the geographical boundary of estuaries in South Africa. In practice, it is found that the 5 m topographic contour approximates the EFZ for most estuaries in South Africa. It is consequently commonly used to delineate the EFZ in the absence of specific biophysical assessments. Where biophysical information is available, the EFZ can be delineated according to the presence of estuarine vegetation or features such as wetlands that are directly supportive of the estuary. This approach informed the EFZ used in the 2018 NBA (SANBI, 2018) (refer to Figure 3).

### **6.3.2 Coastal Protection Zone and proposed Coastal Management Line**

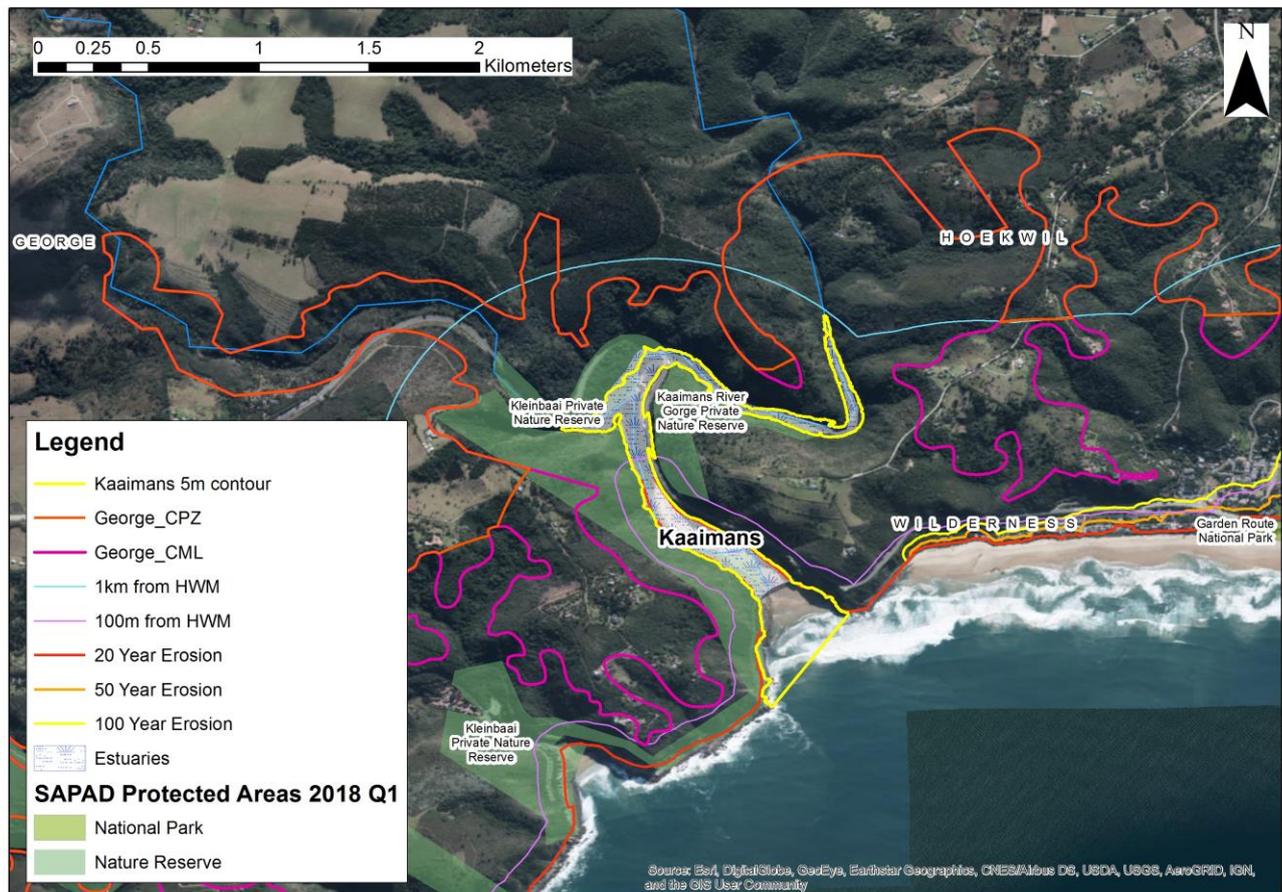
The Integrated Coastal Management (ICM) Act defines a default **Coastal Protection Zone (CPZ)** which, in essence, consists of a continuous strip of land, starting from the High Water Mark (HWM) and extending 100 m inland in developed urban areas zoned as residential, commercial, or public open space,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

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

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

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

In estuaries, the CML is delineated by the 5 m amsl contour or 1:100-year floodline, whichever is wider, to differentiate a zone where formal development should be discouraged. The coastal boundaries for the Kaaimans River estuary are illustrated in Figure 7.



**Figure 7: Coastal boundaries of the Kaaimans River estuary and risk projections (WCG, 2015)**

### 6.3.3 Environmental Impact Assessment (EIA) regulatory line

In respect of the EIA regulatory scheme, an additional line called the Development Set-Back Line (DSL) needs to be differentiated as it relates to the 'development set-back' referred to in the EIA regulations<sup>5</sup> rather than the coastal management lines described in the ICM Act. However, as part of the on-going process of defining coastal management lines for the Western Cape, it is currently **proposed that the CML, as defined under ICMA, also be used as the DSL.**

<sup>5</sup> The Environmental Impact Assessment Regulations, 2014 (as amended in 2017), published under Government Notice No. 326 in Gazette No. 40772 of 4 April 2017, in terms of sections 24(5) and 44 of the National Environmental Management Act, 1998 (Act No. 107 of 1998)

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

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

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

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

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

## 6.4 Zonation of Activities

### 6.4.1 Current zonations and uses

The table below lists the surrounding land use types as per the George Municipal Town Planning Scheme (Figure 8) and activities occurring in and/or adjacent to the Kaaimans River estuary (Table 11).



Figure 8: Extract from the George Municipal Town Planning Scheme (George LM, 2018)

Table 11: Current zonations and activities occurring in and/or adjacent to the Kaaimans River estuary (George LM 2017)

LAND USE	DESCRIPTION
<b>Open Space Zone III</b>	<p>The objective of this zone is to provide for the conservation of natural resources in areas that have not been proclaimed as nature areas (non-statutory conservation), in order to sustain flora and fauna and protect areas of undeveloped landscape including woodlands, ridges, wetlands and the coastline. A range of consent uses is provided to supplement and support the main objective of this zone.</p> <p>Consent uses include a guest house, environmental facilities, freestanding base telecommunication station, harvesting of natural resources, a rooftop base telecommunication station, tourist accommodation, tourist facilities and utility service.</p>
<b>Open Space Zone IV</b>	<p>The objective of this zone is to provide for the conservation of natural resources in areas that have been proclaimed as nature areas (statutory conservation), in order to sustain flora and fauna and protect areas of undeveloped landscape including woodlands, ridges, wetlands and the</p>

