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Groot (Wes) River Estuarine Management Plan

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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 be 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 Groot (Wes) 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.

This EMP is deemed a Lower Level Plan (LLP) of the Garden Route National Park Management Plan (GRNP MP). The purpose of this EMP is to provide the Vision of the future desired state of the Groot (Wes) 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), South African National Parks (SANParks), as per the 2013 NEMP.

Geographical Boundaries

The Groot (Wes) River estuary is a medium-sized, temporarily open/closed estuarine system, within the warm temperate biogeographic region of South Africa, adjacent to Nature's Valley on the southern Cape coast. The size of the estuary, as defined by estuarine functional zone, is approximately 69.9 ha, extending over a length of 2.5 km.

Vision and Objectives

As the Groot (Wes) River estuary forms part of the GRNP, the Park's mission informs the vision for the estuary and is proposed as follows:

To strive for an integrated protected estuary, functionally linked to its neighbouring terrestrial, freshwater, and marine ecosystems, landscapes, and cultural heritage, that contributes to the well-being of present and future generations

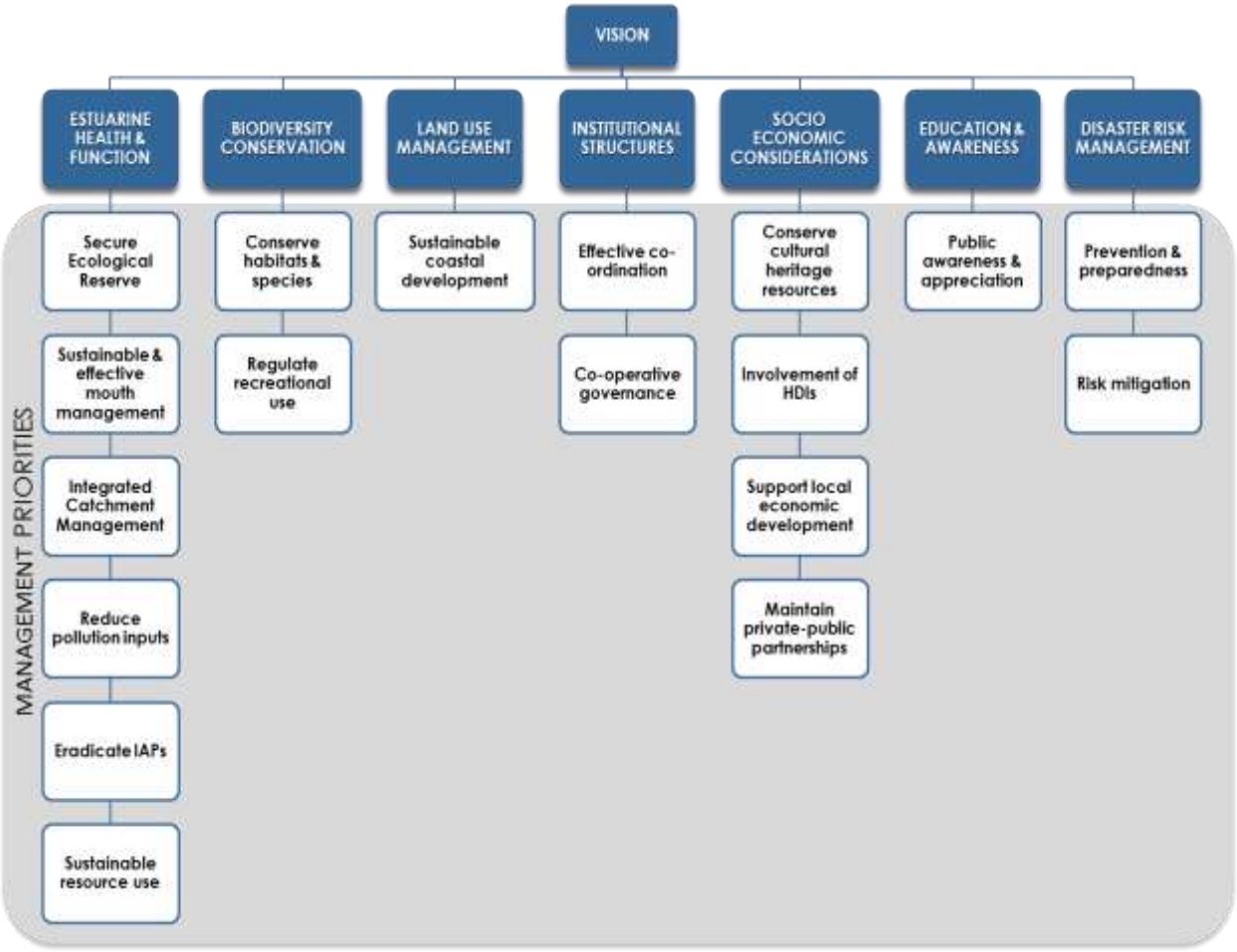
Strategic objectives, performance indicators and priorities for the Groot (Wes) River estuary are as follows:

	Sector / Category	Strategic Objective	Performance Indicator(s)	Priority
1	**Estuarine Health and Function**	1.1 The ecological health, natural patterns and processes of the Groot (Wes) River estuary are maintained and safeguarded, living resources are sustainably managed and estuary nursery function protected (including the long-term processes of natural variation in structure, function and composition over space and time)	• Maintain an A/B ecological condition • Ecological reserves for water quantity and quality are secured • Estuary requirements are integrated into catchment processes • Sewage treatment plant and reticulation system constructed • Pollution to the estuary is prevented • Scientifically sound, effective and sustainable estuary mouth manipulation • Ecological health of the estuary is preserved • Water quality programme(s) in place • Invasive alien plant species are eradicated • Monitoring programmes are in place • Sustainable use of living resources, and reduction in illegal activities • Reduced disturbance and degradation caused by recreational activities	**HIGH**
2	**Biodiversity Conservation**	2.1 The biodiversity of the Groot (Wes) River estuary is protected through appropriate and effective management actions	• EMP is adopted and incorporated into the GRNP MP • Spatial zonation plan is adopted and enforced • All developments are legal compliant and adopt environmental best practice / risk aversion approach • Estuarine habitats and species are protected against negative impacts • Healthy condition of all biological components • Species of Special Concern are identified and conserved through specific measures	**HIGH**
3	**Land-use and Infrastructure Planning and Development**	3.1 Impacts associated with developments, including infrastructure, and proposed changes in land-use are minimised	• All development surrounding and within the EFZ comply with environmental legislation and environmental best practice / risk aversion approach • No further development, transformation or disturbance to the EFZ	**HIGH**

4	**Institutional and Management Structures**	4.1 The Groot (Wes) River estuary is managed well through effective co-operative governance and a developed and well capacitated work force	• EMP is incorporated into the GRNP MP and municipal planning • SANParks is well capacitated with knowledgeable personnel • Committee functioning and effective • Mandated authorities and participating agencies are well capacitated, actions are fulfilled • Effective communication between responsible authorities	**MEDIUM**
5.	**Socio-Economic Considerations**	5.1 Cultural heritage sites, relics and the related intangible heritage resources associated with the Sout (Oos) River estuary, are supported and conserved and SANParks contributes to local economic development, economic empowerment and social development for historically disadvantaged communities	• Up to date inventory of cultural heritage assets and their appreciative value • Updated Cultural Heritage Plan with effective management guidelines • Historically Disadvantaged Individuals (HDIs) are included and benefitting from SANParks opportunities • Increased employment opportunities and employment of local suppliers and programmes • Environmental Protection and Infrastructure programmes (EPIP) implemented and effective • PPP are facilitated and formalised	**LOW/ MEDIUM**
6	**Education & Awareness**	6.1 Meaningful environmental education, awareness and outreach programmes are provided to nurture environmentally conscious members of society	• Value and importance of estuaries in all environmental education programmes and campaigns • Signage erected; information disseminated • Knowledgeable, environmentally-conscious staff	**MEDIUM**
7	**Disaster Risk Management**	7.1 Potential risks that could impact the Groot (Wes) estuary are reduced (inclusive of climate change impacts)	• No further transformation of the EFZ • No further development in high risk areas • Risk assessment portfolio completed • Integrated Safety and Security Plan (SSP) developed, inclusive of the GRNP Disaster Response and Recovery plan • Options for retreat investigated	**HIGH**

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 spatial zonation

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 location of the Groot (Wes) estuary within the GRNP, the proposed zonation of the estuary is dictated by the zonation scheme used by SANParks. Four zones and a special overlay are proposed, namely:

- Low Intensity Leisure Zone– This zone includes the mouth region of the estuary, the lower portion of the western shore and the camp site, where vehicle access and/or basic self-catering facilities are permitted.
- Quiet Zone – The majority of the estuary below the R102 bridge is largely natural in appearance, is undeveloped and with pedestrian and non-motorised boat access only.
- Primitive Zone – The remainder of the estuary above the R102 bridge bears wilderness qualities, with little or no impact on biodiversity patterns and processes.
- Sanctuary overlay - To protect the sensitive habitat of rare and specialised bird species, located above the R102 road bridge and the eastern slackwater arm of the estuary.

- Marine Controlled (Resource Use) Areas – Specified and strictly controlled use of marine living resources (i.e. fishing and bait collection) is allowed in the Groot (Wes) River estuary, Nature's Valley Beach and marine areas west of the estuary.

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.

General baseline information for the Groot (Wes) River estuary is limited. However, there are several ecological monitoring programmes and research projects currently in place by various role players (e.g. water quality, fish and birds, etc.) to improve this. As an outcome of the Reserve Determination Process, a set of minimum monitoring requirements are recommended to ascertain the current state, future pressures on the estuary, and detect any trends. These include details on the ecological component, monitoring action, temporal scale, as well as spatial, scale of monitoring proposed. Ecological specifications are also provided.

By and large, compliance monitoring within the GRNP is the responsibility of SANParks and is undertaken according to applicable legislation and policies and by means of law enforcement and compliance monitoring protocols internal to SANParks. Regular, compliance monitoring on the Groot (Wes) River estuary is in respect to Marine Living Resources Act (MLRA) regulations, with quarterly roving kreel surveys undertaken by the Natures Valley Trust to assess catch and effort.

The performance monitoring plan is proposed to be used by SANParks 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. A monitoring plan correlating with the proposed management priorities is included. It is also anticipated that SANParks will employ the Management Effectiveness Tracking Tool – South Africa (METT-SA) to assess the implementation of the EMP and effectiveness of the management of the estuary, in the context of GRNP management assessment.

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/authorities that are mandated to implement certain actions. While 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 of efficient and effective estuarine management and key role players in the management of the Groot (Wes) River estuary are identified.

The 2013 NEMP identifies SANParks as the RMA, responsible for the co-ordination of the implementation of the Groot (Wes) River EMP because the estuary falls within the GRNP. **It is noted that in the proposed amendments to the 2013 NEMP, such responsibilities remain allocated to the applicable conservation authority, in this case SANParks, in respect to**

estuaries in protected areas or part of a protected area expansion strategy. Ultimately the role of the RMA must be designated through formal signed agreement.It is strongly recommended that the existing Groot (Wes) tripartite management structure, and the Estuary Steering Committee, comprising SANParks, the Bitou LM, Nature's Valley Ratepayers Association and Nature's Valley Trust (NVT), and relevant arrangements remain in place for co-management of the Groot (Wes) River estuary going forward. While the majority of the implementation actions identified in this EMP are the responsibility of SANParks, specific actions remain the responsibility of mandated government agencies. Augmentation of capacity within SANParks could be provided through the recommended appointment of a regional estuarine co-ordinator within DEA&DP. This individual will play a pivotal co-ordinating role between all other implementing agencies and SANParks.

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. It is recommended that the existing Groot Estuary Steering Committee continue to fulfil the role of an EAF for the Groot (Wes), as well as for the Sout (Oos) River estuary, in terms of fostering stakeholder engagement, raising estuary related issues, and monitoring implementation of the EMPs.

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:

- Pollution inputs to the Groot (Wes) River estuary are reduced by upgrading and/or replacing degraded sanitation infrastructure in the EFZ;
- No new development, infilling or land transformation in the EFZ as well as the implementation of appropriate mitigation measures in respect to areas of high risk;
- Ensure sustainable and effective mouth management and the execution of science based artificial breaching / mouth manipulation;
- This EMP, it's spatial zonation and management objectives are incorporated into the updated GRNP MP;
- All data generated through regional and local projects and monitoring programmes should be sourced, collated and stored at SANParks to build up long –term datasets to facilitate adaptive estuarine management; 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.

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ACRONYMS AND ABBREVIATIONS

amsl	Above mean sea level
APO(s)	Annual Plans of Operation
BGCMA	Breede-Gouritz Catchment Management Agency
CARA	Conservation of Agricultural Resources Act (Act No. 43 of 1983)
CBA	Critical Biodiversity Area
CFR	Cape Floristic Region
CML	Coastal Management Line
CMP	Coastal Management Programme
CMS	Catchment Management Strategy
CPZ	Coastal Protection Zone
CSIR	Council for Scientific and Industrial Research
CWAC	Coordinated Waterbird Counts
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 Environment, Forestry and Fisheries
DEFF: WftC	Department of Environment, Forestry and Fisheries: Working for the Coast
DEFF: WfW	Department of Environment, Forestry and Fisheries: Working for Water
DHSWS	Department of Human Settlement, Water and Sanitation
DIN	Dissolved Inorganic Nitrogen
DIP	Dissolved Inorganic Phosphorous
DM	District Municipality
DMA	Disaster Management Act (Act No. 57 of 2002)
DO	Dissolved Oxygen
DSL	Development Setback Line
DST	Department of Science and Technology
DWS	Department of Water and Sanitation (now DHSWS)
EAF	Estuary Advisory Forum
EFZ	Estuarine Functional Zone
EIA	Environmental Impact Assessment
EMFIS	Western Cape Estuarine Management Framework and Implementation Strategy
EMP	Estuarine Management Plan(s)
EPIP	Environmental Protection and Infrastructure Programmes
GDP	Gross Domestic Product
GRNP	Garden Route National Park
GRNP MP	Garden Route National Park Management Plan
HDIs	Historically Disadvantaged Individuals
HWM	High Water Mark
I&AP(s)	Interested and Affected Parties
IAPs	Invasive Alien Plant Species
ICM	Integrated Coastal Management
ICMA	National Environmental Management: Integrated Coastal Management Act (Act No. 24 of 2008)
IDP	Integrated Development Plan
LED	Local Economic Development
LLP	Lower Level Plan
LM	Local Municipality
LUPA	Western Cape Land Use Planning Act (Act No. 3 of 2014)
MaintMP	Maintenance Management Plan
MEC	Member of the Executive Council
METT-SA	Management Evaluation Tracking Tool – South Africa

MLRA	Marine Living Resources Act (Act No. 18 of 1998)
MMP	Mouth Management Plan
MOU(s)	Memorandum of Understanding
MSA	Municipal Systems Act (Act No. 32 of 2000)
MUCP	Management Unit Clearing Plan
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 (2013)
NHRA	National Heritage Resources Act (Act No. 25 of 1999)
NTU	Nephelometric Turbidity Units
NVRA	Natures Valley Ratepayers Association
NVT	Natures Valley Trust
NWA	National Water Act (Act No. 36 of 1998)
PAES	Protected Area Expansion Strategy
PAMP	Protected Area Management Plan
PPP	Private Public Partnerships
RDM	Resource Directed Measures
REC	Recommended Ecological Category
RMA	Responsible Management Authority
RQO(s)	Resource Quality Objectives
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SANParks	South African National Parks
SAPS	South African Police Services
SAR	Situation Assessment Report
SDF	Spatial Development Framework
SSC	Species of Special Concern
SSP	Safety and Security Plan
SWOT	Strengths, Weaknesses, Opportunities and Threats analysis
TPC	Thresholds of Potential Concern
WQ	Water Quality
WRC	Water Research Commission
WUA	Water Users Associations
WUL	Water Use Licence

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 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.

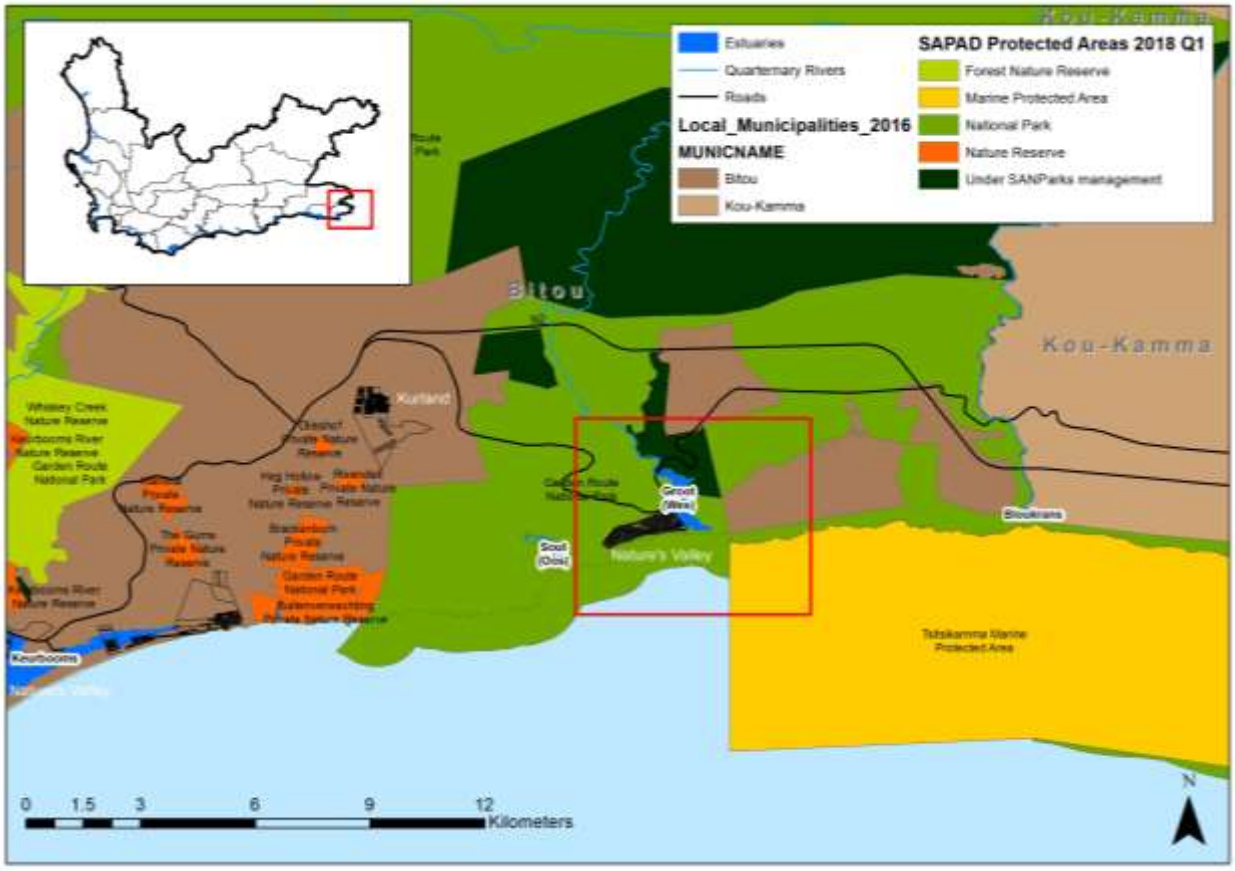

Figure 1: Location map of the Groot (Wes) River estuary within the Bitou Local Municipality and Garden Route National Park

This document represents the first-generation Estuarine Management Plan (EMP) for the Groot (Wes) River estuary developed under the auspices of the Western Cape EMFIS

and brings the Garden Route National Park Management Plan (GRNP MP) in line with the 2013 NEMP in respect to provisions of estuarine management. This EMP is deemed a sector plan of the GRNP MP. The Groot (Wes) River estuary is located in the Bitou Local Municipality (LM), within the Tsitsikamma (De Vasselot) Section of the Garden Route National Park (GRNP), adjacent to the coastal settlement of Nature's Valley (Figure 1 above).

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 bring conducted at five-yearly intervals.