	<p>coastline. A range of consent uses is provided to supplement and support the main objective of this zone.</p> <p>While the primary use is nature reserve, consent uses include: conference facility, freestanding base telecommunication station, function venue, harvesting of natural resources, helicopter landing pad, rooftop base telecommunication station, tourist accommodation, tourist facilities and utility service</p>
<b>Single Residential Zone I</b>	<p>The objective of this zone is to provide for residential development where the predominant type of accommodation is a dwelling house for a single family, where each dwelling has its own land unit, and adequate outdoor space. Limited employment and additional accommodation opportunities are possible as primary, or consent uses, provided that the dominant use of the property remains residential and impacts of such uses do not adversely affect the quality and character of the surrounding residential environment.</p> <p>While the primary use is a single dwelling house, consent uses include a cèche, guest house, halfway house, home care facility, house shop, place of instruction and second dwelling</p>
<b>General Residential Zone II</b>	<p>The objective of this zone is to encourage residential development of a medium density, with a coordinated design, and to accommodate group housing where special attention is given to aesthetics, architectural form and the inter-relationship between components of the group housing scheme. Group housing may be located in single residential areas in places where an increased density is desirable, including along main roads, near local shopping centres and other activity nodes, and also preferably near to public open spaces.</p> <p>The primary use of the zone is for group housing, but consent uses include flats, home occupation and retirement resort</p>
<b>Agriculture Zone II</b>	<p>The objective of this zone is to accommodate larger residential properties, which may be used for limited agriculture, but primarily serve as places of residence for people who seek a rural lifestyle. Such properties are often found close to towns and villages, and new smallholding areas should only be permitted within an acknowledged, demarcated urban area.</p> <p>The primary use of this zone is for smallholdings, but consent uses include agricultural industry, animal care centre, aqua-culture, farm shop, freestanding base telecommunication station, guest house, intensive animal farming, intensive horticulture, plant nursery, quarry, renewable energy structure, riding school, rooftop base telecommunication station, second dwelling, tourist facilities and utility service</p>
<b>Transport Zone I</b>	<p>The objective of this zone is to reserve land for transportation systems, excluding public streets, but including all other transport undertakings.</p> <p>While transport is the primary use, consent uses include: air and underground rights, airfield, airport, business premises, conference facility, container site, helicopter landing pad, hotel, industry, informal trading, motor repair garage, outdoor trading and dining, service station and warehouse</p>
<b>Terrestrial Buffer Zone (estuary) and Core Conservation Zone (catchment)</b>	<p>The Kaaimans River estuary falls within a Terrestrial Buffer Zone, with parts of the upstream river course, classified as core terrestrial biodiversity conservation zone (UNESCO, 2018).</p>

ACTIVITIES	DESCRIPTION
<b>Fishing</b>	Recreational and limited subsistence fishing (including cast/gill netting)
<b>Bait harvesting</b>	Limited sand prawn pumping
<b>Swimming</b>	Swimming
<b>Boating (motorised)</b>	There is a private boat launch site (slipway in the middle reaches). This is used for launching of marine chartered boats (i.e. access to the sea). The status and operation of this site must be urgently investigated.  Due to the shallow mouth, boating in the estuary is limited.
<b>Boating (non-motorised)</b>	Pont access to riverside homes, canoeing/kayaking
<b>Conservation</b>	Two private nature reserves adjacent the system: the Kleinbaai Private Nature Reserve on the west bank (and north west bank at the Boat Launch Site) and the Kaaimans River Gorge Private Nature Reserve (elite development above the N2)

The relevant Local Spatial Development Framework (SDF) (George LM, 2015) identifies all the adjacent properties as being critical biodiversity areas and does not include this area within the urban edge or indicate any intention to further develop the area.

#### 6.4.2 Proposed spatial zonation

Given the small size of the system, the low number of users and limited conflicts, it was initially agreed during stakeholder consultation that the Kaaimans River estuary should be zoned as a Low-Intensity Recreational Use<sup>6</sup> zone (pending confirmation of the no-take status of the system, see below). The purpose of this zonation is to limit the type and intensity of recreational use on the system. Recreational use is in turn restricted by the steeply incised margins, relatively small size and silted nature of the system.

The objectives of this zone are thus as follows:

- To actively manage and direct use and mitigate visitor impacts; and
- Provide additional protection to sensitive or threatened habitats, species or habitats.

As priority estuary in terms of the National Estuary Biodiversity Plan (Turpie et al., 2012), the Kaaimans River estuary is to be considered a full, no-take system. However, following consultation with specialists at the CSIR and DEFF, full protection is no longer warranted as the water quality within the Kaaimans River estuary is deteriorating thus impacting the fish nursery function, and the system is not contributing significantly to fisheries productivity (L. Van Niekerk, *pers. comm.*)<sup>7</sup>. However, partial protection is recommended to contribute to achieving national estuarine biodiversity targets. Public willingness to support this notion is already in play, such that the area above access road is already managed as a no-take

<sup>6</sup> Adapted from the CapeNature protected area zonation scheme for Development-Low Intensity

<sup>7</sup> Lara Van Niekerk, Senior Scientist, Council for Scientific and Industrial Research, including comment on behalf of Dr Steve Lamberth, Dept. of Agriculture, Forestry and Fisheries, 2019.

conservation area by the local community. It is further recommended that the Swart River arm of the estuary also be zoned as no-take conservation area (L. Van Niekerk, *pers. comm.*<sup>8</sup>); this should extend beyond the estuarine boundary, incorporating the ecological support area and for ease of compliance and enforcement (Figure 9). Compliance and enforcement of these no-take areas vests with DEFF in terms of the MLRA.



**Figure 9: Proposed spatial zonation of Kaaimans River estuary, indicating the no-take conservation areas (orange) and water body (blue)**

Allowable activities within Kaaimans River estuary are to be managed as per Table 12. In addition to the table below, no further development and clearing of natural habitat within the EFZ must be permitted. Any formal development proposals or construction activities in or adjacent to the estuary must be subject to the EIA process and any controls emanating from the Provincial determination of coastal management lines.

<sup>8</sup> Lara Van Niekerk, Senior Scientist, Council for Scientific and Industrial Research, including comment on behalf of Dr Steve Lamberth, Dept. of Agriculture, Forestry and Fisheries, 2019.

**Table 12: Zonation prescriptions for the Kaaimans River estuary**

ZONES & CONDITIONS OF USE	RELEVANT LEGISLATION	RESPONSIBLE AUTHORITY	ENFORCEMENT
<b>NO-TAKE CONSERVATION ZONE – above access road and Swart River Arm</b>			
<ul style="list-style-type: none"> <li>No fishing or bait harvesting within these designated areas, in any way or form</li> </ul>	MLRA Regulations	DEFF	DEFF/ CapeNature
<b>MOTORISED BOATING</b>			
<ul style="list-style-type: none"> <li>Launching of motorised boats, in accordance with the Public Launch Site regulations (GN 37761), subject to support from the George LM</li> <li>No wake zone, speed limit ≤10 km/hr</li> <li>No cleaning and discarding of fish</li> <li>Vessels to give way to swimmers and canoers</li> </ul>	ICMA: Public Launch Site Regulations Merchant Shipping Act and regulations	South African Maritime Safety Association (SAMSA)	George LM / CapeNature
<b>OTHER RECREATIONAL ACTIVITIES</b>			
<ul style="list-style-type: none"> <li>Picnicking in designated areas</li> <li>Canoeing/paddling and swimming</li> <li>Walking or bicycle access into adjacent areas</li> <li>Self-catering accommodation, access via Pont system in mid-lower reaches</li> </ul>	Bylaws / Regulations	George LM	George LM
<b>LAND-USE / DEVELOPMENT ACTIVITIES</b>			
<ul style="list-style-type: none"> <li>No further development within the EFZ</li> <li>Sensitive planning existing development and infrastructure in and adjacent to EFZ</li> <li>Vehicle access on designated routes only, with controlled pedestrian access from parking areas and adjacent developments using designated paths.</li> <li>Roads and parking areas to be surfaced to reduce management cost and environmental impacts</li> <li>Effective stormwater control</li> <li>No clearing of indigenous vegetation for access or views</li> </ul>	LUPA, Municipal Town Planning Scheme (TPS), Bylaws, NEMA	George LM	George LM
<ul style="list-style-type: none"> <li>No construction of jetties and slip ways</li> </ul>	Seashore Act	CapeNature	CapeNature

### 6.4.3 Areas requiring rehabilitation

In order to improve the present ecological state of the Kaaimans River estuary to a Category A/B, significant interventions are required in the catchment, namely:

- Maintaining good water quality in the system and the catchment through strict management urban runoff and polluting activities; and
- Improve in baseflows to estuary, specifically through limiting water resource development activities and afforestation within the catchment, and alien plant removal.

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In terms of physical rehabilitation on the Kaaimans River estuary, the habitat map (Figure 6) indicates that portions of the estuary channel have been canalised and stabilised, while in other areas, the natural margin and vegetation has been replaced by development, removed for riverside access, and/or recreational use. In areas where soft margins persist and vegetation has been cleared, indigenous vegetation must re-instated and eroded sections rehabilitated. This specifically relates to open picnic areas and lawns adjacent to the holiday establishments.