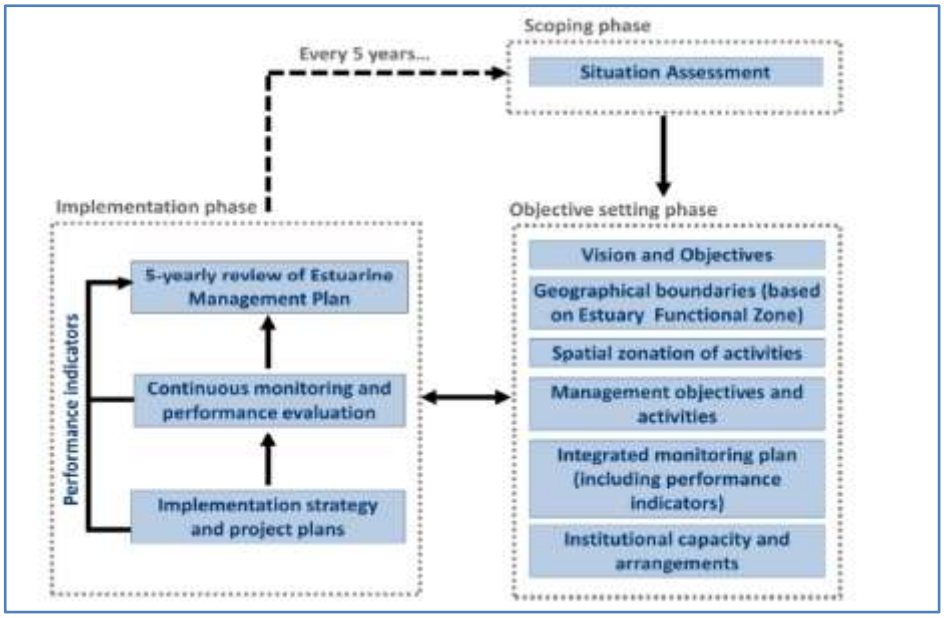

Figure 2: A framework for integrated estuarine management in South Africa

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 Groot (Wes) 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. These aspects of the EMP are founded on the vision, purpose, values and objectives of the GRNP MP (SANParks, 2012a).

Estuarine management is by definition 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 protected area planning processes through the GRNP MP, as well as the municipal Integrated Development Planning (IDP) and Spatial Development Framework (SDF) processes.

1.3 Mandate and responsibilities of the RMA

The co-ordination of the implementation of the EMP vests with the RMA (i.e. South African National Parks (SANParks)) as per the 2013 NEMP. One of the strategic objectives of this EMP is to promote and facilitate the cooperative governance relationship between SANParks and the Groot (Wes) estuary advisory forum (EAF) (Estuary Steering Committee) (See Section 8), as proposed in the 2013 NEMP.

The designated RMA is responsible for the development of the EMP and the overall co-ordination 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; and
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, in this instance, the existing Groot (Wes) Estuary Steering Committee.

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 Groot (Wes) 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 Groot (Wes) River estuary is a medium-sized, temporarily open/closed estuarine system, within the warm temperate biogeographic region of South Africa, adjacent to Nature's Valley on the southern Cape coast. The size of the estuary, as defined by estuarine functional zone, is approximately 69.9 ha, extending over a length of 2.5 km. The geographical boundaries of the Groot (Wes) River estuary, delineating the Estuarine Functional Zone (EFZ), are provided in Table 1 and illustrated in Figure 3.

Table 1: The geographical boundaries of the Groot (Wes) River estuary

DOWNSTREAM BOUNDARY:	Estuary mouth 33°58'53.41"S; 23°34'8.32"E
UPSTREAM BOUNDARY:	Head of estuary 33°57'49.27"S; 23°33'23.77"E
LATERAL BOUNDARIES:	5 m contour above Mean Sea Level along each bank

Figure 3: Geographical boundaries of the Groot (Wes) River estuary EFZ based on the 5 m topographical contour

3 SYNOPSIS OF THE SITUATION ASSESSMENT

Catchment Characteristics

The Groot (Wes) River estuary falls within the Bitou LM, which experiences a warm and temperate climate. Average daily temperatures range from 10°C in winter to 22°C in summer. Highest rainfall occurs during the month of August (average 80 mm), while the lowest rainfall occurs in February (average 28 mm). The size of the estuary, as defined by the estuarine functional zone, is approximately 69.9 ha with an open water area of 39.28 ha and extending over 2.5 km in length.

The underlying geology of the Groot (Wes) River estuary comprises Bokkeveld shales in the upper region, while the bottom of the estuary is composed of alluvial and aeolian sands. The lower western shore consists mainly of Tertiary and Quaternary alluvial and aeolian deposits expect in the head where the Gydo Formation of the Bokkeveld Group is exposed.

Bitou has one of the largest percentages of formally protected land of any municipality in South Africa, with some 50 % of the municipality formally protected under the jurisdiction of SANParks and CapeNature. These areas include the Garden Route National Park and comprises mountains, inland plateaus, a coastal corridor and a marine reserve. At least nine Nature Reserves are located in Bitou, including the former Tsitsikamma National Park and Keurbooms River Nature Reserve. The remaining 50 % of the municipal area is made up of extensive agriculture (veld management and stock farming), intensive agriculture (crop farming), and to a lesser extent wetland and river corridors, Critical Biodiversity Areas and urban development.

Abiotic Function

In terms of the hydrology, there has been a 13 % reduction in the mean annual runoff (MAR) to the estuary between the Reference (12.8 x 10^6 m^3) and Present state (11.1 x 10^6 m^3). River inflow has been reduced in both low and high flow months with a related shift in the onset of the high flow period. A small weir that supplies water to the Natures Valley Township is situated about 200 m upstream from the present national road bridge.

The Groot (Wes) River estuary is categorised as a temporarily open/closed estuarine system. The estuary is about 2 km in length from the mouth to the road bridge that forms the upper limit of tidal exchange when the estuary is wide open. The system is 300 to 400 m wide at its widest point with average depth is about 1.0 m. However, depths of 2.0 m have been recorded in the middle reaches and a maximum depth of 3.3 m in the upper reaches. The western shore (Natures Valley) is low lying and prone to flooding, whereas the eastern shore is steeply incised. The estuary mouth is located at the eastern end of the vegetated sand bar, where it has formed a sand delta. Artificial breaching occurs relatively frequently to prevent flooding of low-lying properties a few times a year. Artificial stabilization of the sandbar at the mouth may also have assisted in keeping the mouth of the estuary open.

The system exhibits both horizontal and vertical salinity gradients, largely attributed to the perched nature of the estuary and little tidal exchange. Recorded surface salinities ranged from 5.7 to 8, and bottom salinities measured between 19.5 and 35. Similarly temperature value vary according to depth and distance from the mouth, with cooler surface waters occurring in the upper reaches, warmer bottom waters occurring at the mouth. The Groot (Wes) is a typical black water (peat-stained), oligotrophic, acidic system. pH values vary depending on the state of the tide and the volume of influent freshwater. Turbidity is low in this system, but light penetration is reduced by the tannin-stained river inflow. The system is low in nutrients.

Biotic Function

Very little information is available on the microalgae of the Groot (Wes) River estuary. Various species of filamentous algae have been recorded in the system, namely, *Stilophera* sp., *Chaetomorpha* and two species of *Enteromorpha*.

Very little information is available on the invertebrate of the Groot (Wes) River estuary. Historical records of zooplankton were reported very low relative to other estuaries in the region with 42 species with a mean zooplankton biomass of 31.01 mg/m^3 reported. Overall, the Groot (Wes) River estuary is not particularly rich in aquatic invertebrates.

Fish data on the Groot (Wes) River estuary is limited. Seventeen species have been recorded in the system, predominantly marine and estuarine dependant species. In general, the Groot (Wes) River estuary appears to serve as a viable habitat for both estuarine-resident and estuarine-associated marine species.

There is little information available on the avifauna of the Groot (Wes) River estuary. While a relatively high number of bird species have been recorded, the number of birds is relatively low indicating that the estuary is not prime bird habitat. While there is little suitable foraging habitat for waders, the system supports a diversity of piscivorous birds such as fish eagles, cormorants and kingfishers. The estuary also appears to provide roosting habitat for gulls and terns

Ecological Health Status, Importance, Recommended Future State, and Ecosystem Services

The ecological health of the Groot (Wes) River estuary is in an A/B Category that is 'unmodified or approximates natural condition' or that only has a few large changes, most of which are natural. The Estuary's natural processes and functionality have been retained and the natural processes should not be modified. The Groot (Wes) River estuary forms part of the core set of priority estuaries in need of protection to achieve biodiversity targets in the National Estuaries Biodiversity Plan. The Groot (Wes) River estuary has statutory protection as it is situated in the Garden Route National Park (Tsitsikamma section). Based on the high ecological and conservation importance the recommended ecological condition for the Groot (Wes) River Estuary remains a Category A.

Estuaries typically provide a range of services that have economic or welfare value. However, it is evident that the Groot (Wes) River estuary provides limited ecosystem

services due to its small size and the fact that it falls within the boundaries of a protected area.

Impacts and Potential Impacts

Although the Groot (Wes) River estuary is in a relatively pristine condition, the environmental processes, activities and developments that pose a threat to the Groot (Wes) River estuary include the following:

- *Environmental hazards* – drought, floods and climate change impacts;
- *Land-use and infrastructure development* – road infrastructure and development occur within the estuary functional zone and related loss of habitat and tidal flows; forestry occurs in the catchment;
- *Water quality and quantity issues* – altered flow and flood regime due to the weir and abstraction of water, the degraded sanitation system is causing water quality issues, and artificial breaching impacts on the natural dynamics of the estuary; and
- *Exploitation of resources* - Limited fish and bait collecting takes place within the estuary.

Socio-economic Context

The Groot (Wes) River estuary and its catchment falls within the Garden Route National Park (Tsitsikamma Section) of the Bitou LM. The Bitou LM has a total estimated population of 59 157 (StatsSA, 2016) and an average growth rate of 5.22% (StatsSA, 2011), making up approximately 9.67% of the total population of the Garden Route District Municipality (DM) (StatsSA, 2016).

Of the population aged 20 years and older, 2% have no form of schooling (StatsSA, 2016). There are 21 914 households in the Bitou LM, of which 61% have access to piped water within their dwellings (StatsSA, 2016). Electricity for lighting is provided to 97% of all households (StatsSA, 2016). Approximately 23 599 people are economically active, with an overall unemployment rate of 30.1%, and a youth unemployment rate of 37.9% (StatsSA, 2011). Approximately 26% of the population earns an average household income of less than R38 200 per annum, while a further 18.1% receive no income at all (StatsSA, 2011). Ward 1 (where the Groot (Wes) River and its catchment falls) of the Bitou LM, which has a total population of 6 298 people (StatsSA, 2011). The Ward is made up of Covie, Natures Valley, Kurland, Crags and Keurbooms, and contains the most informal settlements in the Municipal area (Bitou LM IDP, 2017).

At the end of 2015, the Bitou LM contributed 7.3 % (R 2 189 billion) to the Garden Route DM Gross Domestic Product (GDP), and GDP growth of 3.6 % annum over the period of 2005 – 2015 (Bitou LM IDP, 2017). The municipal economy is based on wholesale and retail trade, catering and, accommodation; construction; finance, insurance, real estate and business services; community, social and personal services; and the agriculture and fisheries sectors, and all of these are driven by tourism, as the main economic driver (Bitou LM IDP, 2017). An important objective for the Bitou LM is diversification of the economy as it is largely based on tourism. The Municipality aims to

increase opportunities for permanent residency, improve IT platforms, road and air travel infrastructure (Bitou LM IDP, 2017).

The direct and indirect benefits derived from estuarine ecosystems services are manifested directly or indirectly in tangible income and employment. There are no known subsistence communities that rely on the natural resources of the Groot (Wes) River estuary for their livelihoods or income generation. The socio-economic value of the system lies within the pristine and unspoilt environment that attracts tourism into the area. This value is limited by the small size of the developed area, and restrictions placed on future development to protect that unique character and aesthetics of the area. Nature's Valley has been identified as having low social and development needs, with only the provision of schooling priority development project for the broader area. As tourism is a major draw card for the region, eco–adventure activities and other sectors related to tourism, such as catering, and accommodation, retail, transport and business services could be investigated as avenues for Local Economic Development (LED) opportunities. The Nature's Valley Trust (NVT) is a small proactive community-driven Non-Profit Organisation that contributes to proactively maintaining the environmental integrity of Nature's Valley and the surrounding area. The NVT is actively involved in research on the system in collaboration with SANParks, and numerous other affiliations.

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 responsible management authority per estuary, in this instance the SANParks. Currently, the estuary is jointly managed by a tripartite management structure comprising SANParks, Bitou LM and Natures Valley Ratepayers Association, led by SANParks as the conservation authority. Key legal instruments that are applicable to estuarine management are then described, and include national, provincial and local management documents, including the Garden Route National Park and (former) Tsitsikamma National Park protected area plans, and a draft mouth management plan for the Groot (Wes) estuary.

Opportunities and Constraints

A Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis for the management of the Groot (Wes) River estuary was undertaken. One of the main strengths is that the estuary, and its mostly undeveloped catchment, fall within the Tsitsikamma Section of the Garden Route National Park, and as such, the system falls under SANParks administration. Nonetheless, there is strong community interest in terms of environmental issues and sense of ownership leading to effective co-management of the estuary by the tripartite. Nature's Valley is regarded as a holiday town where there is no future planned expansion or additional development apart from upgrades to the bulk water supply and long-term upgrade to the sewage infrastructure. The near pristine estuary has undeniable and well-appreciated recreational and aesthetic value. In terms of weakness, some habitat has been lost as a result of development within the estuarine functional zone, and water pollution is a frequent occurrence due to septic

tanks and degraded infrastructure. The system is periodically artificially breached to prevent inundation of septic tanks and properties. In addition, water is abstracted from the system for potable use by means of a weir at the head of the estuary. Opportunities exist to ensure well-managed artificial breaching, increase our knowledge of the system through scientific research, and increase employment opportunities through eco-tourism, education and environmental management initiatives for the estuary. The main threats to the Groot (Wes) River estuary include potential sewage pollution related to septic tanks and degraded sanitation infrastructure in the EFZ, additional water abstraction and consequences for river inflow and natural flooding regimes, and poorly managed artificial breaching in respect to flood control. These aspects will have significant consequences for the functioning of the estuary.

In terms of opportunities for restoration, the priority actions to be taken to achieve the Recommended Ecological Category (REC) of an A (as determined by the Reserve Determination study), include restoring base flow to the system, improving mouth management and reducing/removing fishing effort and bait collection.

Information Gaps and Recommendations

Several research projects and programmes are currently underway by the various institutions involved in the management of the Groot (Wes) River estuary, to generate additional scientific information and to monitor the condition of the estuary, in respect to both natural variation (e.g. fish and bird populations) and human impacts (e.g. pollution from septic tanks). Such research projects and ecological monitoring should be undertaken according to the recommended monitoring programme to fulfil the necessary data requirements for the estuary. In addition, all data generated through regional and local projects and monitoring programmes should be sourced, collated and stored at a central repository (i.e. at SANParks) to build up long –term datasets to facilitate adaptive estuarine management.

4 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 as well as the GRNP 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

An integrated protected area that effectively conserves a functionally linked mosaic of diverse terrestrial, freshwater, estuarine and marine ecosystems, landscapes, and cultural heritage, representative of the Garden Route, that contributes to the well-being of present and future generations.

The 2016 Western Cape Provincial Coastal Management Programme (PCMP), 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

As the Groot (Wes) estuary forms part of the GRNP, the Park's vision informs the vision for the estuary[1] and is detailed as follows:

To strive for an integrated protected estuary, functionally linked to its neighbouring terrestrial, freshwater, and marine ecosystems, landscapes, and cultural heritage, that contributes to the well-being of present and future generations

[1] Minutes of the Matjies, Sout (Oos) and Groot (Wes) Stakeholder meeting, 15th November 2017, SANParks Offices, Stormsriver

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 collective objective for estuarine management, as detailed in the GRNP MP (SANParks, 2012a) is detailed as follows:

Rehabilitation and maintenance of processes to achieve ecosystem conservation in estuarine systems

The strategic objectives for the Groot (Wes) River estuary were discussed at the stakeholder meeting. Based on the feedback received from the participants, the strategic objectives for the Groot (Wes) River estuary align with the following identified sectors or categories of issues (Figure 4, Table 2):

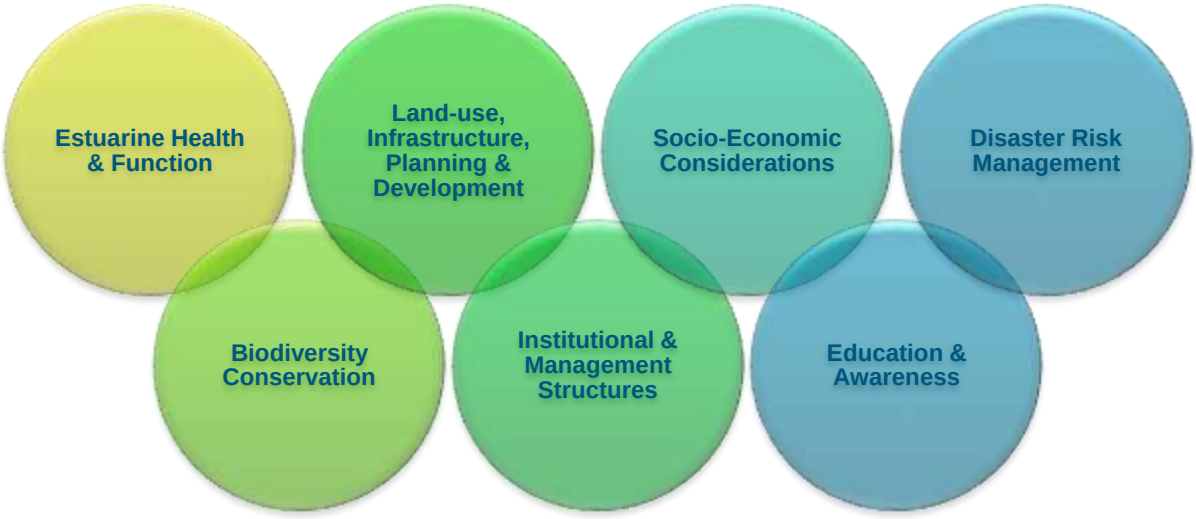

Figure 4: Sectors or categories of issues relevant to the management of the Groot (Wes) River estuary

According to these categories, the strategic objectives for the Groot (Wes) River estuary are as follows (Table 2):

Table 2: Strategic Objectives for management of the Groot (Wes) River estuary, their indicators and level of priority

	Sector / Category	Strategic Objective	Performance Indicator(s)	Priority
1	**Estuarine Health and Function**	1.1 The ecological health, natural patterns and processes of the Groot (Wes) River	• Maintain an A/B ecological condition	**HIGH**

		estuary are maintained and safeguarded, living resources are sustainably managed and estuary nursery function protected (including the long-term processes of natural variation in structure, function and composition over space and time)	• Ecological reserves for water quantity and quality are secured • Estuary requirements are integrated into catchment processes • Sewage treatment plant and reticulation system constructed • Pollution to the estuary is prevented • Scientifically sound, effective and sustainable estuary mouth manipulation • Ecological health of the estuary is preserved • Water quality programme(s) in place • Invasive alien plant species are eradicated • Monitoring programmes are in place • Sustainable use of living resources, and reduction in illegal activities • Reduced disturbance and degradation caused by recreational activities	
2	**Biodiversity Conservation**	2.1 The biodiversity of the Groot (Wes) River estuary is protected through appropriate and effective management actions (including the long-term processes of natural variation in structure, function and composition over space and time)	• EMP is adopted and incorporated into the GRNP MP • Spatial zonation plan is adopted and enforced • All developments are legal compliant and adopt environmental best practice / risk aversion approach • Estuarine habitats and species are protected against negative impacts • Healthy condition of all biological components • Species of Special Concern are identified and conserved through specific measures	**HIGH**
3	**Land-use and Infrastructure Planning and Development**	3.1 Impacts associated with developments, including infrastructure, and proposed changes in land-use are minimised	• All development surrounding and within the EFZ comply with environmental legislation and environmental best practice / risk aversion approach • No further development, transformation or disturbance to the EFZ	**HIGH**
4	**Institutional and Management Structures**	4.1 The Groot (Wes) River estuary is managed well through effective co-operative governance and a developed and well	• EMP is incorporated into the GRNP MP and municipal planning • SANParks is well capacitated with knowledgeable personnel • Committee functioning and effective	**MEDIUM**

		capacitated work force	• Mandated authorities and participating agencies are well capacitated, actions are fulfilled • Effective communication between responsible authorities	
5	**Socio-Economic Considerations**	5.1 Cultural heritage sites, relics and the related intangible heritage resources associated with the Sout (Oos) River estuary, are supported and conserved and SANParks contributes to local economic development, economic empowerment and social development for historically disadvantaged communities	• Up to date inventory of cultural heritage assets and their appreciative value • Updated Cultural Heritage Plan with effective management guidelines • Historically Disadvantaged Individuals (HDIs) are included and benefitting from SANParks opportunities • Increased employment opportunities and employment of local suppliers and programmes • Environmental Protection and Infrastructure programmes (EPIP) implemented and effective • Private Public Partnerships (PPP) are facilitated and formalised	**LOW / MEDIUM**
6	**Education & Awareness**	6.1 Meaningful environmental education, awareness and outreach programmes are provided to nurture environmentally conscious members of society	• Value and importance of estuaries in all environmental education programmes and campaigns • Signage erected; information disseminated • Knowledgeable, environmentally-conscious staff	**MEDIUM**
7	**Disaster Risk Management**	7.1 Potential risks that could impact the Groot (Wes) estuary are reduced (inclusive of climate change impacts)	• No further transformation of the EFZ • No further development in high risk areas • Risk assessment portfolio completed • Integrated Safety & Security Plan (SSP) developed, inclusive of the GRNP Disaster Response and Recovery plan • Options for retreat investigated	**HIGH**

Based on feedback from SANParks officials from the second stakeholder meeting on the 30th of August 2018[2], the Garden Route Protected Area Management Plan (PAMP) is undergoing a major update and will be finalised in 2019. Any changes to the PAMP (e.g.