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## 7 INTEGRATED MONITORING PLAN

According to the standards for estuarine management, management actions should be based on sound scientific evidence. Thus, monitoring is a crucial aspect of the adaptive estuarine management planning process as the generated data will be used to inform and update management decisions. However, the collection, processing and interpretation of such data, particularly ecological data, are generally costly and time-consuming and often require considerable scientific expertise.

In the context of estuarine management, there are three broad categories of monitoring which should be incorporated into an integrated monitoring plan, namely resource monitoring, compliance monitoring and performance monitoring (DEA, 2015). These components are discussed in the following sections.

### 7.1 Resource Monitoring

#### 7.1.1 Current Resource Monitoring

Current resource monitoring includes:

- DWS Water level recorder: The DWS has a permanent water level recorder (K3H1 WMS K30\_102248) in the Kaaimans River (at Upper Barbiers Kraal), approximately 3 km above the estuary, which monitors water levels and conductivity continuously. It is of the utmost importance that this monitoring continues; and
- Water chemistry: A basic water quality monitoring programme funded by the Breede-Gouritz Catchment Management Agency is currently in place for the Swart and Kaaimans river systems, including a sampling point below the dam (quarterly) and at the causeway in the estuary (monthly), respectively. Variables measured include pH, suspended solids, electrical conductivity, chemical oxygen demand, ammonia, PO<sub>4</sub>, E. coli and faecal coliforms. It is imperative that this monitoring programme is maintained, and the data stored and utilised to inform the future management of the Kaaimans River estuary.

There are no known ecological monitoring or research programmes (e.g. invertebrates, fish or birds, etc.) currently being undertaken for the Kaaimans River estuary.

#### 7.1.2 Recommended Resource Monitoring Programmes

In the context of the Kaaimans River estuary, general baseline information is limited. The recommended baseline monitoring requirements to improve the confidence of the preliminary reserve determination as developed through Gouritz Water Classification Study (DWS, 2015), are provided Table 14 in Appendix 1. The recommended long-term monitoring requirements to ascertain impacts of changes in freshwater flow, and current and future impacts on the estuary and/or any improvement or reductions therein are listed in Table 15. The purpose of recommended long-term monitoring programme is also to test for compliance with Ecological Specifications (Ecospecs) and Thresholds of potential concern (TPCs) and to continuously improve understanding of ecosystem function.

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It is recommended, and supported by the George Municipality, that a partnership be formed and implemented with the Nelson Mandela Municipality to undertake resource monitoring.

### **7.1.3 Resource Quality Objectives / Ecological Specifications**

Resource Quality Objectives (RQOs) or Ecological Specifications (EcoSpecs) are clear and measurable specifications of ecological attributes (in the case of estuaries - hydrodynamics, sediment dynamics, water quality and different biotic components) that define a specific ecological category, in this case Category A/B.

Thresholds of potential concern (TPC) are defined as measurable end points related to specific abiotic or biotic indicators that if reached (or when modelling predicts that such points will be reached) prompts management action. In essence, TPCs should provide early warning signals of potential non-compliance to ecological specification (i.e. not the point of 'no return'). The EcoSpecs, and TPCs for the Kaaimans River estuary, are presented in Table 16 (Appendix 2).

## **7.2 Compliance Monitoring**

Compliance monitoring refers to the monitoring of the character and intensity of uses/activities and developments within an estuary/EFZ. Such monitoring is usually prescribed in relevant legislation, regulations, policies, standards, guidelines and or permits and license agreements (DEA, 2015). The purpose of this form of monitoring is to test whether activities are compliant with the established limits and objectives as well as to detect growing pressures on resources.

### **7.2.1 Current Compliance Monitoring**

Currently there is no known compliance monitoring taking place on the Kaaimans River estuary in respect to marine living resources.

When boat launching to sea is possible, launching activities at the so-called 'private' boat launch site or unlisted public launch site, are reportedly monitored by the George Skiboat club in respect to SAMSA regulations (seaworthiness, safety, skippers' licenses) and cleaning of catches, etc<sup>9</sup>.

### **7.2.2 Recommended Compliance Monitoring**

In respect to the implementation of this EMP, the Kaaimans River estuary, as priority estuary in terms of the National Estuary Biodiversity Plan (Turpie et al., 2012), is to be considered a full, no-take system. Compliance monitoring will be the responsibility of the DEFF (or devolved to CapeNature) in terms of the MLRA and will be undertaken according to

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<sup>9</sup> Minutes of the stakeholder meeting for the Kaaimans River estuary estuaries, 14 November 2017, Conville Community Centre, Conville, George

legislation and policies applicable and by means of law enforcement and compliance monitoring protocols.

It is recommended that a scheduled compliance/law enforcement programme be developed, beginning with frequent patrols to ascertain degree and timing of estuary use (e.g. holiday periods), and then modified based on the findings (Table 13).

**Table 13: Recommended compliance monitoring requirements**

INDICATOR	FREQUENCY	TARGET/LIMIT	LEGISLATION	RESPONSIBILITY
<b>USE/ ACTIVITY: FISHING (including marine landings at boat launch site if authorised)</b>				
<ul style="list-style-type: none"> <li>• Number of fishers</li> <li>• Number of harvesters</li> <li>• Species targeted</li> <li>• Catch volume</li> <li>• Gear utilised</li> <li>• Number of offences/transgressions</li> </ul>	Monthly, increased to weekly during peak season	Target species and limits as per MLRA regulations	MLRA	DEFF / CapeNature
<b>USE/ ACTIVITY: BOATING</b>				
<ul style="list-style-type: none"> <li>• Number of boats and other vessels</li> <li>• Boat movements</li> <li>• Number of boat licenses</li> <li>• Number of skipper's licenses</li> <li>• Adherence to boating by-laws for estuary</li> <li>• Number of offences/transgressions</li> </ul>	Monthly, increased to weekly during peak season	Carrying capacity to be determined  No wake, speed $\leq 10$ km/hr	ICMA: Public Launch Site Regulations  Merchant Shipping Act (Act 51 of 1957), Small Vessel Safety Regulations  Municipal boating bylaw	SAMSA / DEA&DP

### 7.3 Performance Monitoring (Review & Evaluation)

A performance monitoring plan is used by the RMA, and/or identified implementing agents, to assess the effectiveness with which planned management activities contained in the EMP are being performed and ultimately to gauge progress in achieving the vision and objectives. This component utilises the performance indicators included for the various actions, specifically the management priorities, and includes a temporal scale or the frequency of the collection of the performance data and the targets that should be achieved.

Ultimately the EMP must be holistically reviewed every 5 years from the date it was adopted, ideally in line with the review cycles of the applicable IDP, SDF and/or CMP. This review is

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the responsibility of the RMA. According to the 2013 NEMP, this review should include an assessment of:

- The effectiveness of the EMP and success with meeting the objectives (i.e. the performance monitoring plan);
- Environmental changes at a local or a wider scale that could affect the estuarine resources or the implementation of the EMP; and
- Changes (if any) to legislation, land-use planning, goals or policies that may require the EMP to be amended.

This review may involve revisiting the SAR to determine the progress or changes that have come about because of the EMP in terms of the objectives that were originally set. It may also require the EMP to be amended, including a revision of the objectives, amendments to the management actions, and/or monitoring protocols. Ideally, representatives and experts in the major sectors (e.g. water quantity and quality, land-use and infrastructure planning and development), should evaluate the efficiency of the EMP in the context of their mandate or area of expertise. Public participation will be required before the amended EMP can be approved.

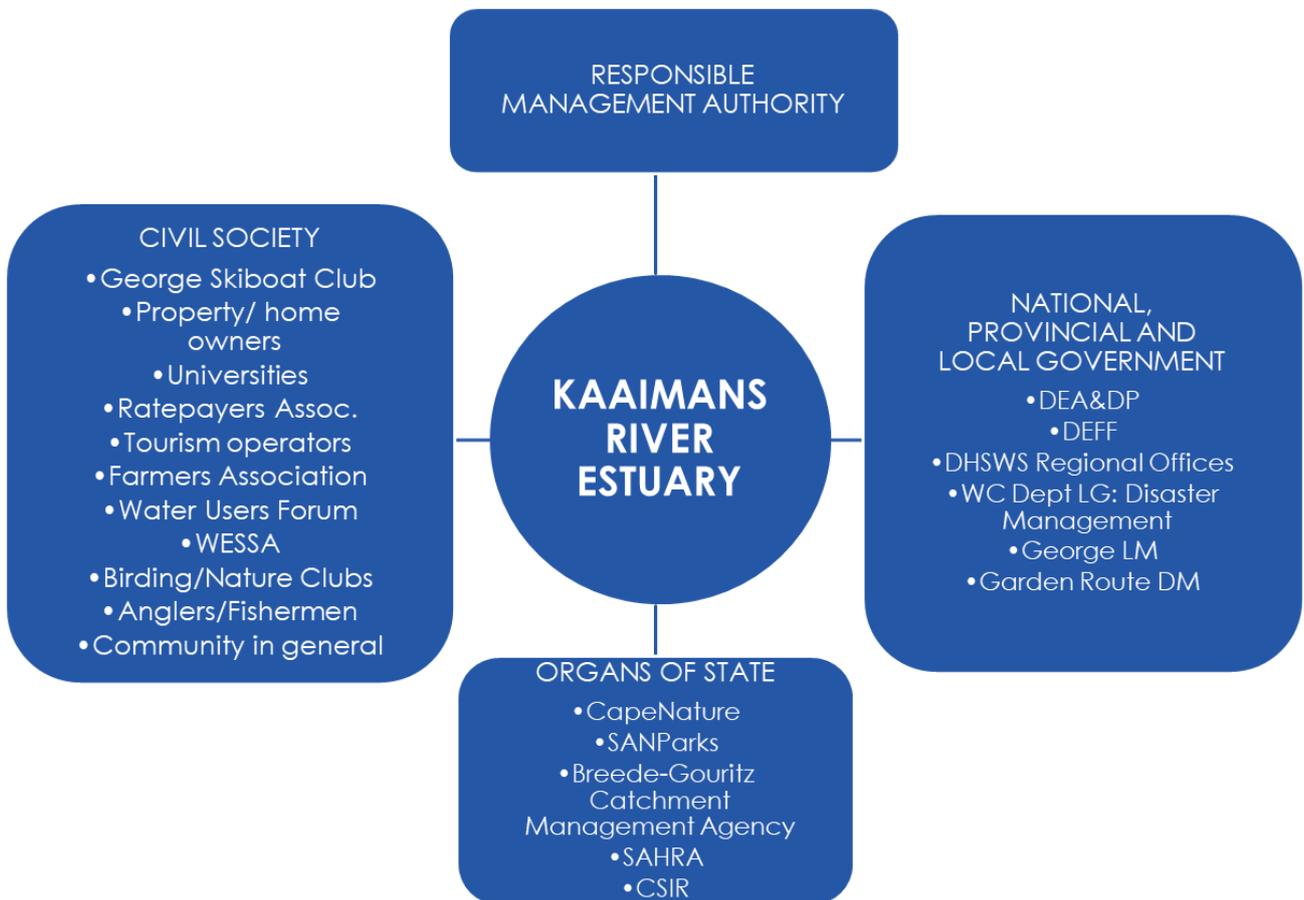
Table 17 in Appendix 3 provides the performance monitoring plan relative to the proposed management priorities.

## 8 INSTITUTIONAL CAPACITY & ARRANGEMENTS

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

### 8.1 Key Role Players

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



**Figure 10: Key role players for the management of the Kaaimans River estuary**

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## 8.2 Responsible Management Authority

The 2013 NEMP identifies the George LM, or its assigned representative, as the RMA, responsible for the co-ordination of the implementation of the Kaaimans River EMP. However, portions of the river/estuary margin fall within private nature reserves (namely, the Kaaimans River Gorge Private Natures Reserve and the Kleinbaai Private Nature Reserve). The requirement to establish the system as a no-take / closed estuary may necessitate protected area status and instatement of a conservation authority (e.g. CapeNature or SANParks). While the management of the Kaaimans River estuary remains the responsibility of the George LM, there must be a joint agreement with the respective landowners and conservation authority. **It is noted that proposed amendments to the 2013 NEMP allocate such responsibilities to the provincial environmental department unless agreement, or until agreement, is reached with the respective municipality, or conservation authority, to undertake the coordination of the implementation process.** Ultimately, the role of RMA must be designated through formal signed agreement.

Specific implementation actions identified in this EMP remain the responsibility of mandated government agencies as well as respective departments within the RMA. As an example, the George LM will monitor water quality in the catchment and within the estuary in respect to recreational health and safety, and DWS will monitor water quantity in respect to dam releases and water user allocations; while the DEFF will ensure compliance with matters related to fisheries (unless otherwise delegated to CapeNature). It is crucial that champions/project leaders/teams are identified who will be responsible for the formulation of detailed project plans and the implementation thereof.

Effective implementation of this EMP requires the augmentation of capacity specifically within the George LM, with the recommended appointment of a regional estuarine management co-ordinator within DEA&DP. This individual will play a critical co-ordinating role for all other implementing agencies and municipal departments.

Progress towards achieving the objectives set out in this EMP should be reviewed on an annual basis by the RMA and communicated to stakeholders as well as to DEA&DP and DEFF via an annual report. This EMP will need to be revisited and updated after five years to reflect goals that have been achieved and to accommodate changing priorities.

## 8.3 Estuary Advisory Forum

While the establishment of an EAF for each estuary is no longer a requirement in the 2013 NEMP, the Western Cape Government still support their establishment and recommend that private entities and non-government organisations continue to play a supporting role in the implementation of this EMP. While an individual EAF is not recommended, the establishment of a regional EAF is proposed, incorporating the Kaaimans, Gwaing and Maalgate estuaries. The EAF should preferably be chaired by either the RMA or the proposed regional estuarine coordinator and should aim to meet on a quarterly basis.

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Government departments should be represented on this regional EAF by delegates mandated by the respective department to do so. Each government representative on the EAF will be tasked to convey recommendations to his/her department and report back to the EAF on behalf of the department. Moreover, representatives from the authority/ies who have executive powers within the specific sector should also be present. This ensures that recommendations are executed, and resources are made available for priority tasks or activities. This also streamlines the flow of information and decreases the turnaround time of required interventions.

The local members of the EAF will play an invaluable role in providing on the ground, local insight and support to the various authorities as well as to the RMA.

## **8.4 Government Departments and Organs of State**

The key to successful implementation of this EMP is the commitment and contribution of all spheres of government to the process, including:

- The George Local Municipality: responsible for providing key municipal services, as well as the provision of management, technical and legislative support;
- The Garden Route District Municipality: Responsible for health and safety issues relating to water and sanitation, disaster management as well as the provision of management and technical support;
- Western Cape Government departments: Responsible for legislatively mandated responsibilities as well as support, including compliance, funding, research and monitoring;
- Relevant National government departments, especially DEFF, DWS (via the regional office), DALRRD, and Department of Science and Technology (DST), etc.; and
- Organs of State: such as SANParks, CapeNature, CSIR, BGCMA, South African Heritage Resources Agency (SAHRA).

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

The DEFF is generally responsible for national standardisation of estuarine management and approval of provincially-compiled estuarine management plans. Direct involvement in individual estuaries will occur via existing forums for intergovernmental coordination. These forums will have the estuarine management on their agendas, and include:

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- The Garden Route (formally Eden) Municipal Coastal Committee: Responsible for facilitating co-management, effective governance and district level co-ordination of coastal and estuarine management issues;
  - Western Cape Provincial Coastal Committee: Responsible for facilitating co-management and effective governance and provincial co-ordination of estuarine management; and
  - Western Cape Estuaries Task Team: Responsible for facilitating provincial co-ordination of estuarine management.