[2] Minutes of the 2nd stakeholder meeting for the Matjies, Sout (Oos) and Groot (Wes) estuaries, 30 August, 2018, SANParks offices, Storms River.

vision, management objectives and park zonation) may directly affect the Groot (Wes) EMP, which will therefore need to be updated accordingly.

5 PRIORITY MANAGEMENT OBJECTIVES AND ASSOCIATED ACTIVITIES

After the review of the background information, as well as after conducting stakeholder engagement, a SWOT analysis of the Groot (Wes) River estuary under the current management practices was prepared.

Table 3: SWOT Analysis

STRENGTHS *(highlights, uniqueness?)*	**WEAKNESSES** *(what could you improve?)*
• Undeveloped, sparsely populated landscape • Near pristine estuarine system • Vast majority of catchment is protected within the Garden Route National Park • High quality natural environment is the driver for economic activity through tourism • Strong impetus from District and Local municipalities for the conservation of the environment, including the coastline and estuaries • No new development proposed in Nature's Valley (apart from upgrade of bulk water infrastructure) and there are strict controls on existing developments • Recreational and Aesthetic value • Strong community involvement and commitment to environmental management (e.g. NVT) • Existing estuary forum within Nature's Valley • Good co-governance of the estuary through the tripartite system between Bitou LM, Nature's Valley Rate Payers Association and SANParks • Research initiatives conducted by Nature's Valley Trust in collaboration with SANParks • Deployment of Working for the Coast by SANParks to assist with pollution management when required.	• Some development in the EFZ • Loss of estuarine habitat as a result of development • Water pollution related to septic tanks and degraded sanitation infrastructure in the EFZ • Forestry, presence of weir and abstraction of water reduces flow to the estuary • Flooding of low-lying properties during high rainfall and high-water levels • Frequent artificial breaching to prevent inundation of conservancy tanks and properties • Disturbance by invasive alien plants

• Deployment of Working for Water by SANParks to control invasive alien plants throughout the catchment (rehabilitation)	
OPPORTUNITIES *(Opportunities for positive change)*	**THREATS** *(what could prevent the EMP from working?)*
• Long term plans to switch to waterborne sewage • Well managed artificial breaching • Opportunities for employment through eco-tourism, education and environmental management initiatives for the estuary	• Additional abstraction of water for potable use • Further decline in water quality from sewage system (sewage pump stations) and Nature's Valley town • Overexploitation of living resources (prawn pumping, fishing) • Possible poor management of artificial breaching • Climate change and loss/change of aquatic ecosystem

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

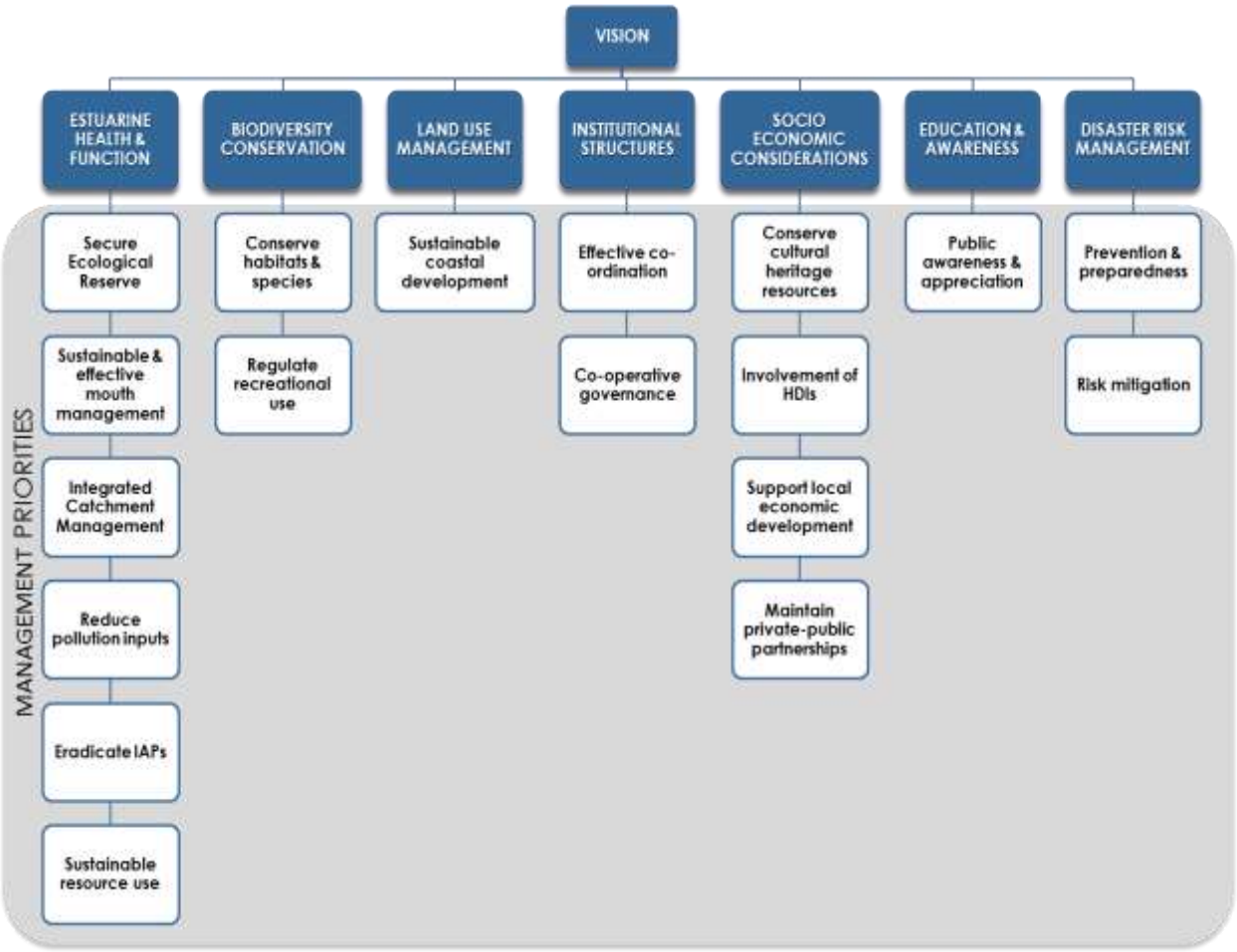

Figure 5: Summary of priority management objectives per management sector

5.1 Estuarine Health and Function

<u>Strategic Objective 1</u>: The ecological health, natural patterns and processes of the Groot (Wes) River estuary are maintained and safeguarded, living resources are sustainably managed and estuary nursery function protected (including the long-term processes of natural variation in structure, function and composition over space and time)

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
Management Objective 1.1: Secure adequate quantity and quality of freshwater input to maintain ecosystem health and functioning					
a.	Lobby Department of Human Settlement, Water and Sanitation (DHSWS) Minister to sign off the recommended freshwater reserves	National Water Act (NWA)	• Meetings held; correspondence written • Recommended reserve(s) signed off • Water resource classified • Reserves secured • Ecological condition maintained as A/B	HIGH	Breede-Gouritz Catchment Management Agency (BGCMA,) SANParks (RMA)
b.	Once classification study signed off, follow up on implementation of water resource classification process	NWA	• Meetings held; correspondence written • Recommended reserve(s) signed off • Water resource classified • Reserves secured • Ecological condition maintained as A/B	HIGH	BGCMA, SANParks (RMA)
c.	Install flow gauging probe in the catchment above the estuary (if identified as priority estuary) *	NWA	• The importance of the Groot (Wes) estuary identified • Flow gauging probe installed • Data generated and reported on	If Groot (Wes) identified as priority estuary	DHSWS, Department of Environment, Forestry and Fisheries (DEFF), BGCMA

d.	Obtain regular updates of monitoring activities of DHSWS and local authorities and alert relevant authorities on changes	NWA, Municipal Systems Act (MSA)	• Data from local authorities and DHSWS	MEDIUM	SANParks (RMA), NVT
e.	Motivate for the construction of a sewage treatment plant and reticulation system to reduce ongoing risk of contamination from septic tanks in the floodplain	NWA	• Sewage treatment plant and reticulation system constructed • Seepage/release of effluent prevented • Reduced risk of nutrient loading & faecal contamination • Improvement in water quality	HIGH	Bitou LM
f.	Monitor and report on the status of the estuary annually	NWA	• Annual report submitted to SANParks and Committee • Data incorporated into EMP 5-year review	HIGH	SANParks (RMA) supported by NVT and Bitou LM
g.	Catchment water quality (WQ) to be summarised and reported on annually	NWA	• Annual report submitted to SANParks and Committee	MEDIUM	DHSWS, BGCMA
h.	Undertake full Resource Directed Measures (RDM) monitoring every 3 years	ICMA, NWA	• Required basic monitoring undertaken • Data produced and reported on • Data incorporated into EMP 5-year review	LOW	DHSWS, BGCMA, SANParks (RMA), NVT (funding from Water Research Commission (WRC), Department of Science and Technology (DST))
Management Objective 1.2: Ensure sustainable and effective mouth management					
a.	Monitor natural mouth dynamics (in partnership with neighbouring land owners and other Interested and Affected Parties (I&APs))	NWA (RDM)	• Mouth state documented • Photographic database generated	HIGH	NVT, SANParks (RMA)
b.	Undertake artificial breaching in accordance with an approved Mouth Management Plan (MMP) and proposed	ICMA	• MMP approved • MaintMP developed and approved	HIGH	SANParks (RMA)

	Maintenance Management Plan (MaintMP) (See Appendix 1 - SANParks, 2017)		• Execution of science based artificial breaching / mouth manipulation		
c.	Engage estuary users in respect to MMP and proposed MaintMP in respect to impacts on uses and zones	ICMA	• Stakeholder meetings undertaken • Stakeholder input received and minuted • Minutes of meetings	HIGH	SANParks (RMA)
Management Objective 1.3: Ensure estuary requirements are integrated into catchment processes to ensure healthy water quality					
a.	Catchment land use map developed and updated annually	NWA	• Updated land use map produced every year	MEDIUM	Department of Agriculture, Land Reform and Rural Development (DALRRD)
b.	Land use and effluent management included in the Catchment Management Strategy (CMS)	NWA	• CMS identifies sources of pollution (land use and effluent) to the estuary and provides mitigation strategies	LOW	BGCMA
c.	CMS implementation monitored monthly at strategic sites (DHSWS).	NWA	• Required basic monitoring undertaken • Data produced and reported on	MEDIUM	DHSWS
d.	Water use plan updated on an annual basis	NWA	• Updated water use plan produced every year	HIGH	DHSWS (Resource protection)
e.	Participate in BGCMA activities, and table estuary issues	NWA	• Meetings attended • Minutes of meetings	MEDIUM	SANParks (RMA)
f.	SDF and environmental overlay updated as and when required	MSA	• Updated SDF and overlays produced	MEDIUM	Bitou LM
Management Objective 1.4: Pollution inputs to the Groot (Wes) River estuary are reduced					
a.	Water level and basic water quality in estuary monitored at designated sites on a weekly basis, taking Resource Quality Objectives (RQOs) into account	NWA	• Estuary WQ database maintained to facilitate long term database • EMP informed by monitoring results going forward	HIGH	NVT, SANParks (RMA)

b.	Continue with water quality monitoring programme that addresses possible threats and sources of pollution and health risk in the estuary (inclusive of monitoring strategic sites on a regular basis, mitigation measures, communication protocol)	NWA	• Pollution sources identified • Mitigation measures implemented • Improved water quality • Communication protocol established • Data made available to Estuary Steering Committee	HIGH	Bitou LM, DHSWS, SANParks (RMA), BGCMA
Management Objective 1.5: Control and where possible eliminate, alien vegetation to facilitate re-establishment of natural biodiversity pattern and process in invaded areas					
a.	Map distribution and abundance of invasive alien plant species (IAPs) in and adjacent to the GRNP	Conservation of Agricultural Resources Act (CARA), NWA, National Environmental Management: Protected Areas Act (NEM: PAA)	• Species distribution map developed	MEDIUM	SANParks (RMA), DHSWS, DALRRD, Department of Environment, Forestry and Fisheries: Working for Water (DEFF: WfW)
b.	Prioritise areas and activities according to current available budget, including follow up maintenance		• Priority areas identified • Priority actions identified • Budget secured	MEDIUM	
c.	Implement Management Unit Clearing Plan (MUCP) including the response for aquatic plant species in the river and estuary		• MUCP/Alien Plant Clearing Plan implemented • River course and estuary clear of IAPs • % total area cleared of IAPs	MEDIUM	
Management Objective 1.6: Ensure and promote sustainable use of living resources within and adjacent to the Groot (Wes) River estuary					
a.	Continue to assess and quantify extractive resource use activities on the estuary through relevant monitoring programmes (e.g. quarterly roving creel surveys)	MLRA, ICMA	• Monitoring programme developed and implemented • Counts of number of harvesters and users • Monitoring and compliance patrols undertaken • Number of permit holders • Extractive use recorded	MEDIUM	SANParks (RMA), Natures Valley Trust (NVT)
b.	Continue with monitoring of fish and bait stocks (Including recruitment) and	MLRA	• Monitoring programmes established	MEDIUM	NVT

	establish carrying capacity for resource use, taking RQOs into account		• Carrying capacity established and enforced • Research projects commissioned • Number of joint/ research projects • Reports submitted to DEFF • Report submitted to SANParks and Committee		
c.	Collate monitoring results (catch and effort) and compile reports on sustainability of marine resource use (including the estuary) to DEFF	MLRA, ICMA		MEDIUM	SANParks (RMA)
d.	Continue to liaise and cooperate with other research agencies on joint projects for the Groot (Wes) estuary	MLRA, ICMA		MEDIUM	SANParks (RMA), NVT
e.	Deploy human resources to enforce existing legislation under the MLRA (e.g. permits, catch restrictions, gear)	MLRA, ICMA	• Increased patrols and monitoring conducted • Number of joint operations conducted • Incidents of poaching reduced • Transgressors prosecuted • Sustainable harvesting of marine living resources • Healthy populations/recovery of target species	LOW	SANParks (RMA), DEFF
f.	Initiate and enforce ban on night fishing	MLRA, ICMA		When adopted	DEFF/ SANParks (RMA)
g.	Combined compliance monitoring and enforcement operations need to be planned to address illegal activities	MLRA, ICMA,		MEDIUM	South African Police Service (SAPS), DEFF, DEA&DP, SANParks (RMA)

5.2 Biodiversity Conservation

Strategic Objective 2: The biodiversity of the Groot (Wes) River estuary is protected through appropriate and effective management actions (including the long-term processes of natural variation in structure, function and composition over space and time)

Table 5: Management Objectives and Actions for Biodiversity Conservation

	Proposed Activity/Action	Relevant Legislation	Performance Indicator	Priority	Responsibility
Management Objective 2.1: Ensure the conservation of natural estuarine habitats and indigenous species					
a.	Adopt, implement and enforce spatial zonation plan	ICMA, NEM: PAA	• EMP and zonation plan adopted by SANParks • EFZ controls enforced and offenders prosecuted • Corrective action undertaken • No permanent development, infilling or land transformation of EFZ • All developments comply with environmental legislation and environmental best practice / risk aversion approach • Reduced habitat loss/degradation and disturbance, and inappropriate behaviour	HIGH	SANParks (RMA)
b.	Ensure that all proposed developments adhere to the full suite of relevant environmental legislation, particularly the coastal management line and associated development controls	ICMA, Land Use Planning Act (LUPA), National Environmental Management Act (NEMA), NWA, NEM: PAA, National Environmental Management: Biodiversity Act (NEM:BA), etc.		HIGH	Bitou LM, SANParks (RMA), DEA&DP, Natures Valley Ratepayers Association (NVRA)
c.	Continue with seasonal (summer/winter) monitoring of coastal bird populations, taking RQOs into account	NWA (RDM), NEM:BA, MLRA	• Indicator species identified • Species list and abundance data produced and reported on • Database developed • Conservation value established • Monitoring reports compiled and submitted	HIGH	SANParks (RMA), NVT, (funding from WRC, DST)
d.	Develop and implement fauna biodiversity surveys and monitoring programmes of selected indicator species or taxa, including	NEM:BA		HIGH	SANParks (RMA), NVT, South Africa Biodiversity Institute (SANBI),

	Species of Special Concern (SSC) to ascertain conservation value of the Groot (Wes) estuary		• Data incorporated into EMP 5-year review • SSC identified		(funding from WRC, DST)
e.	Implement SANParks 'Species of Special Concern (SSC) Programme' where applicable	NEM:BA	• Species lists compiled • Mitigation measures implemented • Monitoring reports compiled and submitted	HIGH	SANParks (RMA)
d.	Investigate options for the effective control of alien fishes (e.g. Mosquito fish) in the Groot (Wes) River and estuary	NEM:BA, Marine Living Resources Act (MLRA)	• Control methods identified and implemented • Reduction/eradication of alien fish species	HIGH	DEFF, SANParks (RMA), NVT
Management Objective 2.1.2: Regulate recreational use of the Groot (Wes) River estuary					
a.	Adopt, demarcate and enforce spatial zonation plan to protect estuarine habitats and other users	ICMA, NEM: PAA	• EFZ controls enforced and offenders prosecuted • Reduced habitat loss/degradation and disturbance, and inappropriate behaviour	HIGH	SANParks (RMA)
b.	Informative signage, indicating zonation and allowable activities, to be placed at strategic points	ICMA, NEM: PAA	• Signage created and erected in key public spaces	MEDIUM	SANParks (RMA), NVT
c.	Determine carrying capacities for each water-based activity in consultation with relevant organs of state	'Recreational Water Use Manual' (Department of Water Affairs (DWA), RW GP2.2), MLRA, Bitou River bylaws,	• Carrying capacities determined • Revised boating bylaws • Notification gazetted	MEDIUM	SANParks (RMA), NVT
d.	Develop clear regulations to manage each use and monitor users and impacts		• Regulations developed and gazetted • Regulations enforced • Counts of users recorded • Impacts recorded	MEDIUM	SANParks (RMA)
e.	Continue to monitor and regulate boat usage, including number of boats operating on the estuary or taking part in a specific activity (e.g. angling competitions).		• Counts of boats on the water recorded • Counts of boat licenses/users/ participants recorded • Carrying capacity enforced	MEDIUM	SANParks (RMA)