#### **8.4.1 Project Plans for Implementation**

Effective implementation of this EMP requires the conversion of the priority actions into detailed project plans, which must be prepared and adopted into the respective departmental implementation strategies. A template for such project plans is provided in the EMP Development Guideline (DEA, 2015) and is attached as Appendix 4 for ease of reference. This template can also be utilised to facilitate the implementation of other projects proposed in the EMP, e.g. water quality monitoring programme.

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## 9 RECOMMENDATIONS AND CONCLUSION

The following items/issues are considered critical towards the ultimate achievement of the vision and should be immediately addressed and/or receive greatest effort in respect to human/financial resources:

- Restoration of baseflows, in line with ecological reserve recommendations;
- No take zone established and implemented;
- Invasive alien plant species eradicated via effective implementation of EPIP Programme and other measures;
- Status of current private launch site resolved;
- Mouth management plan developed and execution of science based artificial breaching / mouth manipulation, only if specified in the MMP; and
- The DEA&DP to consider the appointment of a Regional estuarine management co-ordinator/champion within either DEA&DP or CapeNature, to support the RMA.

In conclusion, this plan adopts the principle of adaptive management and presents an integrated and holistic approach to addressing not just the impacts but also the social and economic drivers that affect estuarine health. The actions proposed in this EMP reflect an ongoing process of implementation and should accommodate potential amendment due to changing circumstances. They are the first steps of a long-term process designed to secure ongoing and sustainable improvements to the current situation.

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## 10 REFERENCES

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## APPENDIX 1: RECOMMENDED MONITORING PROGRAMMES

**Table 14: Generic baseline surveys to improve confidence in the preliminary reserve determination of estuaries (Priority components are highlighted) (DWS, 2015)**

Monitoring action	Temporal Scale (frequency and timing)	Spatial Scale (Number of stations)
<b>Hydrology</b>		
For larger systems record river inflow at head of estuary (smaller systems hydrology to be simulated every 10 years).	Continuous.	Install recorder near head of estuaries.
<b>Hydrodynamics</b>		
Record water levels Large system (permanent recorder DWS levelled to mean sea level). Smaller systems (small in situ probe).	Continuous.	Near mouth.
Aerial photography (or using high resolution satellite imagery i.e. 5x5 m pixel size, e.g. Google Pro or BirdEye).	Once-off.	Entire estuary.
<b>Sediment dynamics</b>		
Monitoring berm height using appropriate technologies.	Quarterly.	Mouth.
Bathymetric surveys: Series of cross section profiles and a longitudinal profile collected at fixed 500 m intervals, but in more detail in the mouth including the berm (every 100 m). Vertical accuracy at least 5 cm.	Once-off.	Entire estuary.
Collect sediment grab samples (at cross section profiles) for analysis of particle size distribution and organic content (and ideally origin, i.e. microscopic observations).	Once-off.	Entire estuary.
<b>Water quality</b>		
Electrical conductivity, pH, inorganic nutrients and organic content (e.g. Total P and Kjeldahl N) in river inflow (preferably also suspended solids and temperature).	Monthly (as in DWS monitoring programme).	Include monitoring station near head of estuary.
Salinity and temperature profiles (and any other in situ measurements possible e.g. pH, DO, and turbidity).	Quarterly, preferably for two years.	Along entire length of estuary (at least three stations covering all zones).
Inorganic nutrient concentrations (together with above).	Quarterly, preferably for two years.	Along entire length of estuary (at least three stations covering all zones).
Measure pesticides/herbicides and metal accumulation in sediments (for metals investigate establishment of distribution	Once-off.	Entire estuary, including depositional areas (i.e. muddy areas).

Monitoring action	Temporal Scale (frequency and timing)	Spatial Scale (Number of stations)
models – refer to Newman and Watling, 2007)		
<b>Microalgae</b>		
<p>Record relative abundance of dominant phytoplankton groups, i.e. flagellates, dinoflagellates, diatoms, chlorophytes and blue-green algae.</p> <p>Chlorophyll-a measurements taken at the surface, 0.5 m and 1 m depths, under typically high and low flow conditions using a recognised technique, e.g. spectrophotometer, HPLC or fluoroprobe.</p> <p>Intertidal and subtidal benthic chlorophyll-a measurements (four replicates each) using a recognised technique, e.g. sediment corer or fluoroprobe.</p>	Quarterly preferably for two years.	Along length of estuary minimum five stations.
<b>Macrophytes</b>		
<p>Map area covered by different macrophyte habitats using recent imagery. Conduct field survey to record total number of macrophytes habitats, identification and total number of macrophytes species, number of rare or endangered species, or those with limited populations. Assess extent of invasive species in EFZ.</p> <p>Where there are salt marsh areas greater than 1 ha measure % plant cover along elevation gradient. Sediment samples collected along the transect and analysed in the laboratory for sediment moisture, organic content, EC, pH and redox potential. In the field measure depth to water table and ground water salinity</p>	Once-off, in summer.	Entire estuary (mapping). Where there is salt marsh (minimum three transect sites).
<b>Invertebrates</b>		
<p>Collect duplicate zooplankton samples at night from mid-water levels using WP2 nets (190 µm mesh) along estuary</p> <p>Collect sled samples (day) at same zooplankton sites for hyper benthos (190 µm)</p> <p>Collect grab samples (five replicates) (day) from the bottom substrate in mid-channel areas at same sites as zooplankton (each sample to be sieved through 500 µm).</p> <p>Intertidal invertebrate hole counts using 0.25 m<sup>2</sup> grid (five replicates per site).</p> <p>Establish the species concerned (<i>C. kraussi</i> or <i>U. africana</i>) using a prawn pump.</p>	Quarterly, preferably for two years.	Minimum of three sites along length of entire estuary. For hole counts –three sites in each of muddy or sandy areas.

Monitoring action	Temporal Scale (frequency and timing)	Spatial Scale (Number of stations)
Collect sediment samples using the grab for particle size analysis and organic content (at same sites as zooplankton) (preferably link with sediment dynamics).		
<b>Fish</b>		
<p>Record species and abundance of fish, based on seine net and gill net sampling. Sampling with a small beam trawl for channel fish should also be considered.</p> <p>Seine net specifications: 30 m x 2m, 15 mm bar mesh seine with a 5 mm bar mesh with a 5 mm bar mesh 5 m either side and including the cod-end.</p> <p>Gill nets specifications: Set of gill nets each panel 30 m long by 2 m deep with mesh sizes of 44 mm, 48 mm, 51 mm, 54 mm, 75 mm, 100 mm and 145 mm.</p> <p>Gill net sampling can be replaced by a large mesh seine (44 mm stretch mesh, 100 m x 2 m).</p> <p>Trawl specification: 2 m wide by 3 m long, 10 mm bar nylon mesh in the main net body and a 5 mm bar in the cod-end.</p>	Once-off, in spring/summer and autumn/winter.	Larger system (> 5 km): 10 - 15 stations along length of estuary (~ length/10). Small systems (< 5 km): 3 - 5 stations (mouth, mid, top).
<b>Birds</b>		
Undertake count of all water birds.	Once-off.	Entire estuary.