			• Designated small craft launching and mooring areas established • Boat usage regulated • Reduced habitat loss/degradation and disturbance, and inappropriate behaviour		
f.	Develop and implement an effective communication strategy for users		• Strategy developed • Effective network established • Cell phone link set up • Peaks season patrols • Investigative surveys/ questionnaires undertaken	LOW	SANParks (RMA), NVT

5.3 Land-use and Infrastructure Planning and Development

Strategic Objective 3.1: Impacts associated with developments, including infrastructure, and proposed changes in land-use are minimised

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

	Action	Relevant Legislation	Performance Indicator	Priority	Responsibility
Management Objective 3.1: Ensure appropriate and sustainable coastal development in and around the Groot (Wes) River estuary, considering ecosystem services and sense of place					
a.	Spatial plan needs to be incorporated into all relevant government department planning documents and processes (e.g. municipal IDP, SDF & overlay, Water Use Licence (WUL) Applications, Environmental Impact Assessments (EIA) Applications)	MSA, LUPA, NEMA,	• EMP included in all relevant planning documents • EFZ respected as a no development area	HIGH	All authorities
b.	Ensure that all proposed developments adhere to the full suite of relevant environmental legislation, particularly the coastal management line, coastal protection zone, and associated development controls	NEMA, NEM: PAA, NEM:BA, ICMA, etc	• All developments comply with environmental legislation and environmental best practice / risk aversion approach • No permanent development, infilling or land transformation of EFZ • Transgressors prosecuted • Corrective action undertaken • Reduced risk of degradation, transformation and disturbance to the estuary	HIGH	DEA&DP, Bitou LM, SANParks (RMA)
c.	Use Estuary Steering Committee as source of I&APs for EIAs	MSA, LUPA, ICMA, NEMA	• Committee partakes in development planning affecting the estuary	HIGH	Bitou LM, Garden Route DM, DEA&DP

			• Impacts on the estuary are mitigated/prevented		
d.	Maintain stewardship agreements with Nature's Valley landowners on adjacent properties	NEM: PAA	• Signed stewardship agreements/Memorandum of Understanding (MOUs) • Reduced risk of degradation, transformation and disturbance to the estuary	MEDIUM	NVRA, SANParks (RMA)
e.	Enforce best practice guidelines in respect to sustainable urban drainage systems (SUDS)	MSA, NWA, ICMA	• 1-day training for officials convened and attended • SUDS applied by building control and technical services	MEDIUM	Bitou LM, SANParks (RMA)

5.4 Institutional and Management Structures

<u>Strategic Objective 4</u>: The Groot (Wes) River estuary is well managed through effective co-operative governance and a developed and well capacitated work force

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

	Action	Relevant Legislation	Performance Indicator	Priority	Responsibility
Management Objective 4.1: Ensure effective co-ordination of estuarine management responsibilities					
a.	SANParks to adopt and facilitate implementation of the EMP by incorporating the EMP into the GRNP MP and other planning documents	ICMA, NEM: PAA	• EMP and zonation plan adopted by SANParks • EMP included in all relevant municipal planning documents	HIGH	SANParks (RMA)
b.	Inform and integrate the estuarine management objectives for the EMP into all relevant government departments planning documents and processes	MSA, LUPA, NEMA, ICMA, NWA	• EMP included in all relevant planning documents	MEDIUM	SANParks (RMA), Bitou LM
c.	Undertake needs analysis and identify skills and equipment requirements	ICMA, NEM: PAA	• Needs and shortages identified • Motivation for acquisition drafted and approved • Skills plan developed • Equipment purchased and maintained	LOW	SANParks (RMA)
d.	Implement skills development and ongoing training in respect to estuarine management to ensure capacity	ICMA, NEM: PAA,	• Motivation for training drafted and approved • Staff attend relevant accredited training courses	LOW	SANParks (RMA)
e.	Develop effective communication protocols and processes with implementing agents (SANParks to maintain working relationships with mandated department & agreements	ICMA, NEM: PAA	• Project champions identified • Networks established, and contacts database compiled • Regular email correspondence	MEDIUM	SANParks (RMA)

	need to be developed to address each management action)				
f.	Ensure that EMP is maintained, reviewed, enforced and budgeted for annually (according to the SANParks 'Financial Management and Administration Programme')	ICMA, NEM: PAA	• Feedback solicited from participating agencies • Annual reporting on progress of EMP actions and achievements to DEFF and Committee • Action plans updated as and when required • An action plan for securing future funding drafted and approved • Funding secured for 5-year cycle	HIGH	SANParks (RMA), with input from all authorities
g.	Monitor and report on the status of the estuary and implementation of EMP on an annual basis	NWA	• Annual reporting on progress of EMP actions and achievements to DEFF and Committee • Data incorporated into EMP 5-year review	MEDIUM	SANParks (RMA)
h.	Undertake formal 5-year review of the EMP as prescribed by the 2013 NEMP, with involvement Estuary Steering Committee	ICMA	• Management Evaluation Tracking Tool – South Africa (METT-SA) assessment undertaken • Motivation for updated drafted and approved • Funding confirmed • Terms of reference drafted • Consultants appointed • EMP updated	LOW	SANParks (RMA), with input from all authorities
Management Objective 4.1.2: Maintain and support mechanisms for representative cooperation and interaction					
a.	Implement procedures to ensure cooperative governance between all government departments with a mandate to act	ICMA, Inter-governmental relations Act	• Roles and responsibilities defined and accepted via MOUs signed between RMA and spheres of government and participating agencies	HIGH	All authorities

			• Minutes of meetings • Active collaboration of various implementing agents		
b.	Constitute / maintain an Estuary Steering Committee to facilitate co-operative governance	ICMA, NEM: PAA	• Committee constituted (Membership includes representatives of government and stakeholders/civil society) • Committee meets on a quarterly basis • Information is exchanged on a regular basis • Estuary issues are tabled • Minutes of meetings	HIGH	SANParks (RMA)
c.	SANParks to facilitate/chair and participate in Committee meetings	ICMA, NEM: PAA		HIGH	SANParks (RMA)
d.	SANParks / DEA&DP Estuarine Management Co-ordinator present on critical fora to ensure that estuarine issues are tabled, e.g. BGCMA, Water Users Associations (WUA), Agriculture groups etc.	ICMA, NEM: PAA	• SANParks / DEA&DP EMC attendance at critical forum meetings • Minutes of meetings	HIGH	SANParks (RMA), DEA&DP
e.	Estuary Steering Committee to monitor performance of SANParks in respect to implementation of Groot (Wes) River EMP	ICMA	• Authorities to provide formal feedback on mandated activities • Committee meets on a quarterly basis • Minutes of meetings • Annual report submitted to DEFF	MEDIUM	All authorities, All stake-holders
f.	Individual agencies to identify and address training needs, with possible secondment to address training and capacity shortfalls	ICMA	• Motivation for training drafted and approved • Staff attend relevant accredited training courses • MOUs to be developed for secondments	MEDIUM	All authorities
g.	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, NEM: PAA	• Need and Desirability investigation undertaken • Motivation for acquisition drafted and approved • Equipment purchased and maintained	MEDIUM	All authorities

			• Project champion(s) for allocated management actions • Staff performance appraisals per Performance Management System in terms of management actions and projects		
h.	Mandated authorities and participating agencies to confirm budget allocations for mandated actions	MSA, NWA, ICMA, NEMA, NEM: PAA	• Formal feedback from authorities on mandated activities • Motivation for budget drafted and approved • Funding secured for 5-year cycle	LOW	All authorities

5.5 Socio-economic Considerations

Strategic Objective 5: Cultural heritage sites, relics and the related intangible heritage resources associated with the Groot (Wes) River estuary, are supported and conserved and SANParks contributes to local economic development, economic empowerment and social development for historically disadvantaged communities

Table 8: Management Objectives and Actions for Socio-Economic Considerations

	Proposed Activity/Action	Relevant Legislation	Performance Indicator	Priority	Responsibility
Management Objective 5.1: Rediscover, rehabilitate and protect all cultural heritage resources					
a.	In collaboration with stakeholders, update and maintain the inventory of heritage resources associated with the Groot (Wes) River estuary	National Heritage Resources Act (NHRA)	• Information gathered, and inventory updated • Significance of heritage assets determined • Cultural Heritage Plan updated and implemented • Site-specific management guidelines developed for all sites • Assets managed consistent with objectives	LOW	SANParks (RMA), South African Heritage Resources Agency (SAHRA)
b.	Identify and map tangible heritage resources relevant to the Groot (Wes) River estuary	NHRA			
c.	Update and implement the Cultural Heritage Management Programme as it applies to the Groot (Wes) River estuary	NHRA			
Management Objective 5.2: Encourage involvement of historically disadvantaged communities and individuals in the utilization and service provision of tourism & recreation products in the Park					
a.	Ensure tourism & recreation provision opportunities are specifically marketed to HDIs	ICMA, NEM: PAA	• Opportunities identified (e.g. trail guides, invasive plant clearing, etc.) • Target groups/stakeholders identified • SANParks procurement policies, guidelines & procedures are implemented. • Increased employment opportunities	MEDIUM	SANParks (RMA), NVT
b.	Ensure that SANParks procurement policies favouring HDIs are implemented	ICMA, NEM: PAA		MEDIUM	SANParks (RMA)

Management Objective 5.3: Contribute to the local and regional economy					
a.	Implement Environmental Protection and Infrastructure Programmes (EPIP) such as DEFF: WfW and Department of Environment, Forestry and Fisheries: Working for the Coast (DEFF: WftC)	ICMA, NEM: PAA	• EPIP programmes adopted and implemented • Signed agreements • Increased employment opportunities	MEDIUM	SANParks (RMA)
b.	Update the current service provider database to ensure that preference is given to local suppliers	ICMA, NEM: PAA	• Updated database • Increased employment of local suppliers	MEDIUM	SANParks (RMA)
Management Objective 5.4: Facilitate and maintain Private Public Partnerships (PPP)					
a.	Identify potential PPP opportunities within the GRNP and make them available to local stakeholders	ICMA, NEM: PAA	• Opportunities identified • Target groups/stakeholders identified • Business plans/APOs developed and adopted • Increased employment opportunities	MEDIUM	SANParks (RMA)
b.	Formalise and implement potential PPP through approved business plans/annual operation plan (APO)	ICM		MEDIUM	SANParks (RMA)
c.	Initiate smaller scale and emerging projects in accordance with SANParks policy	ICMA	• Priority projects identified • Action plans for priority projects developed and implemented	LOW	SANParks (RMA), NVT

5.6 Education & Awareness

<u>Strategic Objective 6</u>: Meaningful environmental education, awareness and outreach programmes are provided to nurture environmentally conscious members of society

Table 9: Management Objectives and Actions for Education & Awareness

	Action	Relevant Legislation	Performance Indicator	Priority	Responsibility
Management Objective 6.1: Provide a structured basis for environmental interpretation and education					
a.	Include the value and importance of estuaries in all existing environmental education programmes and campaigns	NEM: PAA	• Education & awareness programmes developed and implemented at schools and through stakeholder/interest groups • Increased educational opportunities at group gatherings, community meetings, conferences etc. • Increased knowledge and appreciation of estuary importance	MEDIUM	SANParks (RMA), NVT
b.	Plan, develop and implement resources and appropriate interpretive materials for environmental education and to enhance environmental awareness, including signage, posters, and pamphlets and webpage design, inclusive of estuary value and importance	NEM: PAA	• Interpretive materials available to the public • Educational/informative signage erected at strategic points • Posters and pamphlets erected/ disseminated • Increased knowledge and appreciation of estuary importance	MEDIUM	SANParks (RMA), NVT
c.	Plan and implement awareness programmes to provide environmental awareness to staff	NEM: PAA	• Knowledgeable, environmentally-conscious staff	MEDIUM	SANParks (RMA), NVT

5.7 Disaster Risk Management

<u>Strategic Objective 7</u>: Potential risks that could impact the Groot (Wes) estuary are reduced (inclusive of climate change impacts)

Table 10: Management Objectives and Actions for Disaster Management

	Action	Relevant Legislation	Performance Indicator	Priority	Responsibility
Management Objective 6.1: Disaster prevention and preparedness					
a.	Conduct and maintain a risk assessment portfolio and identify areas of potential concern (catchment/marine pollution, flooding, erosion, etc.)	Disaster Management Act (DMA) (Act 57 of 2002), National Environmental Management: Waste Act (NEM: WA), NEMA, ICMA, NWA, NEM: PAA	• Risk assessment portfolio compiled • High risk areas identified and included in relevant plans	MEDIUM	SANParks (RMA)
b.	Obtain the data emanating from water quality monitoring by local and regional authorities within estuaries, and feeder rivers and inlets		• Local and regional authorities engaged • Data obtained and integrated with SANParks monitoring	MEDIUM	Bitou LM, DHSWS, BGCMA SANParks (RMA)
c.	Establish a health incident evacuation plan, identifying actions, timing and responsible agencies and actors		• Health incident evacuation plan developed	MEDIUM	Bitou LM, SANParks (RMA), NVT
d.	Review disaster management initiatives and plans by other agencies, to include in the GRNP Safety and Security Plan (SSP)		• Integrated SSP developed, inclusive of the GRNP Disaster Response and Recovery plan	MEDIUM	SANParks (RMA)
e.	Develop and incorporate estuary early warning system (flooding, marine storm surge, marine pollution) into SSP		• Estuary risks and early warning system included in SSP • Contingency plans developed • Emergency response networks established	MEDIUM	SANParks (RMA), WC Dept of Local Gov: Disaster Management

f.	Engage and assist disaster management units from various agencies and municipalities			MEDIUM	SANParks (RMA), WC Dept of Local Gov: Disaster Management
g.	Conduct an annual audit of the SSP and mitigation measure readiness.		• SSP kept up to date • Effective and appropriate mitigation measures available	MEDIUM	SANParks (RMA)
Management Objective 6.2: Mitigate areas of high risk					
a.	Investigate options of retreat/relocation for risk prone infrastructure and development	ICMA, NEMA	• Key areas identified as per risk assessment • Feasibility of retreat/relocation investigated	MEDIUM	SANParks (RMA), Bitou LM
b.	Rehabilitate areas of bank erosion, trampling, disturbed riparian vegetation (priority areas and hot spots).	ICMA, NEMA	• Degradation profiles compiled • Rehabilitation programme developed &implemented • Re-establishment of indigenous vegetation • Priority degraded areas restored	LOW	SANParks (RMA), Bitou LM
c.	Install appropriate defence against flooding and erosion for critical infrastructure	ICMA, NEMA	• Appropriate defence methods identified • Infrastructure protected	HIGH	Bitou LM, SANParks (RMA)
d.	Enforce the 'Polluter pays' principle and timeous and appropriate rehabilitation/clean-up operations for damaged/polluted areas	NEMA, NWA	• Transgressors prosecuted • Corrective action undertaken; degraded areas rehabilitated	MEDIUM	Bitou LM, DEA&DP, SANParks (RMA)

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 of resources 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-go or minimal disturbance zones;
- those areas which can support controlled, sustainable exploitation of marine living resources; and
- those where various forms and levels of appropriate water-based recreation are acceptable.

The habitat map shown in Figure 6 is used as the baseline for the identification of sensitive estuarine habitats. As the Groot (Wes) River estuary falls within the GRNP, the whole estuary, including identified sensitive habitats, are protected.

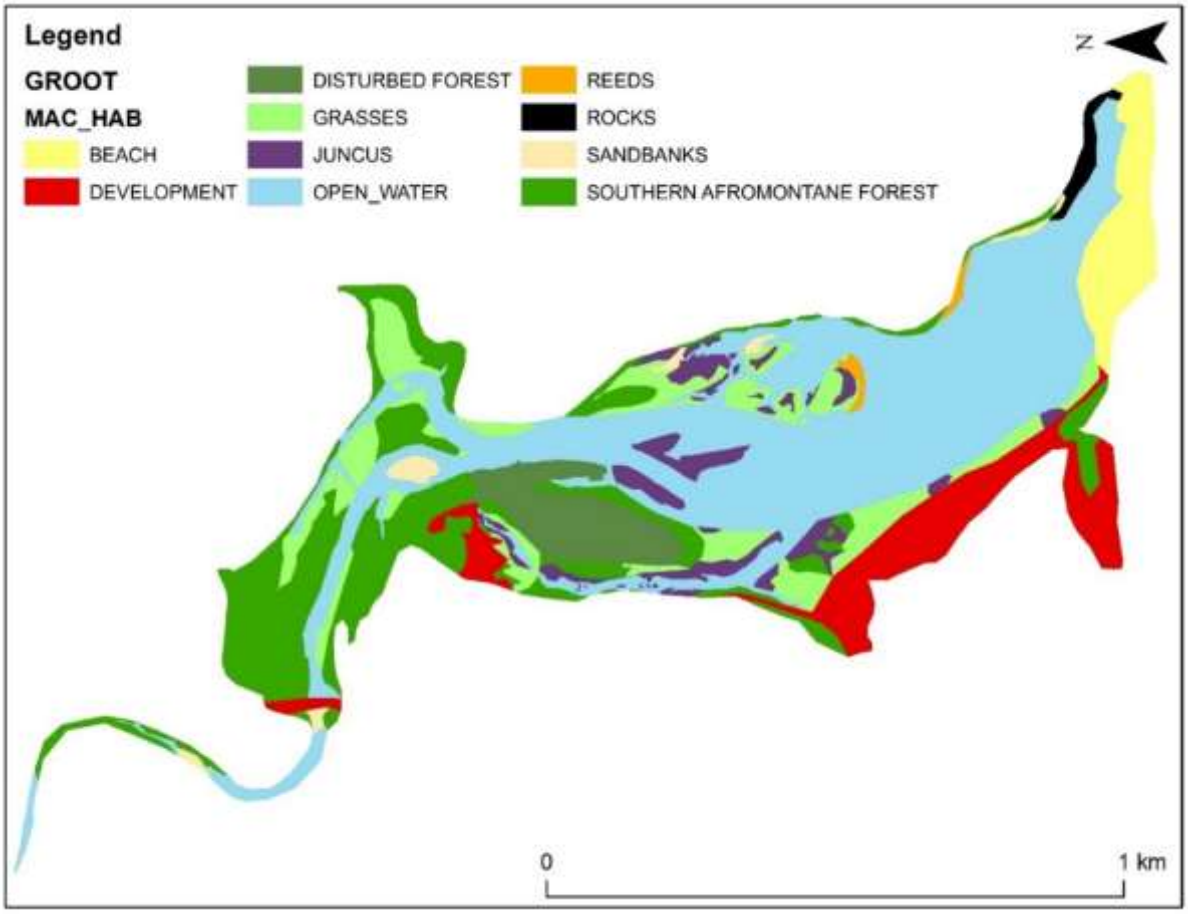

Figure 6: Habitats identified in the Groot (Wes) River estuary

6.3 Legislated Coastal Boundaries and Buffer Zones

6.3.1 Garden Route National Park

The GRNP MP includes a zoning plan (SANParks, 2012a) which takes consideration of the sensitivity and value of the Park's biophysical, heritage and scenic resources, the Park's regional context as well as current and planned infrastructure and tourist routes/products. The zoning plan sets out the rationale for different use zones, describes the zones, and provides management guidelines for each of the zones.

The Groot (Wes) River estuary and the vast majority of its catchment are protected within the GRNP as evidenced in Figure 1 (pg. 1) above. The GRNP is also acknowledged as a core terrestrial protected area with the Garden Route Biosphere Reserve (UNESCO, 2018).

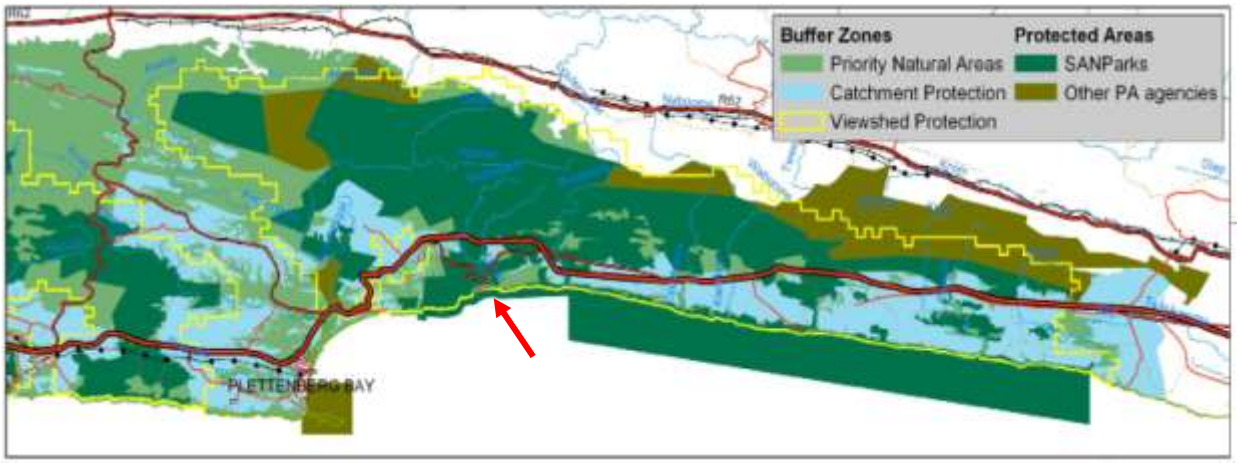

Figure 7: Location of the Groot (Wes) River estuary (red arrow) within the Garden Route National Park

6.3.2 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*".

The Estuarine Functional Zone (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 an estuary 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.

6.3.3 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 (Figure 8). In accordance with provisional delineation of the CPZ for estuaries in the Garden Route DM (formerly Eden DM), 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. **Where protected areas are concerned the CPZ is extended to include these areas, i.e. the GRNP.**

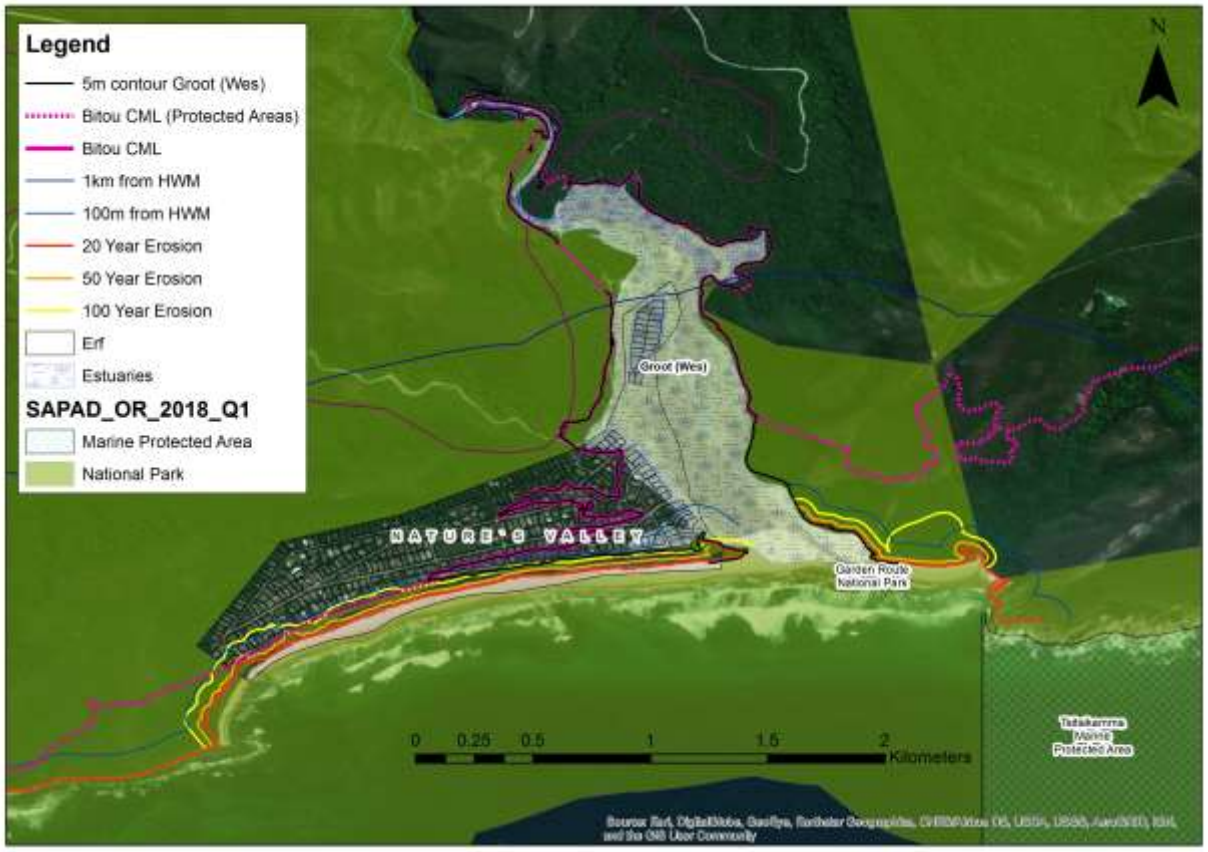

Figure 8: Proposed Coastal Management Line for consideration in future park planning processes (WCG, 2015)

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.

6.3.4 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[3] rather than the coastal management lines described in the ICM Act. However, as part of the on-going process of defining coastal management lines for the Western Cape, it is currently **proposed that the CML, as defined under ICMA, also be used as the DSL**.

Reference to development set-backs is found in the 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 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 Environment, Forestry and Fisheries.

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,

[3] 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)

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 Estuary Zonation

6.4.1 Municipal zonation and current uses

The GRNP is identified as a formally protected conservation area in the Bitou LM Spatial Development Framework (SDF) (Core 1a) falling outside the urban edge. The intention, as detailed in the SDF, is that such areas continue to enjoy the highest levels of protection. The municipality proposes that further continuous corridors between the mountain and the sea, such as that between Natures Valley on the coast and the Garden Route National Park, should be promoted. Economic growth and employment opportunities from protected areas need to be promoted (CNdV, 2017).

Table 11 below lists the surrounding land use types as per the Nature's Valley Local Spatial Development Framework (SDF) (Wiehahn, 2014) and the Bitou Municipal SDF (CNdV, 2017) (Figure 9), and activities occurring in and/or adjacent to the Groot (Wes) River estuary.

Current use of the estuary is regulated according to the SANParks GRNP zoning plan.

Table 11: Current zonations and activities occurring in and/or adjacent to the Groot (Wes) River estuary

LAND USE	DESCRIPTION
Protected Area Garden Route National Park	The land beyond the urban edge of Nature's Valley is zoned as Protected Area, i.e. the Garden Route National Park (now including the Tsitsikamma National Park – De Vasselot Section). The Groot River Lagoon is included in the protected area.
Open Space / Parks / Protected Areas	Seawards of the R102, the western shoreline delineated by Lagoon Drive on the edge of the Nature's Valley residential area, is deemed open space as part of the protected area.
Residential Zone 1	Numerous residential and holiday establishments of Nature's Valley are located on the western bank
Transport	R102 coastal road bridge, numerous residential roads
ACTIVITIES	
Non-motorised boating: canoeing / kayaking	Throughout most of the system, except sanctuary areas
Recreational fishing	Limited and controlled recreational angling in the lower estuary and beach
Bait harvesting	Limited and controlled sand prawn pumping in the lower estuary
Swimming	Limited swimming mainly associated with beach amenity and De Vasselot camp site
Beach-based recreational activities	Sunbathing, picnicking etc. on the beach associated with the sand bar. No dogs permitted on the beach.

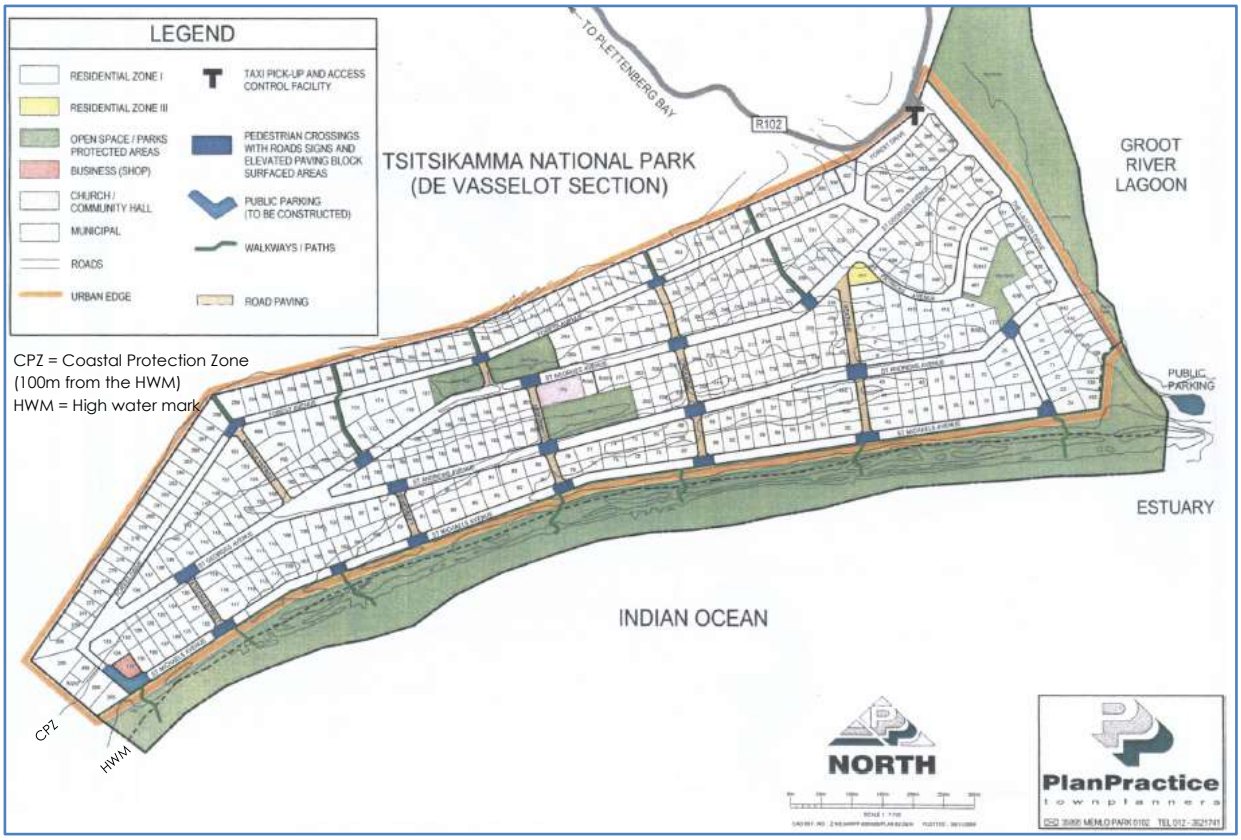

Figure 9: Nature's Valley Local Area Spatial Plan (Wiehahn, 2014)

6.4.2 Proposed spatial zonation / Garden Route National Park zonation

Zonation of the Groot (Wes) River estuary in terms if this EMP is dictated by the zonation of the GRNP and SANParks prescriptions apply. The zoning plan within the GRNP includes a dual zoning system and includes visitor use zones as well as special management overlays designating areas requiring special management interventions.

Four zones and special overlay are proposed for the Groot (Wes) River estuary as per the GRNP zoning plan (GRNP MP 2012a) (Figure 10):

6.4.2.1 Low Intensity Leisure

This zone includes the mouth region of the estuary, i.e. the terminal sand bar and channel inlet, and extends approximately 350 m upstream along the western shoreline/Nature's Valley shoreline. The Nature's Valley Rest Camp / De Vasselot Camp site is also zoned as Low Intensity Leisure.

In this zone, motorised self- drive (vehicle) access and basic self-catering facilities are permitted or exist. Visitor numbers are higher than in the Quiet and Primitive Zones. The objectives of this zone are to (GRNP MP, 2012a):

- Mitigate the biodiversity impacts of the relatively high levels of tourism activity and infrastructure that are accommodated within this zone through careful planning and active management;
- Restrict the negative effects of the activities and infrastructure to the zone;

- Maintain the zone in a generally natural state that is in keeping with the character of a Protected Area; and
- Manage and limit activities and facilities that impact on the wild appearance and reduce the wilderness characteristics of the area to ensure that the area still provides a relatively natural outdoor experience.

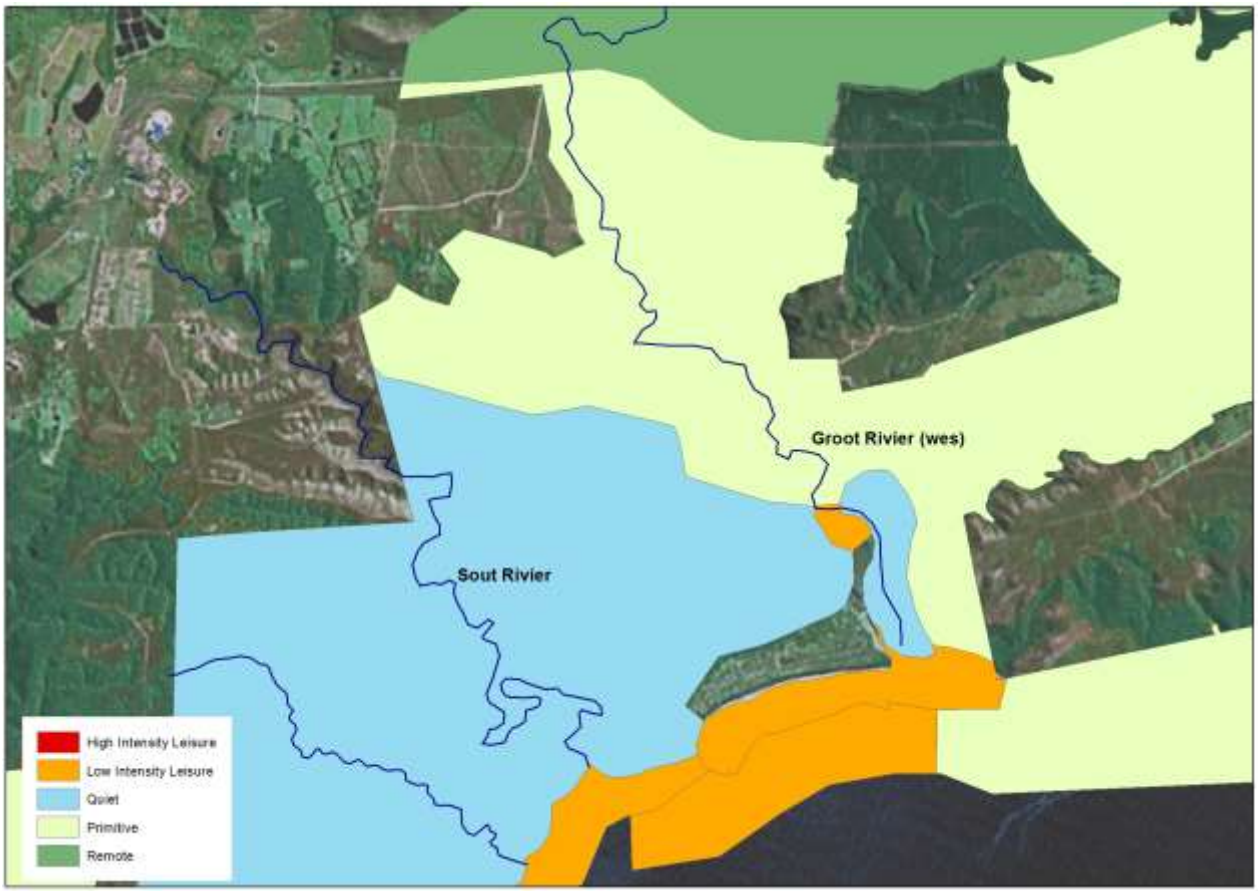

Figure 10: Garden Route National Park Use Zones: Tsitsikamma Section

6.4.2.2 Quiet

The majority of the estuary, up to the R102 bridge near the head of the system, is zoned as Quiet (Figure 10) to limit access to non-motorized vessels only (canoes/kayaks). This zone generally retains a natural appearance and character, is undeveloped (no accommodation) and without roads (i.e. pedestrian access/ walking only). The objectives of this zone are to (GRNP MP, 2012a):

- Maintain the zone in a generally natural state, with the proviso that limited impacts on biodiversity patterns and processes are allowed in order to accommodate park recreational and tourism objectives; and
- Restrict activities which impact on the appearance and character of the area; although the presence of larger numbers of visitors and the facilities they require, may impact on the feeling of "wildness" found in this zone.

6.4.2.3 *Primitive*

The remainder of the estuary, from the R102 upwards, is zoned as Primitive. This zone generally retains wilderness qualities, serving as a buffer to the Remote zone, and while access is controlled, basic self-catering facilities are permitted. The objectives of this zone are to (GRNP MP, 2012a):

- Maintain the zone in a generally natural state with little or no impact on biodiversity processes, and very limited and site-specific impacts on biodiversity pattern; and
- Restrict activities which impact on the intrinsically wild appearance and character of the area, or which impact on the wilderness characteristics of the area (solitude, remoteness, wildness, serenity, peace etc) and limit impacts to the site of the facility.

6.4.2.4 *Sanctuary areas overlay (No-go areas)*

Two sanctuary areas exist, namely, upstream of the R102 bridge (Primitive zone) and the eastern arm / slack water opposite the De Vasselot campsite (Quiet zone) (Figure 11).

These areas have been set aside as sensitive habitat sites, to provide sanctuary for rare and highly specialised bird species, which utilise these areas for nesting, roosting and feeding. These are no-go areas where access and recreational activities are not permitted. All of the above-mentioned zones are designated in the terms of the GRNP MP under the NEM: PAA and administered by SANParks. Further detail on these zones can be found in the GRNP MP (2012a).

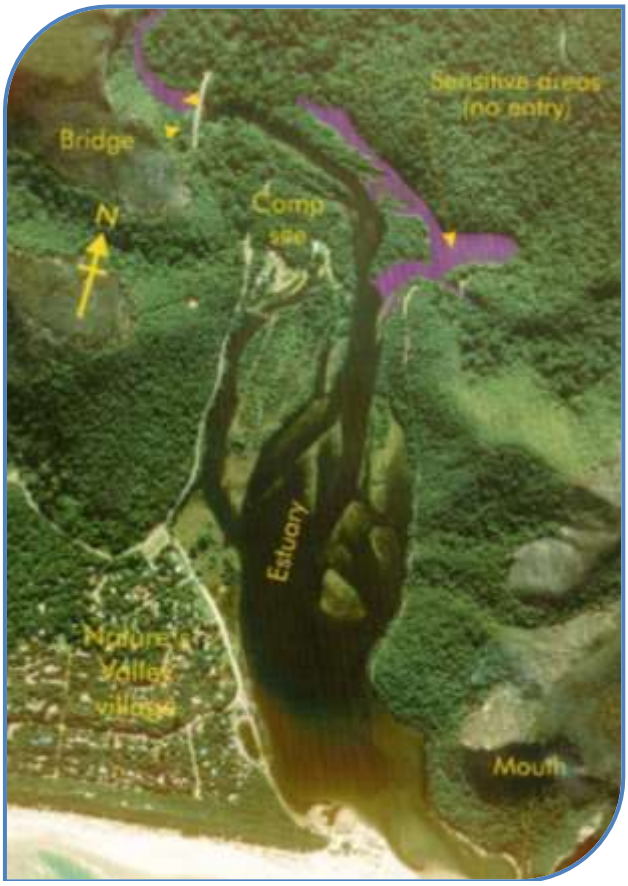

Figure 11: Extract from Tsitsikamma/ Garden Route NP information brochure indicating Sanctuary Areas on the Groot (Wes) River estuary

6.4.2.5 Resource Use Management Areas – Marine Controlled

In terms of extractive resource use, the Groot (Wes) River estuary, the marine areas west of Nature's Valley and Nature's Valley beach, are designated as Marine Controlled Areas in terms of SANParks Resource Use Management for the MPA. Until these areas are declared no-take zones, specified and strictly controlled use of marine living resources (i.e. fishing and bait collection) is allowed in this zone in accordance with the MLRA (SANParks, 2012a).