**Table 15: Recommended long-term monitoring programme for the Kaaimans River estuary (priority components are highlighted) (DWS, 2015)**

ECOLOGICAL COMPONENT	MONITORING ACTION	TEMPORAL SCALE	SPATIAL SCALE
<b>Hydrology</b>	Record river inflow at head of estuary	Continuous	Head of estuary
<b>Hydrodynamics</b>	Record water levels using small in situ probe	Continuous	Near mouth
	Aerial photography (or using high resolution satellite imagery i.e. 5x5 m pixel size, e.g. Google Pro or BirdEye)	Every 3 years	Entire estuary
<b>Sediment dynamics</b>	Monitoring Berm height using appropriate technologies	Quarterly	Mouth
	Bathymetric surveys: Series of cross section profiles and a longitudinal profile collected at fixed (e.g. 300-500 m intervals) but in more detail in mouth including berm (every 100 m). Vertical accuracy at least 5 cm	Every 3 years (and after large resetting event)	Entire estuary
	Set sediment grab samples (at cross section profiles) for analysis of particle size distribution (and ideally origin, i.e. microscopic observations)	Every 3 years	Entire estuary
<b>Water quality</b>	Electrical conductivity, pH, inorganic nutrients and organic content (e.g. TP and Kjeldahl N) in river inflow ( <i>preferably also suspended solids and temperature</i> )	Monthly continuous (as in DWS monitoring programme)	Just above head of estuary
	Salinity and temperature profiles (and any other in situ measurements possible e.g. pH, Dissolved Oxygen (DO), turbidity)	Seasonally, annually	Along entire length of estuary (at least 3 stations covering all zones)
	Inorganic nutrient concentrations (together with above)	High flow/low flow surveys, every 3 years or when significant change in WQ expected	Along entire length of estuary (at least 3 stations covering all zones)
	Measure pesticides/herbicides and metal accumulation in sediments (for metals investigate establishment of distribution models – see Watling and Newman, 2007)	Once off, then every 3 – 6 years, if results show contamination	Entire estuary, including depositional areas (i.e. muddy areas)

ECOLOGICAL COMPONENT	MONITORING ACTION	TEMPORAL SCALE	SPATIAL SCALE
<b>Microalgae</b>	<p>Record relative abundance of dominant phytoplankton groups, i.e. flagellates, dinoflagellates, diatoms, chlorophytes and blue-green algae.</p> <p>Chlorophyll-a measurements taken at the surface, 0.5 m and 1 m depths, under typically high and low flow conditions using a recognised technique, e.g. spectrophotometer, HPLC, fluoroprobe.</p> <p>Intertidal and subtidal benthic chlorophyll-a measurements (4 replicates each) using a recognised technique, e.g. sediment corer or fluoroprobe.</p>	Quarterly for 1 <sup>st</sup> two years and then low flow surveys every 3 years	Along length of estuary minimum 5 stations
<b>Macrophytes</b>	<p>Map area covered by different macrophyte habitats using recent imagery. Conduct field survey to record total number of macrophytes habitats, identification and total number of macrophytes species, number of rare or endangered species, or those with limited populations. Assess extent of invasive species in EFZ.</p> <p>Where there are salt marsh areas greater than 1 ha measure % plant cover along elevation gradient. Sediment samples collected along the transect and analysed in the laboratory for sediment moisture, organic content, EC, pH and redox potential. In the field measure depth to water table and ground water salinity</p>	Every 3 years in summer	<p>Entire estuary (mapping)</p> <p>Where there is salt marsh (minimum 3 transect sites)</p>

ECOLOGICAL COMPONENT	MONITORING ACTION	TEMPORAL SCALE	SPATIAL SCALE
<b>Invertebrates</b>	<p>Collect duplicate zooplankton samples at night from mid-water levels using WP2 nets (190 um mesh) along estuary</p> <p>Collect sled samples (day) at same zooplankton sites for hyper benthos (190 um)</p> <p>Collect grab samples (5 replicates) (day) from the bottom substrate in mid-channel areas at same sites as zooplankton (each sample to be sieved through 500 um).</p> <p>Intertidal invertebrate hole counts using 0.25 m<sup>2</sup> grid (5 replicates per site). Establish the species concerned (<i>Callichirus kraussi</i> or <i>Upogebia africana</i>) using a prawn pump.</p> <p>Collect sediment samples using the grab for particle size analysis and organic content (at same sites as zooplankton) (<i>preferably link with sediment dynamics</i>)</p>	<p>Quarterly for 1<sup>st</sup> two years and then Every 2 years mid-summer</p>	<p>Minimum of 3 sites along length of entire estuary</p> <p>For hole counts – three sites in each of muddy or sandy areas,</p>
<b>Fish</b>	<p>Record species and abundance of fish, based on seine net and gill net sampling. Sampling with a small beam trawl for channel fish should also be considered.</p> <p>Seine net specifications: 30 m x 2 m, 15 mm bar mesh seine with a 5 mm bar mesh with a 5 mm bar mesh 5 m either side and including the cod-end</p> <p>Gill nets specifications: Set of gill nets each panel 30 m long by 2 m deep with mesh sizes of 44 mm, 48 mm, 51 mm, 54 mm, 75 mm, 100 mm and 145 mm</p> <p>Gill net sampling can be replaced by a large mesh seine (44 mm stretch mesh, 100 m x 2 m)</p> <p>Trawl specification: 2 m wide by 3 m long, 10 mm bar nylon mesh in the main net body and a 5 mm bar in the cod-end</p>	<p>Twice annually Spring/ summer and autumn/ winter</p>	<p>3-5 stns (mouth, mid, top)</p>
<b>Birds</b>	<p>Undertake count of all water birds</p>	<p>Every 2 years mid-summer</p>	<p>Entire estuary</p>

## APPENDIX 2: ECOLOGICAL SPECIFICATIONS

**Table 16: EcoSpecs and Thresholds of Potential Concern for the Kaaimans River estuary (Category A/B) (DWS, 2015; 2018)**

ECOLOGICAL COMPONENT		RECOMMENDED RQO						THRESHOLD OF POTENTIAL CONCERN					
<b>Hydrology</b>		• Maintain flow regime						• Varies more than 10% of MAR					
Month	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual
MMR/MAR (%Nat)	70.9	74.5	74.7	70.7	70.4	72.8	72.3	73.7	69.5	67.3	74.1	73.8	72.5
<b>Hydro-dynamics</b>		<ul style="list-style-type: none"> <li>• Maintain mouth state to create the required habitat for birds, fish, macrophytes, microalgae and water quality</li> <li>• Maintain connectivity with marine environment at a level that ensures water quality and habitat remains suitable for biota typically found in the estuary</li> </ul>						<ul style="list-style-type: none"> <li>• Closed mouth state varies by &gt; 10% from present</li> <li>• Average water depth &lt; 0.5 m in the mouth region (to be confirmed by monitoring)</li> <li>• Average water depth &lt; 1.0 m in the middle to upper region, excluding Swart Arm (western arm) which is 5 to 10 m deep. (to be confirmed by monitoring).</li> <li>• Average water level change by more than 20% from present</li> </ul>					
<b>Water Quality</b>		<ul style="list-style-type: none"> <li>• Salinity distribution not to cause exceedance of TPCs for fish, invertebrates, macrophytes and microalgae</li> <li>• Turbidity and Dissolved oxygen not to cause exceedance of TPCs for biota</li> <li>• DIN/DIP concentrations not to cause in exceedance of TPCs for macrophytes and microalgae</li> <li>• Concentrations of waterborne pathogens should be maintained in an Acceptable category for full contact recreation</li> <li>• Toxic substances not to cause exceedance of TPCs for biota</li> </ul>						<ul style="list-style-type: none"> <li>• Average Salinity &gt; 30 (expected average range 10-30)</li> <li>• DO &lt; 5 mg/l in estuary</li> <li>• Turbidity &gt; 10 NTU in low flow</li> <li>• Secchi: to bottom</li> <li>• Dissolved Inorganic Nitrogen (DIN) &gt;100 µg/l once off</li> <li>• Dissolved Inorganic Phosphates (DIP) &gt; 20 µg/l once off</li> <li>• ≥185 Enterococci/100 ml</li> <li>• ≥500 E. coli/100 ml</li> <li>• Concentrations in water column exceed target values as per SA Water Quality Guidelines for coastal marine waters (DAAF, 1995)</li> <li>• Concentrations in sediment exceed target values as per WIO Region guidelines (UNEP/Nairobi Convention Secretariat and CSIR, 2009)</li> </ul>					
<b>Sediment dynamics</b>		<ul style="list-style-type: none"> <li>• Flood regime to maintain the sediment distribution patterns and aquatic habitat (instream physical habitat) so as not to exceed TPCs for biota</li> <li>• Changes in sediment grain size distribution patterns not to cause exceedance of TPCs in benthic invertebrates</li> <li>• Change in average sediment composition and characteristics</li> <li>• Change in average bathymetry</li> </ul>						<ul style="list-style-type: none"> <li>• Average sediment composition (% fractions) along estuary change from baseline (to be measured) by 30% (per survey)</li> <li>• Average depth along main channel change from 30% of baseline (to be determine) (system expected to significant fluctuation in bathymetry between flood and extended closed periods)</li> </ul>					