6.4.3 Areas requiring rehabilitation

No active rehabilitation is required for the Groot (Wes) River estuary, apart from keeping a watching brief on the system, with a focus on water quality, and removing invasive vegetation. The latter is undertaken by SANParks via the Working for Water programme and this occurs throughout the catchment. When required, the DEFF: WftC programme, also facilitated by SANParks, assists with pollution management.

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

The following monitoring activities are undertaken on the Groot (Wes) River estuary by various role-players:

- Water Quality Monitoring:
    - A basic water quality monitoring programme funded by the Breede-Gouritz Catchment Management Agency is currently in place at the R102 road bridge in the upper reaches of the system. It is strongly recommended that this monitoring programme is maintained, and the data stored and forwarded onto the RMA to inform the future management of the Groot (Wes) River estuary; and
    - Monthly water quality and bacteriological sampling of the Groot (West) Estuary is undertaken by the Bitou Municipality. Any source of pollution into the system

needs to be identified and the necessary remedial steps taken, including where pollution is caused by private individuals;

- Mouth dynamics and water levels - The monitoring procedure includes regular observations whether the estuary mouth is open or closed (either with or without overtopping) with the dates of breaching and closing recorded. Observations are done at the mouth of Groot Estuary, and the water level at Nature's Valley Rest-camp;
- Fish community - The fish community of the estuary is monitored on a quarterly basis in a collaborative project between SANParks and the Nature's Valley Trust. This monitoring includes multiple sample sites (n=6), multiple gear types (seine, fyke and gill nets) and records of species, abundance and size frequencies. Spatial and temporal patterns in distribution and abundance of an alien invasive fish species (Mosquito fish, *Gambusia affinis*) are also monitored at 11 sites every month. Several water parameters (temperature, salinity, dissolved oxygen and pH) are also measured at each site at the time of sampling; and
- Monthly waterbirds counts, contributing to Coordinated Waterbird Counts (CWAC) data.

(Litter monitoring is undertaken by NVT from the Groot (Wes) to the Sout (Oos) estuaries, and a GIS database has been generated, which highlights hotspots, for example, for fishing related litter.)

7.1.2 Recommended Resource Monitoring

The recommended long-term monitoring programme, the purpose of which is to test for compliance with Ecological Specifications set by the Reserve Determination Process (DWS, 2015) and to continuously improve understanding of ecosystem function, is presented Table 12 (Appendix 2). While all components in the long-term monitoring programme remain important, certain primary (abiotic) data are of highest priority and are highlighted.

7.1.3 Ecological Specifications

Ecological Specifications (EcoSpecs) are clear and measurable specifications of ecological attributes (in the case of estuaries - hydrodynamics, sediment dynamics, water quality and different biotic components) that define a specific ecological category, in the case of the Groot (Wes), a Category A.

Thresholds of potential concern (TPC) are defined as measurable end points related to specific abiotic or biotic indicators that if reached (or when modelling predicts that such points will be reached) prompts management action. In essence, TPCs should provide early warning signals of potential non-compliance to ecological specification (i.e. not the point of 'no return'). The EcoSpecs, as well as the TPCs, representative of a Category A for the Groot (Wes) River estuary, are presented in Table 13(Appendix 3).

A formalised resource monitoring programme should be developed by SANParks for the Groot (Wes) River estuary according to the Reserve Determination methods. The programme should seek to address the indicated priorities as soon as possible and various components can be monitored/researched by the Nature's Valley Trust (See Section 8).

7.2 Compliance Monitoring

Compliance monitoring refers to the monitoring of the type 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.

By and large, compliance monitoring within the GRNP is the responsibility of SANParks and is undertaken according to legislation and policies applicable to protected areas and by means of law enforcement and compliance monitoring protocols internal to SANParks.

The GRNP MP (SANParks, 2012a) acknowledges that "*Careful management is required in order to ensure adequate protection of resources and maintaining the sustainability of the line-fishery. Consequently, it is essential to monitor and evaluate the sustainability of fishing and bait collecting in the open areas of the GRNP*." The information gathered from monitoring programmes, namely quantifying use and assessing the resource base, is essential to the adaptive management strategy adopted by SANParks (SANParks, 2012a).

7.2.1 Existing compliance monitoring

Compliance monitoring around the Groot (Wes) River estuary is currently limited to ad hoc patrols. Monitoring is undertaken weekly, unless deviated from as a result of unforeseen events or emergencies, and is limited to compliance with Marine Living Resources Act Regulations (permits, bag limits etc.).

Compliance monitoring in terms of building regulations for Nature's Valley is jointly undertaken by the Nature's Valley Ratepayers' Association and Bitou LM.

7.2.1 Recommendations for compliance monitoring

It is recommended that the current compliance monitoring by SANParks continues and should be increased during the peak holiday season, if not done so already.

Future compliance monitoring should also include:

- Volume of water abstracted from the Groot (Wes) River and MAR reaching the estuary against the ecological reserve level, once the upgrades to the reservoir are completed.

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. As per the ICMA, an annual report must be submitted

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 GRNP MP. This review is the responsibility of SANParks as the RMA. SANParks applies the Management Effectiveness Tracking Tool – South Africa v.3a (METT-SA) to assess the effectiveness of the management of its protected areas. The METT-SA is intended to report on progress. Thus, the score is the baseline against which future assessments are made to see if there has been improvement in management effectiveness. The METT-SA is site-specific and uses a specific set of indicators tailored for the protected area concerned. In addition to the overall score, the ratings of individual indicators can be tracked, and the next steps required to improve management effectiveness for this particular element can thus be determined. The assessment process is typically undertaken at the end of the 2-year financial period and culminates in the compilation of a METT-SA Action Plan to address the shortcomings or poor performance. It is envisaged that SANParks will employ the METT-SA to assess the management effectiveness of the SANParks EMP at the 5-year review period.

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 14 in Appendix 4 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 of efficient and effective estuarine management. This has been successfully implemented for the Groot (Wes) River estuary. Figure 12 overleaf displays the key role players that should be included in its management.

Figure 12: Key role players for the management of the Groot (Wes) river estuarine system

8.2 Responsible Management Authority

The 2013 NEMP identifies SANParks as the RMA responsible for the co-ordination of the implementation of the Groot (Wes) River EMP. **It is noted that in the proposed amendments to the 2013 NEMP, such responsibilities remain allocated to the applicable conservation authority, in this case SANParks, in respect to estuaries in protected areas or part of a protected area expansion strategy.** Ultimately the role of the RMA must be designated through formal signed agreement.

The majority of the implementation actions identified in this EMP are the responsibility of SANParks as the authority for the protected area, supported by mandated government agencies where indicated. 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.Augmentation of capacity within SANParks could be provided through the recommended appointment of a regional estuarine co-ordinator within DEA&DP. This individual will play a pivotal co-ordinating role between all other implementing agencies and SANParks.

Progress towards achieving the objectives set out in this EMP should be reviewed on an annual basis by the SANParks 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 Groot (Wes) 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.

The Groot Estuary Steering Committee was established around 2012 as an advisory body to SANParks. It comprises SANParks, NVRA, NVT and the Bitou LM, as well as the general public. The Committee is chaired mainly by SANParks and meets annually to discuss a variety of issues for the entire estuary.

Further to this, in the spirit of co-operative governance enabled through the Tripartite Agreement (WCG, 2018), members of the Committee have amicably managed the affairs of the estuary for numerous years and have adopted specific management responsibilities, outlined as follows (M. Barnardo, 2017, pers. comm [4]):

1) SANParks:
   - Mainly responsible for activities on the river (e.g. regulation of boats);
   - Exploitation of marine living resources (including illegal activities such as poaching);
   - Planning for climate change, and options for climate change adaptation, such as a retreat[5]; and
   - Custodian of data generated on the estuary.
2) Bitou Municipality:
   - Extracting water from the river to supply Natures Valley township;

[4] Mr M. Barnardo, Bitou Local Municipality, 2017.

[5] Minutes of the Matjies, Sout (Oos) and Groot (Wes) Stakeholder meeting, SANParks Offices, Stormsriver

- Managing the storm water pipe flowing into the estuary;
- Managing the flow of conservancy and septic tanks close to the Storm Water system; and
- Regular collection of water samples to check for bacterial contamination or hazardous chemicals flowing into the river.

3) Nature's Valley Rate Payers Association (NVRA):
   - Dealing with residents and also assisting the above groups in educating the residents of Nature's Valley; and
   - Being the eyes and ears for the committee.

4) Nature's Valley Trust (NVT):
   - Responsible for research activities that are happening in the estuary, in collaboration with SANParks.

Where required, relevant or additional government departments should be invited to be represented on the Committee by delegates mandated by the respective department to do so, as well as representatives from the authority/ies who have executive powers within a specific sector. Each representative on the Committee will be tasked to convey recommendations to his/her department and report back to the forum on behalf of the department. 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 various local members (e.g. NVRA) will play an invaluable role in providing on the ground, local insight and support to the SANParks and the various authorities.

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:

- SANParks as RMA: Coordinating and undertaking the implementation of the EMP, management of the Groot (Wes) estuary as a component of the GRNP;
- Bitou Local Municipality: Responsible for issues relating to tourism, technical support in respect to water quality monitoring for health and safety purposes, as well as water abstraction of water in the Groot (Wes) catchment;
- Garden Route District Municipality: Responsible for 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, DHSWS (via the regional office), DALRRD, Department of Science and Technology (DST); and
- Organs of State: CapeNature, Council for Scientific and Industrial Research (CSIR), 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:

- The Garden Route Municipal Coastal Committee: Responsible for facilitating co-management, effective governance and district level co-ordination of coastal and estuarine management issues; and
- 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 5 for ease of reference. This template can also be utilised to facilitate the implementation of other projects proposed in the EMP.

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:

- Pollution inputs to the Groot (Wes) River estuary are reduced by upgrading and/or replacing degraded sanitation infrastructure in the EFZ;
- No new development, infilling or land transformation in the EFZ as well as the implementation of appropriate mitigation measures in respect to areas of high risk;
- Ensure sustainable and effective mouth management and the execution of science based artificial breaching / mouth manipulation;
- This EMP, it's spatial zonation and management objectives are incorporated into the updated GRNP MP;
- All data generated through regional and local projects and monitoring programmes should be sourced, collated and stored at SANParks to build up long –term datasets to facilitate adaptive estuarine management; 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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APPENDIX 1: GROOT (WEST) ESTUARY MOUTH AND MAINTENANCE MANAGEMENT PLAN 2019

South African
NATIONAL PARKS

Groot (West) Estuary
Mouth & Maintenance Management Plan

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ABBREVIATIONS	
AMSL	Above mean sea level
CWAC	Co-ordinated Waterbird Counts
CSIR	Council for Scientific and Industrial Research
DALRRD	Department of Agriculture, Land Reform and Rural Development
DEFF	Department of Environment, Forestry & Fisheries
DEA&DP	Western Cape Government's Department of Environmental Affairs & Development Planning
DHSWS	Department of Human Settlement, Water & Sanitation
EFZ	Estuarine Functional Zone
EIA	Environmental Impact Assessment
EIS	Estuary Importance Score
EMP	Estuary Management Plan
GRNP	Garden Route National Park
I&AP	Interested and Affected Party
MaintMP	Maintenance Management Plan
MAR	Mean annual runoff
MMP	Mouth Management Plan
MSL	Mean sea level
NBA	National Biodiversity Assessment, 2011
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
Psu	Practical salinity units
REC	Recommend Ecological Category
SANParks	South African National Parks
TOC	Temporarily open closed

1 OBJECTIVE OF THE MOUTH MANAGEMENT PLAN

STATEMENT OF THE PROBLEM

Most of the Estuarine Functional Zone (EFZ) and catchment of the Groot (West) system falls on property managed by South African National Parks (SANParks), therefore the estuary can be considered in a near natural state. Given the mostly undisturbed nature of the estuary, it is still able to breach naturally depending on rainfall, and the height of the sandbar at the estuary mouth. However, given that low-lying developments occur on the floodplain in Natures Valley, periodic high water levels under a natural flooding regime may result in temporary inundation of infrastructure and facilities. Prolonged high water levels in the Groot (West) may also result in the flooding of septic tanks of some waterfront properties, which in turn can result in faecal contamination of the estuary. Prolonged or extensive inundation of infrastructure adjacent to the estuary may therefore lead to consideration of premature breaching.

OBJECTIVES OF THE GROOT (WEST) MOUTH MANAGEMENT PLAN

To manage the mouth of the Groot (West) Estuary in a manner that will maintain healthy, functional ecological processes in the estuary. Achieving and maintaining the Recommended Ecological Category (REC) of the Groot (West) Estuary, namely Category B (NBA 2011).

IS ARTIFICIAL BREACHING TO BE CONSIDERED AT GROOT (WEST) ESTUARY?	No	Yes
High water levels		x
Floods (emergency)		x
Water quality (emergency)		x
Fish Kills (at DEFF discretion as important nursery)		x
IS A MAINTENANCE MANAGEMENT PLAN[1] REQUIRED?	YES	

[1] As part of an authorisation in terms of the Environmental Impact Assessment (EIA) Regulations

KEY DATA /INFORMATION SOURCES

The information presented below has largely been drawn from historical studies, DWS and SANParks monitoring programs, the 2011 National Biodiversity Assessment, and internal SANParks knowledge.

KEY RECOMMENDATIONS IN SUPPORT OF THE GROOT (WEST) ESTUARY MOUTH MANAGEMENT PLAN

Wherever possible, breaching of the Groot (West) Estuary should be allowed to occur naturally. However, artificial breaching of the Groot (West) Estuary may be undertaken to either restore unnaturally altered ecosystem processes, reduce the threat of flooding of infrastructure currently on the floodplain, or manage artificially and fundamentally altered water quality. The height at which artificial breaching may be undertaken is in essence a compromise to reduce the threat of flooding of properties on the floodplain, retention of sufficient head of water on breaching to perpetuate hydrological processes influencing the erosion of marine sediments in the estuary mouth, and the maintenance of natural ecosystem patterns and processes dependant on varying estuarine water levels.

KEY LEGISLATION RELEVANT TO THIS MOUTH MANAGEMENT PLAN

According to the National Environmental Management Act (No. 107 of 1998) ("NEMA"), viz, the Environmental Impact Assessment (EIA) Regulations 2014 (Government Notice No.'s R. 326, R 327, R. 325 and R. 324 in Government Gazette No. 40772 of 7 April 2017), the following activities may not commence without an environmental authorisation from the competent authority:

The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock from:

I. the seashore;

II. the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever distance is the greater; or

III. the sea.

but excluding where such infilling, depositing, dredging, excavation, removal or moving

I. occurs behind the development setback line.

II. is for maintenance purposes undertaken in accordance with a management plan agreed to by the relevant environmental authority; or

III. falls within the ambit of activity 21 in this Notice, in which case that activity applies; occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or where such development is related to the development of a port or harbour, in which case Activity 26 in Listing Notice 2 of 2014 applies

[Listing Notice 1, Activity Number 18]

This Mouth & Maintenance Management Plan (MMP) would serve to support a formal application for agreement of the adoption of a *Maintenance Management Plan (MaintMP)* by DEFF to perform required ecosystem maintenance. It is recommended that such agreement be limited to a five-year period, at the end of which the MMP should be subject to specialist review before being re-submitted for approval by the competent authority prior to the MaintMP lapsing.

Natural breaching is the preferred option for the Groot (West) Estuary. Artificial breaching of estuaries may at times be undertaken when considered essential for the restoration of natural patterns and processes and the reduction of pollution impacts. Artificial breaching is also periodically required as, *inter alia*, a form of flood management due to the historic development areas and infrastructure on the floodplain. This artificial breaching is a listed activity as contained in Government Notice (GN) No. R 983 of 2014, which requires environmental authorisation unless undertaken in accordance with a maintenance management plan approved or adopted by the relevant competent authority. This plan application is therefore necessary to meet the legislative requirements of the EIA Regulations in order to allow for estuary breaching activities under the maintenance provision.

The activities for which the adoption of a MMP/MaintMP is requested includes the breaching / moving of sand at the estuary mouth by means of machinery (bulldozer or front end loader); pumps or by hand and/or by a combination of mechanical and physical equipment to protect the estuary from potential pollution entering the estuary from the ocean and, in exceptional circumstances / where sufficient motivation is provided, to avoid flooding of properties and or infrastructure, and in some cases restore artificially disrupted environmental processes, for example movement of biota between the marine and estuarine environments.

When developing this MMP/MaintMP for the Groot (West) Estuary, the provisions of the National Environmental Management: Integrated Coastal Management Act, 2008 (Act No. 24 of 2008), as amended, the National Estuarine Management Protocol (GN No. 341 of 2013) as well as the relevant Coastal Management Programmes (National, Provincial and Municipal) have been taken into account. This MMP/MaintMP conforms to the prescripts (vision, objectives and standards) of all the above legislation and documents.

2 DESCRIPTION OF THE GROOT (WEST) ESTUARY

Table 1: Description of the estuary and its importance

Threat	Discussion
Location	The Groot (West) Estuary is a small to medium size (39 ha) temporarily open/closed estuary, entering the sea at Nature's Valley in the Western Cape and falls within the Tsitsikamma Section of the Garden Route National Park (DWS 2015). The Groot and Bobbejaan Rivers feed into the Groot Estuary, which is approximately 2 kms in length (CSIR 1983). The average depth of the estuary is about 1 metre but depths of 2 - 3 metres can be found in the middle and upper reaches. Higher rainfall levels occur in the winter seasons (June - August) and spring (September-November) and lower rainfall levels in autumn (March – May) and in summer (December – February). The western shore is low lying and prone to flooding, while the eastern shore is bounded by hills dropping steeply to the water's edge (CSIR 1983). The geographical boundaries, as presented by the EFZ are represented in Figure 1 and geo-referenced as follows (DWS 2015): Downstream boundary: Estuary mouth 33°58'53.41"S 23°34'8.32"E Upstream boundary: 33°57'49.27"S 23°33'23.77"E Lateral boundaries: 5 m contour AMSL along each bank  **Figure 1:** The estuary functional zone of the Groot (West) Estuary (DWS 2015).
Estuary Importance	Referring to the estuarine importance rating system (DWAF, 2008), the importance score of the Groot (West) Estuary – a score of 62 – indicates that the estuary is "Important" (DWS 2015). Turpie et al. (2002) ranked the Groot West Estaury as 81st out of South Africa's ±250 estuarie, according to physical and biological attributes, habitat importance and rarity. The Groot (West) Estuary is situated in the Tsitsikamma Section of the Garden Route National Park (GRNP). The system therefore forms part of the core set of priority estuaries in need of protection to achieve biodiversity targets in the National Estuaries Biodiversity Plan for the NBA (Turpie et al., 2012). The NBA (Van Niekerk and Turpie, 2012) recommends that the estuary be fully protected, and that 50% of the estuary margin be undeveloped.

	The Groot (West) system is largely pristine, with the estuary supporting estuarine resident and marine migrant species, including species such as Cape stumpnose and the over-exploited leervis, spotted grunter and white steenbras. The estuary provides food and shelter for juvenile fish and other organisms. It is a breeding area for various birds, including yellow-billed duck, giant kingfisher and half-collared kingfisher. In a prioritization exercise that rated estuaries according to their importance to estuarine-associated fish species the Groot (West) Estuary received a rating of 119 out of 248 (Maree et al. 2003).
Conservation status	The current ecological classification in the NBA lists the Groot (West) Estuary as a category B estuary. As such, and according to the standards set out in the National Estuarine Management Protocol, the estuary has to be managed to, as a minimum, maintain this ecological classification. The estuary is in a national park and as such is also managed accordingly.
Vegetation	The western bank accommodates wetland vegetation including the common reed *(Phragmites australis),* common rush *(Juncus kraussi),* while the eastern bank is covered with indigenous forest (Morant and Bickerton 1983).
Important fish nursery	The Groot (West) Estuary, is a temporary open/closed (TOC) system (Whitfield 2000), and is closed off from the sea for varying lengths of time by a sandbar which forms at the mouth (Morant & Bickerton 1983). Several biota occurring in the estuarine environments have an obligate marine phase in their life cycle. For most fully aquatic species movement between the estuarine and marine environments can only be achieved during periods when the estuary mouth is open (Whitfield 1989a, 1989b), or in the case of some larval fishes, when there is substantial over-wash of the sandbar (Whitfield 1992). The first fish survey of the Groot (West) Estuary occurred in 1981 during which 18 species were sampled (16 marine and two freshwater (CSIR 1983)). Harrison (1995) conducted limited sampling, whilst SANParks in collaboration with Natures Valley Trust have been monitoring the fish community within the estuary since 2011 (SANParks unpublished data). Between February and December 2011 a total of 26 30m beach seine net pulls were completed during which a total of 31 268 fish representing 20 species from 12 families were sampled (Table 2). Species sampled by CSIR but not by SANParks include elf, needlefish, flathead mullet and sand steenbras. **Table 2:** Fish sampled within the Groot (West) Estuary between February and December 2011, grouped by estuarine association categories Whitfield (1998). Categories: Ib = Resident species spawning in estuaries, freshwater and marine environments, IIa = Euryhaline marine species which breed at sea but juveniles dependant on estuaries as nursery areas, IIb = Euryhaline marine species which breed at sea with juveniles occurring mainly in estuaries, but also found at sea, IIc =Euryhaline marine species which breed at sea with juveniles occurring in estuaries but are usually more abundant at sea, IV = Freshwater species, Vb = Facultative catadromous species.

Family	Common name	Scientific name	Estuarine Classification
Atherinidae	Cape silverside	*Atherina breviceps*	Estuarine
Clupeidae	Estuarine roundherring	*Gilchristella aesturia*	Estuarine
Gobiidae	Prison goby	*Caffrogobius gilchristi*	Estuarine
	Sand goby	*Psammogobius knysnaensis*	Estuarine
	Goby sp		Estuarine
Sygnathidae	Longnose pipefish	*Syngnathus acus*	Estuarine
Carangidae	Leervis	*Lichia amia*	Marine
Haemulidae	Spotted grunter	*Pomadasys commersonnii*	Marine
Monodactylidae	Oval moony	*Monodactylus falciformis*	Marine
	Round moony	*Monodactylus argenteus*	Marine
Mugilidae	Groovy mullet	*Liza dumerili*	Marine
	Southern mullet	*Liza richardsonii*	Marine
	Striped mullet	*Liza tricuspidens*	Marine
	Freshwater mullet	*Myxus capensis*	Marine
	Mullet sp		Marine
Sparidae	Cape stumpnose	*Rhabdosargus holubi*	Marine
	White steenbras	*Lithognathus lithognathus*	Marine
	White stumpnose	*Rhabdosargus globiceps*	Marine
Ariidae	White sea-catfish	*Galeichthys feliceps*	Marine
Soleidae	Blackhand sole	*Solea bleekeri*	Marine
	Cape sole	*Hetermycteris capensis*	Marine
Pocolidae	Mosquito fish	*Gambusia affinis*	Freshwater

Estuarine roundherring numerically dominated catches comprising 65% of all fish caught, followed by Cape stumpnose (31%) and white steenbras (1.13%). In terms of mass, catches were dominated by Cape stumpnose (45%), followed by southern mullet (19%) and white steenbras at 14%. Index of relative importance (%IRI) calculations which takes into account each species frequency of occurrence (%FO) and contributions to overall catch in terms of numbers (%N) and mass (%M) indicates that Cape stumpnose are the dominant species within the system (47%) followed by estuarine roundherring (34%) and white steenbras (8%) (Table 3).

Table 3: Frequency of occurrence (proportion of samples in which a species was sampled), contributions towards total catch (number of individual fish per species expressed as a proportion of the total catch and relative gravimetric contribution of a species to the total mass) and final species contributions within the Index of Relative Importance. IRI = (%N + % M) x (%FO)

Species	EA	Total %FO	%N (31268 fish)	%M (170 Kg)	%IRI
Blackhand sole	IIa	7.69	0.04	0.02	0.00
Cape silverside	Ib	15.38	0.18	0.06	0.04
Cape sole	IIa	30.77	0.19	0.02	0.06
Cape stumpnose	IIa	61.54	30.90	45.27	46.77
Estuarine roundherring	Ib	50.00	65.01	3.87	34.36
Freshwater mullet	Vb	15.38	0.05	12.00	1.85
Goby sp	Ib	3.85	0.00	0.00	0.00
Groovy mullet	IIb	3.85	0.00	0.35	0.01
Leervis	IIb	3.85	0.00	0.00	0.00
Longnose pipefish	Ib	3.85	0.01	0.00	0.00
Mosquito fish	IV	3.85	0.02	0.03	0.00
Mullet sp	II	65.38	1.08	1.72	1.82
Oval moony	IIb	34.62	0.99	0.32	0.45
Prison goby	Ib	3.85	0.04	0.06	0.00
Round moony	IIb	3.85	0.00	0.00	0.00
Sand goby	Ib	26.92	0.03	0.02	0.01
Southern mullet	IIc	34.62	0.28	18.91	6.63
Spotted grunter	IIa	7.69	0.02	1.60	0.12
Striped mullet	IIb	3.85	0.01	0.16	0.01
White sea-catfish	IIb	3.85	0.00	0.00	0.00
White steenbras	IIa	50.00	1.13	14.42	7.76
White stumpnose	IIa	7.69	0.01	1.19	0.09

Size frequencies for the most commonly caught species indicate that predominantly juveniles are being sampled, supporting the theory that the estuary provides an important nursery function to these species.

Important Bird site

Important Bird and Biodiversity Areas (IBA) are important sites for the conservation of bird species. These IBA sites are critical for the long-term survival of bird species that are globally threatened, have a restricted range and are restricted to specific biomes/vegetation types. Over 12,000 IBAs have been identified worldwide using an internationally agreed set of criteria.

The estuary falls into the Tsitsikamma – Plettenberg Bay IBA (Marnewick *et al*. 2015). It is a breeding area for various birds, including yellow-billed duck, African finfoot, water thick-knee, giant kingfisher, malachite kingfisher, pied kingfisher and half-collared kingfisher. It is also used extensively by other species that do not breed, but do feed in the estuary, including African fish-eagle, western osprey, reed cormorant and white-breasted cormorant. A total of 37 species have been recorded between 1998 and 2017 (Table 4).

Table 4. A bird list extracted from the CWAC dataset based on 34 counts conducted by BirdLife Plettenberg Bay and NVT between January 1998 and February 2017.

SABAP Spp no.	Common name	Taxonomic name
48	Cormorant, Cape	*Phalacrocorax capensis*

50	Cormorant, Reed	*Phalacrocorax africanus*
47	Cormorant, White-breasted	*Phalacrocorax carbo*
52	Darter, African	*Anhinga rufa*
95	Duck, African Black	*Anas sparsa*
96	Duck, Yellow-billed	*Anas undulata*
59	Egret, Little	*Egretta garzetta*
213	Finfoot, African	*Podica senegalensis*
149	Fish-eagle, African	*Haliaeetus vocifer*
89	Goose, Egyptian	*Alopochen aegyptiacus*
88	Goose, Spur-winged	*Plectropterus gambensis*
6	Grebe, Little	*Tachybaptus ruficollis*
263	Greenshank, Common	*Tringa nebularia*
287	Gull, Kelp	*Larus dominicanus*
72	Hamerkop,	*Scopus umbretta*
55	Heron, Black-headed	*Ardea melanocephala*
63	Heron, Green-backed	*Butorides striata*
54	Heron, Grey	*Ardea cinerea*
84	Ibis, Hadeda	*Bostrychia hagedash*
395	Kingfisher, Giant	*Megaceryle maximus*
396	Kingfisher, Half-collared	*Alcedo semitorquata*
397	Kingfisher, Malachite	*Alcedo cristata*
394	Kingfisher, Pied	*Ceryle rudis*
245	Lapwing, Blacksmith	*Vanellus armatus*
172	Osprey,	*Pandion haliaetus*
231	Oystercatcher, African Black	*Haematopus moquini*
235	Plover, White-fronted	*Charadrius marginatus*
258	Sandpiper, Common	*Actitis hypoleucos*
262	Sandpiper, Marsh	*Tringa stagnatilis*
294	Tern, Arctic	*Sterna paradisaea*
290	Tern, Caspian	*Sterna caspia*
291	Tern, Common	*Sterna hirundo*
296	Tern, Sandwich	*Sterna sandvicensis*
298	Tern, Swift	*Sterna bergii*
10009	Tern, Unidentified	
274	Thick-knee, Water	*Burhinus vermiculatus*
686	Wagtail, Cape	*Motacilla capensis*

Estuary Condition w.r.t breaching	In 2000 the overall condition of the estuary was rated as good (Whitfield 2000). The NBA for estuaries rated the present ecological status as good and gave the estuary a Category B score (Van Niekerk & Turpie, 2012). The system is largely pristine, but over the years increased activities around the estuary have influenced the system to some degree. Pressures on the system include flow reduction (due to abstraction for Natures Valley town), bridge construction, artificial breaching and increased nutrient loading largely due to low-lying septic tanks and development in the EFZ. There are 401 erven in the town of Natures Valley which is situated immediately west of the Groot (West) Estuary, with approximately 100 of these being occupied full time, for which the local municipality abstracts water from the Groot River. From time to time *Salmonella typhi* and *Escherichea coli (E.coli)* bacteria may be present in the estuary due to flooding that inundates the septic tanks of certain properties within the floodplain. Monthly water quality and bacteriological sampling of the Groot (West) Estuary is undertaken by Bitou Municipality. Faecal contamination of the estuary needs to be closely monitored as a joint effort by SANParks, DWS, Bitou municipality and stakeholders.

Recommended Ecological Condition	In a desktop study the NBA for estuaries rated the Present Ecological State Groot (West) Estuary as Good, and scored it an overall B (Van Niekerk & Turpie 2012). Applying the guidelines for the determination of the REC the Groot (Wes) Estuary – an "Important" system in a protected area - the REC was set as a Category A (NBA 2011). This can be achieved by improved mouth management practices, as well as maintaining base flow during low flow periods. The latter can, for example, be achieved through investigating alternative practices to supply water to the adjacent town (i.e. not drawing from the river during low flow periods) (DWS 2015).

3 MOTIVATION FOR ARTIFICIAL BREACHING

Historical records indicate that the Groot (West) is a temporarily open/closed estuary. As such this system is blocked off from the sea for varying lengths of time by a sand bar that forms at the mouth. In the Groot (West) system available morphological evidence coupled with low salinity in the back-barrier suggests that, when open, the mouth serves mainly as an overflow channel rather than a tidal inlet (Harrison 1996).

Artificial breaching of the Groot (West) Estuary may at times be undertaken when considered essential to reduce the threat of flooding of infrastructure currently on the floodplain. It may also be considered to either restore unnaturally altered ecosystem processes, or manage artificially and fundamentally altered water quality.

Development of residential properties in Natures Valley on the estuarine floodplain has in the past been approved by local governments. If the estuary is left to breach naturally, water levels under a typical flooding regime can result in inundation of an access road in Natures Valley; the public parking area near the estuary mouth; private gardens along Lagoon drive, and some camping sites in the SANParks De Vasselot restcamp. High water levels in the Groot (West) may also result in the flooding of septic tanks associated with some waterfront properties, which in turn can results in faecal contamination of the estuary, as indicated by high *E. coli* counts, particularly during draw-down periods. Flooding of land adjacent to the estuary can also be expected when river floods coincide with high tides when the estuary is open. Prolonged or extensive inundation of infrastructure adjacent to the estuary may therefore result in consideration for artificial breaching.

Artificial breaching of the estuary by SANParks may be necessary where the natural breaching of the estuary is significantly disrupted by human alteration of hydraulic processes and such change in the breaching is deemed by scientific investigation to have had, or be likely to have a long-term detrimental effect on estuarine biota or environmental processes. In these instances, the estuary should be breached as close to its natural breaching state as possible in order to mimic natural breaching. Given the current relative natural flow in the river it is unlikely that this would regularly be required.

Hydraulic studies of the Groot Estuary are extremely limited, being confined largely to unpublished once-off measurements of flow speeds by ECRU in 1982 (Morant & Bickerton 1983). Local knowledge suggests that the difference between the water height at which flooding of facilities may commence (2.0m amsl) and estimated average natural breaching height (2.1-2.2m amsl) is relatively small. Higher water levels could occur during periods when the sand sill builds up higher than 2.2m amsl, or when river floods coincide with periods when the estuary mouth is closed, or even with high tides when the estuary is open.

The height at which estuaries are artificially breached are in essence a compromise to reduce the threat of flooding of residential and other properties that have been developed on the estuarine floodplains, whilst retaining sufficient head of water on breaching to perpetuate hydrological processes influencing the erosion of marine sediments in the estuary mouth and to maintain patterns and processes dependant on varying estuarine water levels.

The main breaching principles for the Groot (West) Estuary are that:

- The estuary should be allowed to open naturally (or unaided) whenever possible,

- If a need for breaching is identified (i.e. flooding of property) the minimum artificial breaching level for the Groot (West) Estuary is 2.4 m amsl. Wherever possible, breaching of the Groot (West) Estuary should be allowed to occur naturally therefore the minimum breaching height is set higher than the expected natural breaching height (assuming the sandbar is not higher than 2.4m).
- Where inundation of infrastructure is resulting in regular premature breaching, the first consideration of the management system should be phased retreat or modification of said infrastructure to eliminate the effects of high water levels experienced in estuarine systems prior to natural breaching. Additionally, future developments in flood prone areas and improvements/extensions on property that will exacerbate flooding and estuarine health problems need to be actively discouraged.
- Artificial breaching should not be considered as a solution to improve water quality but can be considered for public health reasons, as indicated/after being substantiated by accepted virological, bacteriological and/or chemical tests, and/or where there is the obvious introduction of matter that may pose a significant health risk as determined by SANParks personnel and, where necessary, as advised by an appropriately qualified specialists.

A summary of the motivations for potential artificial breaching is provided below in Table 5.

Table 5: Summary of artificial breaching motivation

	Potential Threat		**Relevance**
Human wellbeing and safety	Threat to human life (as a result of high water levels)		No threats to human life
	Threat to immoveable property and infrastructure (as a result of high water levels)		Yes, there are a number of low lying properties around the edges of the Groot (West) Estuary.
	Human health impact (e.g. flooding septic tanks)		No significant health issues but there are undoubtedly nutrients entering the system from low-lying septic tanks that may become inundated during high water levels when the mouth is closed. An effort is being made to replace the septic tanks with improved systems when the opportunity arises.
	Loss/impaired access (e.g. roads, footpaths)		Inundation of an access road in Natures Valley; the public parking area near the estuary mouth, private gardens along Lagoon drive, and some camping sites in the SANParks De Vasselot restcamp occurs during high water levels when the mouth is closed
	Harmful / Noxious algal blooms		During long closed phases algal blooms may naturally develop along the banks in the shallow warm water.
	Impact(s) on recreational use (e.g. increase depth / surface area when mouth is closed, reduced fishing).		Recreational activities are not majorly impacted by mouth state. It is however noted that when the mouth is open the area can become deeper resulting in an unsafe bathing area. This resulted in one drowning in December 2017.
Ecosystem requirements	Impact on avifuana abundance, species richness/ community composition	Important bird habitat	Yes
		Impact of artificial breaching	Water fowl in the upper reaches may benefit from closed mouth conditions.
		Impact of NOT breaching	The associated higher water levels and potential reduction in fish abundance may indirectly impact on some bird species.
		Occurrence of avian botulism	No bird deaths reported and assessed to date.

	Impact on estuarine fish abundance, species richness/ community composition	Important fish nursery	Artificial breaching may be necessary in order to maintain the ecological functioning of the estuary and its value as a nursery area for fish; this being achieved by ensuring that the mouth is open to allow recruitment and emigration during the peak recruitment period during spring – early summer (August –November).
		Impact of artificial breaching	Positive impacts are recruitment of larval and juvenile fish and return of adolescents and reproductively active fish to the sea to spawn. Negative aspects are a temporary reduction in water volume and littoral habitat and limited mortality of resident benthic species through stranding in algal and macrophyte beds. Aggregations of fish at the mouth just prior to and during breaching are particularly vulnerable to exploitation especially by illegal methods.
		Impact of NOT breaching	Nursery area not available to juvenile fish and eventual drop in recruitment or available biomass of exploited species to marine fisheries.
		Occurrence of fish kills	Fish kills have not been recorded in this system. Should fish kills arise in future from hypo / hypersalinity and / or estuarine harmful algal blooms (e.g. *Microcystis*, golden algae *Prymnesium parvum*) this may be mitigated by open mouth conditions. Nevertheless, ill-timed or inadequate breaching at low water levels and with little water movement may compromise already-stressed fishes' immunity to pathogens and exacerbate fatalities.
	Water quality (Thresholds of concern that would compromise estuarine ecosystem or ecosystem services	Salinity thresholds of concern (high or low) that would compromise ecosystem or ecosystem services	Not applicable.
		Ammonia levels	Not applicable.
		Toxic substance in the context of breaching	Not applicable.
		Pollution sources include septic tanks at houses that leak or become inundated during high water levels and stormwater from the village entering the system.	
	Eutrophication	Excessive reed growth	N/A
		Macrophyte blooms	N/A
		Harmful algal blooms	N/A
	Sedimentation	On-going sedimentation	No large scale bathymetric surveys have been carried out in the estuary. Regular artificial breaching and resultant reduced sediment scour on breaching would be expected to increase sediment deposition and accumulation, particularly in the lower estuarine reaches.
	Type	**Yes/No**	**Motivation**
	Major flood events associated with severe flood damage	Yes	Only an emergency if estuary water level is high and a severe flood is eminent (i.e. cut-off low/1:20 year flood). Premature breaching will also be considered when major flow or flooding is experienced, threatening infrastructure along the estuary.
	Poor water quality	Yes	Low oxygen levels throughout the system may be considered an emergency (must be verified through regular monitoring and estuarine specialist consultation). Salinity levels are not a consideration because the system is characteristically saline.

	Fish kills	Yes	DEFF to determine the cause of fish kills and then establish if major fish kills can be remedied by breaching.
	Hazardous spill	Yes	Facilitation of the dispersal, dilution or removal of chemical pollutants that have been accidentally introduced into the system, and which pose a significant threat to either public health, the survival of estuarine biota, and/or the ecological functioning of the estuarine system. The mouth may not be artificially closed other than to protect the estuary by preventing the inflow of pollutants from the marine environment, as contained in the Oil Spills Contingency Plan for the area by the Branch: Oceans and Coasts of the Department of Environment, Forestry and Fisheries. Spillage of organic waste should be addressed using standard biological control measures.
	Emergency repair	Yes	The undertaking of emergency repair of essential services infrastructure may result in the mouth needing to be breached in order to lower the water level and undertake the work.

4 RELEVANT AUTHORITIES

Table 6 lists the key lead authorities involved in artificial breaching at the Groot (West) Estuary.

Table 6: Key lead authority involved in artificial breaching

Management authority	SANParks
Advisory committee	Groot (West) Estuary Advisory Forum
Authorisation (breaching/emergency)	SANParks. The authorising authority for this MMP/MaintMP is the National Department of Environment, Forestry and Fisheries.
The subcommittee for the consultation for planned and emergency breaching includes the Area Manager for the Tsitsikamma Section of the GRNP, the GRNP Park Manager and SANParks Scientific Services. The Groot (West) Estuary Advisory Forum, which consists of SANParks, Bitou Municipality, Natures Valley Ratepayers Association and the Natures Valley Trust, plays an advisory role for the management of this estuary. The forum should aim to meet three times a year. Data on water level, berm height, salinity, as well as water quality parameters where feasible, will be collated by SANParks. Once the Breaching sub-committee has decided that an artificial breach must occur, SANParks (in conjunction with Bitou Municipality at times), shall be responsible for overseeing the breaching activities. The Local authority includes the Bitou Municipality. The authorising authority for this MMP/MaintMP is the National Department of Environment, Forestry and Fisheries.	