ECOLOGICAL COMPONENT	RECOMMENDED RQO	THRESHOLD OF POTENTIAL CONCERN
<b>Microalgae</b>	<ul style="list-style-type: none"> <li>Maintain median phytoplankton/benthic microalgae biomass</li> <li>Prevent formation of phytoplankton blooms</li> </ul>	<ul style="list-style-type: none"> <li>Phytoplankton &gt;3.5 ug/l (median)</li> <li>Benthic microalgae &gt;11 mg/m<sup>2</sup> (median)</li> <li>Phytoplankton &gt;20 µg/l and/or cell density &gt;10 000 cells/ml (once-off)</li> </ul>
<b>Macrophytes</b>	<ul style="list-style-type: none"> <li>Maintain distribution of macrophyte habitats</li> </ul>	<ul style="list-style-type: none"> <li>20% change in the macrophyte area (reeds currently cover 0.6 ha and salt marsh 0.02 ha)</li> </ul>
<b>Invertebrates</b>	<ul style="list-style-type: none"> <li>Establish presence absence of sand prawn <i>Callichirus kraussi</i> on sand banks in lower estuary</li> <li>Establish presence absence of the copepod <i>Pseudodiaptomus hessei</i> or estuarine congeneric in the zooplankton of the estuary</li> </ul>	<ul style="list-style-type: none"> <li>If present populations deviate from average baselines (as determined in first 3 visits) by more 30%</li> </ul>
<b>Fish</b>	<p>Fish assemblage should comprise the 5 estuarine association categories in similar proportions (diversity and abundance) to that under the present. Numerically assemblage should comprise:</p> <ul style="list-style-type: none"> <li>Ia estuarine residents (50-80% of total abundance)</li> <li>Ib marine and estuarine breeders (5-20%)</li> <li>Ila obligate estuarine-dependent (10-20%)</li> <li>Ilb estuarine associated species (5-15%),</li> <li>Ilc marine opportunists (20-80%)</li> <li>Ill marine vagrants (not more than 5%)</li> <li>IV indigenous fish (1-5%)</li> <li>V catadromous species (1-5%)</li> </ul> <p>Category Ia species should contain viable populations of at least 2 species (<i>G.aestuarina</i>, &amp; <i>Hyporhamphus capensis</i>,</p> <p>Category Ila obligate dependents should be well represented by at least 2 large exploited species (<i>L. lithognathus</i>, <i>Lichia amia</i>).</p> <p>REI species dominated by both <i>Myxus capensis</i> and <i>G. aestuarina</i>.</p>	<ul style="list-style-type: none"> <li>Ia estuarine residents &lt;50%</li> <li>Ib marine and estuarine breeders &lt;10%</li> <li>Ila obligate estuarine-dependent &lt;10%</li> <li>Ilb estuarine associated species &lt;5%</li> <li>Ilc marine opportunists &lt; 20%</li> <li>Ill marine vagrants &gt; 5%</li> <li>IV indigenous fish &lt;1%</li> <li>V catadromous species &lt;1%</li> </ul> <p>Species composition &gt; 50% similar to last 3 sampling trips (system naturally highly unstable due to resetting events)</p>
<b>Birds</b>	<ul style="list-style-type: none"> <li>Maintain population of original groups of birds present on the estuary</li> </ul>	<ul style="list-style-type: none"> <li>Number of birds in any group, other than species that are increasing regionally such as Egyptian geese, drops below the baseline median (determined by past data and or initial surveys) number of species and/or birds counted for 3 consecutive summer or winter counts.</li> </ul>



## APPENDIX 3: PERFORMANCE MONITORING PLAN

**Table 17: Recommended Performance Monitoring Plan for the management of Kaaimans River estuary**

MANAGEMENT OUTPUT	PERFORMANCE INDICATOR	TEMPORAL SCALE (frequency)	RELEVANT LEGISLATION	RESPONSIBLE AUTHORITY
<b>1. ESTUARINE HEALTH AND FUNCTION</b>				
1.1 Secure adequate quantity and quality of freshwater input to improve and maintain ecosystem health and functioning	<ul style="list-style-type: none"> <li>Recommended reserve(s) signed off and implemented</li> <li>Sustained base flow to estuary</li> <li>Ecological conditions improved from B to A/B</li> <li>Water resource utilisation plan developed</li> <li>Effective regulation of water use</li> <li>Ecological monitoring programme (fish and birds) developed and implemented</li> <li>Mouth Management Plan developed</li> <li>Execution of science based artificial breaching / mouth manipulation (only if needed)</li> <li>Monitoring on the state of the catchment and estuary</li> </ul>	<ul style="list-style-type: none"> <li>Twice a year for DWS</li> <li>Twice a year</li> </ul>	NWA	DWS, BGCMA, RMA, George LM, DEFF
1.2 Ensure estuary requirements are integrated into catchment processes to ensure healthy water quality	<ul style="list-style-type: none"> <li>Critical catchment maps updated</li> <li>Effective catchment management</li> <li>Good catchment water quality preserved</li> <li>Water use plan cognisant of estuarine water requirements</li> </ul>	<ul style="list-style-type: none"> <li>Twice a year</li> </ul>	NWA, NWA, MSA, CARA, NEM: BA, NEM: PAA	DWS, BGCMA, DEFF, George LM
1.3 Minimise pollution by addressing activities that lead to poor water quality	<ul style="list-style-type: none"> <li>Water quality (WQ) monitoring programme implemented</li> <li>Control of all polluting discharges, including scheduled clearing of conservancy/ septic tanks</li> <li>Environmental best practice irt effluent reduction, and urban drainage is implemented and enforced</li> <li>Waste management plan in place for peak visitor periods</li> </ul>	<ul style="list-style-type: none"> <li>Quarterly for WQ monitoring programme</li> <li>Twice a year</li> </ul>	NWA, CARA	RMA, George LM, DEFF, GRBR
1.4 Control the spread and densification of invasive alien plant species (IAPs)	<ul style="list-style-type: none"> <li>Detailed maps of invasive vegetation produced and priority areas identified</li> <li>IAPS eradication programme implemented</li> <li>Increased area / tonnes of IAPs removed</li> </ul>	<ul style="list-style-type: none"> <li>Annually</li> </ul>	CARA, NWA	DEFF, RMA, DEFF: WfW, GRBR

MANAGEMENT OUTPUT	PERFORMANCE INDICATOR	TEMPORAL SCALE (frequency)	RELEVANT LEGISLATION	RESPONSIBLE AUTHORITY
1.5 Ensure sustainable resource use through an effective level of compliance management	<ul style="list-style-type: none"> <li>No-take zone(s) established</li> <li>Status of fish and bait stocks determined</li> <li>Level of extractive use established, including subsistence use</li> <li>Increased patrols and monitoring conducted - compliance monitoring programme in place</li> <li>Signage created and erected in key public spaces</li> <li>Communication strategy developed for estuary users</li> <li>Reduced habitat degradation and inappropriate behaviour/activities</li> <li>Reduction in illegal activities</li> <li>Improved fish and invertebrate populations</li> </ul>	<ul style="list-style-type: none"> <li>Twice a year</li> </ul>	ICMA, MLRA	RMA, DEFF, CapeNature, GRBR
<b>2. BIODIVERSITY CONSERVATION</b>				
2.1 Ensure the conservation of estuarine habitats and indigenous species	<ul style="list-style-type: none"> <li>Level of protection/conservation status obtained</li> <li>Spatial zonation plan adopted, implemented and enforced</li> <li>Participation of land owners and stakeholders</li> <li>EMP and zonation plan included in GRBR Management Plan</li> <li>Educational signage installed</li> <li>Reduced habitat degradation and inappropriate behaviour/activities</li> </ul>	<ul style="list-style-type: none"> <li>Twice a year</li> </ul>	ICMA, NEMA, MLRA, LUPA, NEM: PAA, NEM:BA, WC BRA	RMA, CapeNature, GRBR, George LM, DWS
<b>3. LAND USE AND INFRASTRUCTURE DEVELOPMENT PLANNING</b>				
3.1 Ensure appropriate and sustainable coastal development in and around the Kaaimans River estuary, considering ecosystem services and sense of place	<ul style="list-style-type: none"> <li>Kaaimans EMP included in all relevant planning documents</li> <li>EMP included in management plan for GRBR</li> <li>Bylaws developed and gazetted</li> <li>No new development, infilling or land transformation in the EFZ, undeveloped margins of EFZ preserved</li> <li>Inspections undertaken, transgressors prosecuted, and remedial actions implemented</li> <li>Regional EAF partakes in development planning affecting the estuary</li> </ul>	<ul style="list-style-type: none"> <li>Annually</li> </ul>	ICMA, LUPA, WC BRA, MSA, NEMA	GRBR, George LM, DEA&DP and applicable authorities

MANAGEMENT OUTPUT	PERFORMANCE INDICATOR	TEMPORAL SCALE (frequency)	RELEVANT LEGISLATION	RESPONSIBLE AUTHORITY
<b>4. INSTITUTIONAL AND MANAGEMENT STRUCTURES</b>				
4.1 Ensure effective co-ordination of estuarine management responsibilities	<ul style="list-style-type: none"> <li>• Designated RMA and MOU signed</li> <li>• Kaaimans EMP adopted by RMA</li> <li>• Kaaimans EMP incorporated into GRBR management plan</li> <li>• Bylaws developed and gazetted to support zonation and protect EFZ</li> <li>• Regional Estuarine management function established</li> <li>• RMA official(s) are well-trained and knowledgeable</li> <li>• Regional EAF constituted and chaired by RMA</li> <li>• Good communication and working relationship established with implementing agencies, including DEA&amp;DP for ad hoc support</li> <li>• Regional EAF supported and meets on quarterly basis</li> <li>• RMA presence at critical forum meetings</li> <li>• Effective system of monitoring, report and review in place</li> <li>• Annual reporting undertaken by RMA</li> <li>• Funding secured for 5-year cycle</li> </ul>	<ul style="list-style-type: none"> <li>• Quarterly</li> </ul>	ICMA, MSA, NEMA, LUPA, NWA, WC BRA	RMA, George LM, Garden Route DM, applicable authorities
4.2 Define and enable co-operative governance	<ul style="list-style-type: none"> <li>• MOUs signed between RMA and spheres of government and participating agencies</li> <li>• Active collaboration of various institutions, private and civil stakeholders</li> <li>• Individual agencies knowledgeable and with capacity and resources to carry out mandated actions</li> <li>• Formal review of EMP every 5 years</li> </ul>	<ul style="list-style-type: none"> <li>• Annually</li> </ul>	MSA, NWA, ICMA, NEMA, WC BRA, CARA	RMA supported by all applicable authorities

<b>5. SOCIO-ECONOMIC CONSIDERATIONS</b>				
5.1 Regulate recreational use of the estuary	<ul style="list-style-type: none"> <li>• Informative signage and markers erected and maintained</li> <li>• Carrying capacities determined for each use and regulations gazetted</li> <li>• EFZ controls enforced and offenders prosecuted</li> <li>• Boat Launching issues resolved</li> <li>• If authorised, public launch site well-managed, management plan in place, and ongoing monitoring of boating activity</li> <li>• Communication strategy developed for estuary users/landowners</li> </ul>	• Annually	ICMA, WC BRA, MLRA, MSA	RMA, DEFF, George LM
5.2 Promote involvement of historically disadvantaged communities and individuals in the provision of tourism & recreation services	<ul style="list-style-type: none"> <li>• Livelihood opportunities identified for communities in close proximity to Kaaimans River estuary</li> <li>• Education and capacitation of personnel</li> <li>• EPIP programmes adopted and implemented</li> <li>• Employment of local communities</li> </ul>	• Annually	ICMA	RMA, George LM, Garden Route DM, SANParks
<b>6. EDUCATION AND AWARENESS</b>				
6.1 Promote high levels of public awareness and appreciation of the value of estuaries	<ul style="list-style-type: none"> <li>• Education &amp; awareness programme developed and implemented</li> <li>• Educational signage erected, and information disseminated</li> <li>• George estuaries webpage operational</li> <li>• Reduced habitat loss/degradation and disturbance, and inappropriate behaviour</li> <li>• Reduced illegal fishing activities</li> </ul>	• Every 3 years	ICMA, MLRA	RMA, GRBR, George LM
<b>7. DISASTER RISK MANAGEMENT</b>				
7.1 Disaster prevention and preparedness	<ul style="list-style-type: none"> <li>• Risk assessment portfolio compiled, and key areas identified</li> <li>• Health incident evacuation plan developed</li> <li>• Emergency response networks established</li> <li>• Integrated flood disaster management plan developed</li> <li>• All developments and activities are legally compliant</li> </ul>	• Annually	DMA, MSA, NEM: WA, NEMA, ICMA, NWA	RMA, George LM, Garden Route DM, DWS, Western Cape Dept of Transport: Public Works (WC DoT&PW),

	<ul style="list-style-type: none"> <li>• Estuarine issues incorporated in relevant disaster management planning documents</li> <li>• No future development within EFZ, and development setback from EFZ</li> </ul>			WC Dept of Local Gov: Disaster Management
7.2 Mitigate areas of high risk	<ul style="list-style-type: none"> <li>• Rehabilitation programme developed &amp; implemented</li> <li>• Risk areas included in regional disaster management plan and contingency plans developed</li> <li>• Critical infrastructure defended</li> <li>• Reduced incidence of pollution, and timeous implementation of mitigation</li> </ul>	<ul style="list-style-type: none"> <li>• Annually</li> </ul>	DMA, MSA, NEM: WA, NEMA, ICMA, NWA,	

## APPENDIX 4: PROJECT PLAN TEMPLATE

<b>ACTION</b>	Describe the action to be undertaken																																																											
<b>COMPLETION DATE</b>	Provide date of expected completion																																																											
<b>PERFORMANCE INDICATOR</b>																																																												
Requirements stipulated in policy and legislation																																																												
Available methods, protocols and best practice-guides																																																												
Spatial zonation consideration (e.g. limits/targets)																																																												
Detailed work plan	Task 1: Task 2: Task 3: Task 4:																																																											
Scheduling	<table border="1"> <thead> <tr> <th rowspan="2">TASK</th> <th colspan="9">TIME (months)</th> </tr> <tr> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> <th>7</th> <th>8</th> <th>9</th> </tr> </thead> <tbody> <tr> <td>1</td> <td style="background-color: #4F81BD;"></td> <td style="background-color: #4F81BD;"></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td></td> <td></td> <td style="background-color: #4F81BD;"></td> <td style="background-color: #4F81BD;"></td> <td style="background-color: #4F81BD;"></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td style="background-color: #4F81BD;"></td> <td style="background-color: #4F81BD;"></td> <td style="background-color: #4F81BD;"></td> <td></td> </tr> <tr> <td>4</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td style="background-color: #4F81BD;"></td> <td style="background-color: #4F81BD;"></td> </tr> </tbody> </table>	TASK	TIME (months)									1	2	3	4	5	6	7	8	9	1										2										3										4									
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Responsibilities for different tasks	E.g. Identify specific departments, personnel and/or service providers responsible for execution of this action																																																											
Monitoring and reporting plan	E.g. <ul style="list-style-type: none"> <li>Define data and information to measure in order to monitor performance indicator/s</li> <li>Specify frequency at which data/information should be collected/monitored</li> <li>Where and when to report on progress</li> </ul>																																																											
Human resource plan	<table border="1"> <thead> <tr> <th rowspan="2">HUMAN RESOURCE</th> <th colspan="4">WEEKS PER TASK</th> </tr> <tr> <th>1</th> <th>2</th> <th>4</th> <th>4</th> </tr> </thead> <tbody> <tr> <td>Staff member 1</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Staff Member 2</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Service provider</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	HUMAN RESOURCE	WEEKS PER TASK				1	2	4	4	Staff member 1					Staff Member 2					Service provider																																							
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