5 BREACHING SPECIFICATIONS

The following breaching specifications need to be met before artificial breaching of the Groot (West) Estuary can be considered (Table 7):

Table 7: Groot (West) Estuary Breaching Specifications

Breaching considerations	Details		
Minimum breaching level (water level should be as high as possible before breaching)	≥2.4 m msl	Y/N	Level to MSL
	Planned breaching is to be collectively decided upon by the subcommittee comprising the Tsitsikamma Area Manager, the Garden Route National Park Manager and SANParks Scientific Services. This would constitute planned breaching and would typically be undertaken to prevent excessive flooding of infrastructure or in extreme events (e.g. estuary being closed for years) to reinstate natural processes.		

	The minimum artificial breaching level for the Groot (West) Estuary in the absence of emergency conditions is 2.4 m amsl. A gauging plate is to be erected and maintained at the mouth by SANParks. The estuary must wherever possible be allowed to breach naturally, which on average, according to local knowledge, occurs at approximately 2.2 m amsl. Thus some flooding of facilities/infrastructure is tolerated, which commences when the estuary water level is approximately 2.0m amsl. If the water level continues to slowly rise to achieve or exceed 2.4m amsl (because the sandbar at the estuary mouth is in excess of 2.4 m amsl) then artificial breaching can be considered. It is recommended that SANParks patrol the berm when water levels are high as the public may attempt unauthorized breaching. The risk of this is high when the water level is about 30 cm below the berm height. Emergency breaching would be in response to events such as a large scale contamination with pollutants (e.g. a tanker spill), significant public health risks that cannot be managed by means other than breaching, or the threat of major flooding where the rain has already fallen, water levels are increasing, and the sandbar is high. While a minimum breaching height in the event of an emergency is not prescribed, these situations should be dealt with on a case-by-case basis in consideration of the circumstance, time scales and degree of threat. The breaching is to be collectively decided upon by the subcommittee. An issue however that needs to be guarded against is frequent pre-emptive responses to inaccurate emergency weather warnings that lead to repetitive premature breaching. If this were to happen, in certain circumstances other management actions would need to be considered as alternatives to breaching, such as sandbar skimming. Where skimming is undertaken the sandbar height may not be reduced to less than 2.4m amsl over any portion of its length.
Optimum breaching period (if applicable)	The Groot Estuary is relatively small and its catchment quite steep. This results in the estuary filling and draining quite quickly. Artificial breaching can occur multiple times per year. Optimal fish recruitment would be between September to November but extending until around March. It is preferable to breach the estuary during September to November as this corresponds to the breeding cycle of certain key marine species, provided that normal breaching conditions (minimum water height of 2.4 m amsl) are met.
Neap-spring breaching considerations	Preferably 3-4 days before spring tide, but priority should be given to wave conditions and water levels. Local observations are required on the degree to which waves will hinder breaching attempts during the planned breaching. The higher the berm, the more the system is buffered against the effects of high waves from the ocean. A calm period of 1 to 2 days is preferred.
Timing of breaching	Wherever possible it should be attempted to coincide estuary breaching with a receding tide to maximise the rate of sediment erosion in the estuary mouth by out-flowing water.
Consider safety of public during breaching	Law Enforcement personnel must be in attendance during the opening of the estuary mouth to assist with crowd control and to prevent fishing during the initial mouth opening. Night breaching is preferred in order to lessen numbers and alleviate crowding of spectators. Signage is important during breaching to warn people about dangers of interfering with breaching or being too close when it is executed and must be erected before planned breaching may occur. The following signage is proposed: "*This zone is actively managed under a mouth management plan please stay clear of the area while breaching is in progress*".
Breaching trench to maximize outflow	A preparatory channel may be constructed at any time prior to estuary breaching if deemed necessary by SANParks personnel to facilitate future breaching. The extent and design of a preparatory channel must be such that unintended premature breaching of an estuary (<2.4m amsl – Groot (West) Estuary) cannot occur as a result of either sediment erosion from the preparatory channel by high seas, or deliberate acts to breach the estuary by unauthorised persons. A preparatory channel is constructed by means of a bulldozer, and/or back-actor or similar such equipment in an area that has been identified where a natural breach is most likely to take place, from the water's edge

	of the estuary to the high water mark on the seaward side, and the height of the plug on the seaward side not exceeding 3 amsl and not lower than 2 amsl. Wherever possible heavy earth moving equipment, such as a bulldozer, mechanical shovel, or similar equipment should be used in the breaching of the estuary to maximise the length and depth of the breaching channel; increase the probability of being able to effect a breach at the desired time; and decrease the time required to effect a breach during periods of increased flooding risk. A deep (up to 2m if possible) trench at least 4m wide should be excavated before breaching to maximize outflow.
Location of the breaching position	The location of the breaching point should take historical breaching points, if known, into account, and thereby mimic the natural system in terms of where the mouth would be if the estuary had breached naturally. Significant scouring potential is lost if the system has to cut new channels in the lower reaches during breaching. This consideration may require the alignment of the breaching channel with an older historical channel configuration. Lastly, care should be taken with the breaching location to ensure that the channels do not become unnecessarily long resulting in reduced tidal flushing and possible premature closure.
Disposal of sediment removed during excavation	The sand removed from the channel, should either be distributed adjacent to the channel on the beach or stockpiled and removed at a later stage in accordance to the resource utilization policy. In the unlikely event of marine sediment remaining on the beach after a breaching, no additional action is required as it will generally wash away after a few high tides.
Mobilizing machinery and equipment on site during breaching	• The TLB/bulldozer access to the estuary mouth will be from the estuary carpark. • The TLB/bulldozer may not access adjacent dunes or any other routes other than the specified route indicated by SANParks' officials for the breaching operation. If the specified route is for some reason inaccessible permission must first be granted by a duly authorised SANParks official to use another possible route to the estuary. • SANParks personnel must be on duty to indicate to operator which way to go and where to breach the mouth and must remain in the area during breaching. • Before the vehicle accesses the beach, the area must be checked for breeding birds and these nesting areas must be avoided. • Care should be taken to ensure that earth moving equipment do not damage indigenous vegetation of conservation worthiness on route to the excavation site. • Equipment and machinery must be in be in a good mechanical state. Fluid leaks are not to cause additional pollution. • Once it has been established that a clear outflow channel has formed and breaching is progressing on its own momentum the earth moving equipment may be removed from the beach. • Appropriate people control mechanisms must be implemented, such as comprehensive signage with information on the associated dangers. • The management authority remains responsible for costs associated with estuary breaching unless otherwise specified. • SANParks retains management responsibility of the designated area, even though they may grant permission to manage the designated area, on their behalf, to any competent contractor /service provider, in this case Bitou Municipality. • SANParks personnel are to ensure that the site is rehabilitated and that the operator exits the area via the same point where they've entered. • All temporary signage and barrier tape must be removed after breaching has been completed and restrictions on access and activities (eg. fishing) no longer imposed. • The methodology outlined above will be regularly assessed and adjusted to implement the most effective breaching method.
Noise & light pollution	Noise on this site should be kept to a minimum and within the relevant noise control by-laws/regulations of the municipality.

Ecological considerations	Fish: There will be a restriction on any fishing in the breaching channel, estuary mouth, and up to 500m upstream of the estuary mouth for two days before (where known) and both during breaching and two days after breaching to prevent exploitation of migrating fish. SANParks personnel will be deployed for this period to ensure compliance with this condition.

6 OPERATIONAL PROCEDURES

Two types of breachings are distinguished for the Groot (West) Estuary, namely (a) Planned artificial breachings undertaken according to the MMP/MaintMP and (b) Emergency breaching (e.g. to avoid danger of extreme flooding). Each type is briefly discussed below and illustrated with a flow chart.

6.1 Planned mouth breaching procedures

SANParks is responsible for the operational aspects of the Groot (West) Estuary MMP/MaintMP. They can delegate this function, but ultimately they have oversight over the functioning of the Breaching Sub-committee. SANParks (or its delegated structure) are required to coordinate the Breaching Sub-committee, which include:

- Convening Breaching Sub-committee meetings (when listed specifications are triggered or in expected to be triggered in the near future due to inclement weather);
- Recording the minutes of the Breaching Sub-committee meetings;
- Distributing relevant information to the Breaching Sub-committee members;
- Sharing the post-breaching incident report of the Breaching Sub-committee; and
- Sharing process followed with the Estuary Advisory Forum (if time permits).

SANParks is also responsible for continuous monitoring of the conditions in the catchment when water levels become elevated. Communication between the different role players should take place on a regular basis. This can be done at an advisory committee/forum meetings or as email communications summarising critical aspects. The day-to-day monitoring should include the following aspects:

- The actual and expected rainfall in the catchment;
- The water level in the estuary and its rate of increase;
- The actual and predicted wave conditions;
- The availability of equipment to breach the mouth;
- Water quality conditions (if applicable); and
- Biotic responses to elevated water levels (e.g. fish aggregations at mouth, formation of algal blooms, die-back of macrophytes, bird nesting behaviour).

Once the breaching criteria (see Section 5) are met, the decision to artificially breach will be made by SANParks. A flow chart (Figure 2) for a planned mouth breaching procedures to be followed is included in Table 7.

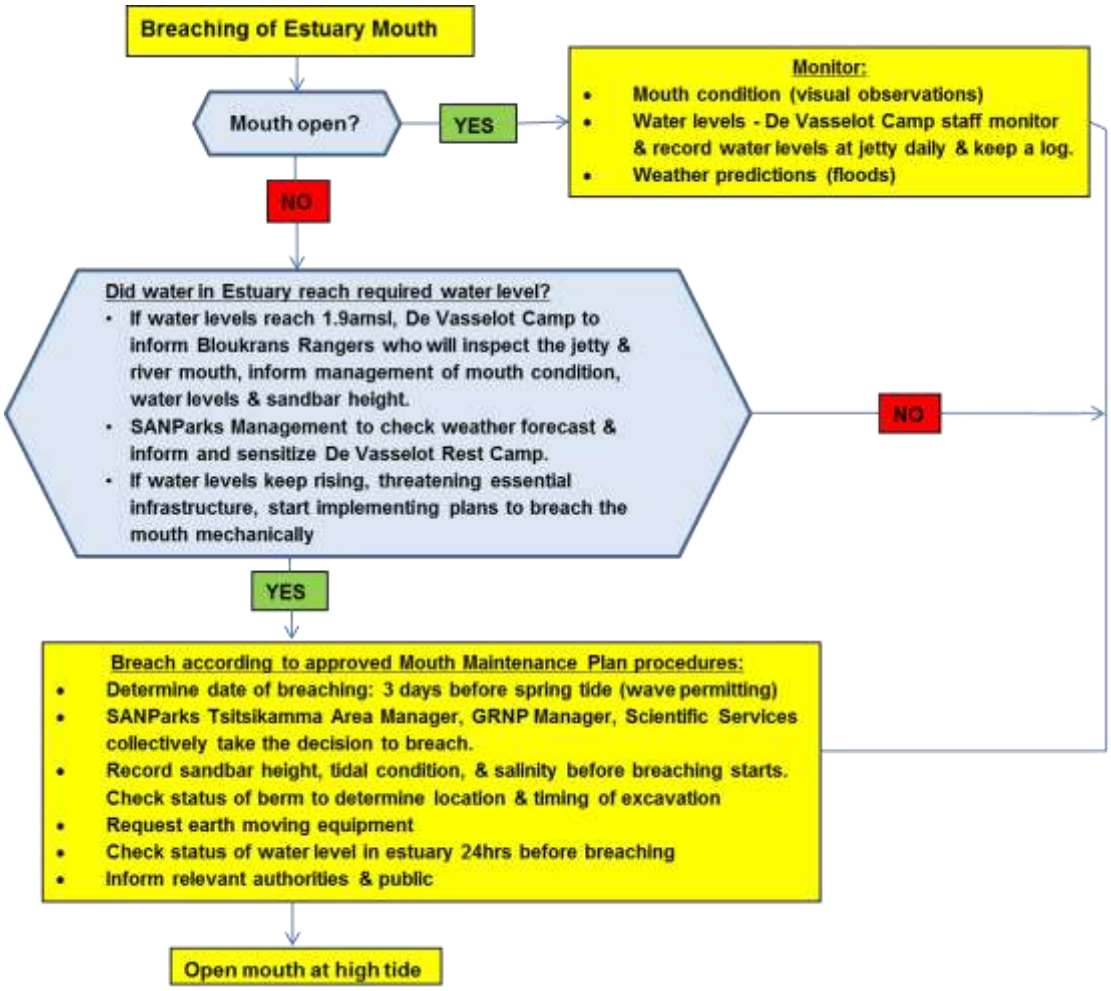

Figure 2: A flow chart illustrating the breaching plan for normal conditions

Once the Breaching Sub-committee has established that the relevant criteria have been met and that artificial breach must occur, SANParks shall be responsible for overseeing the breaching activities. SANParks is responsible for the following:

- Ensuring the availability of Earth moving equipment on day of breaching;
- Establishing the exact location and time of the breaching channel;
- Verifying that the sandberm at the mouth is high enough above the water line that there is no risk of "fluidization" of berm sediment (i.e. turns to quicksand) and associated risk to operator and equipment;
- Deployment of flags and signage to warm public of risk to safety; and
- Breaching of the estuary mouth (it should be noted that the excavations may take several hours).

Finally SANParks is responsible for the compilation of a Breaching Incident Report to be provided to DEFF within 14 days of the actual breaching (see Section 8 for more detail on the report).

6.2 Emergency

A flow chart for the undertaking of mouth breachings under emergency conditions is included in Figure 4. Breachings should be undertaken in the swiftest manner possible. While breaching should be conducted according to an Estuary Mouth Management Plan and an approved MaintMP, some of the general breaching principles may be waivered under emergency conditions to ensure an expedient breaching. Emergency conditions could develop when an estuary mouth is closed/constricted and severe rainfall occurs in the catchment causing a large flood. Constant monitoring of the conditions in the catchment is required when emergency conditions develop.

Communication between the different role players, i.e. SANParks, Bitou Municipality, and key authorities involved, should take place, if time is available, to monitor the situation.

Included in the monitoring are:
• The actual and expected rainfall in the catchment.
• The water level in the estuary and its rate of increase.
• The height and width of the sand berm at the mouth.
• The actual and predicted wave conditions.
• The availability of equipment to breach the mouth on short notice.

While most emergency breachings relate to floods Section 3 lists some additional events that can constitute an emergency at the Groot (West) Estuary.

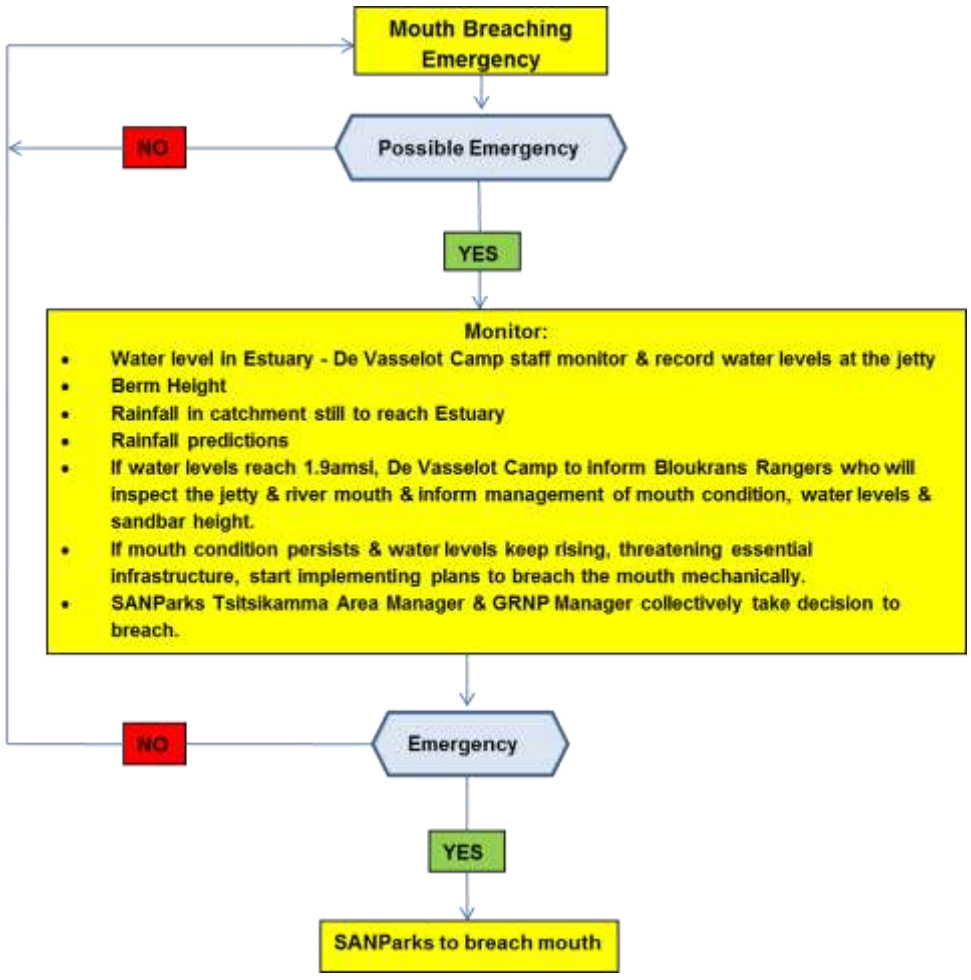

Figure 3: A flow chart illustrating the breaching plan for emergency conditions

7 MONITORING PROGRAMME

The following monitoring programme supports the responsible management of artificial breaching (Table 9):

Table 8: Monitoring programme for Groot (West) Estuary

MONITORING ACTIONS	FREQUENCY	AGENCY RESPOSNSIBLE
Weather forecast (projected rainfall and waves)	Period leading up to breaching	SA Weather Services
Water levels	Continuous	DWS ?
Salinity	Monthly (and day before and after 5 to 10 days after breaching)	SANParks
Observations whether estuary mouth is open or closed	Continuous	SANParks
In situ water quality and bacteriological sampling	Monthly	Bitou Municipality
Berm height	Weekly (and just before breaching if breaching is planned)	SANParks
Photographs	To be arranged between authorities before, during and after breaching	SANParks
Fish surveys Distribution, abundance, movement and behaviour (e.g. recruitment, aggregations, fish kills)	Quarterly	SANParks & Natures Valley Trust

Any source of pollution into the system needs to be identified and the necessary remedial steps taken, including where pollution is caused by private individuals. Where deemed necessary, the cost of remediation should be recouped from such private individuals as provided for in NEMA.

The fish community of the estuary is monitored on a quarterly basis in a collaborative project between SANParks and the Natures Valley Trust. This monitoring includes multiple sample sites (n=6), multiple gear types (seine, fyke and gill nets) and records of species, abundance and size frequencies. Spatial and temporal patterns in distribution and abundance of an alien invasive fish species are also monitored.

8 REPORTING

Following an estuary mouth opening a Breaching Incidence Report needs to be compiled and provided to DEFF within 2 weeks of breaching. The relevant SANParks section ranger will compile this report and submit it to the Area Manager for recordkeeping and submission to DEFF. This report should contain as much information as possible on the breaching motivation and the process followed during the breaching.

In addition to the Breaching Incidence Report, the managing authority should compile an Annual Mouth Breaching Report that summarises information on all mouth manipulation activities, ecological responses and consequences to human well-being and safety. It is suggested that information on breaching activities are made available within the GRNP's general newsletter and/or website to keep the general public and interested parties updated, and in doing so communicate progress with the implementation of the MMP. Such feedback sessions provide the opportunity for a critical review of current breaching practises and discussions on possible improvements to future MMPs.

Illegal breaching of the Groot (West) Estuary mouth will be strictly monitored and SANParks law enforcement personnel will be responsible for enforcing Reg. 39 (1) (b), Reg. 39 (1) (c) (iv) and Reg. 81 (b) of the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003).

8.1 Breaching Report

Table 9 below summarises the minimum content of a Groot (West) Estuary Breaching Report. The initial Breaching (incidence) report should be complied within two weeks of breaching, with data gaps (e.g. duration open) addressed after mouth closure.

Table 9: Content of Groot (West) Estuary breaching report

ACTIONS	AGENCY RESPOSNSIBLE
Weather and ocean information: • Weather conditions • State of the tide (spring-neap/ high-low tide) • Sea conditions (calm/stormy, swell)	SANParks
Breaching specifications that triggered the event: • Indicate which of the section 5 specifications necessitated the breaching (include supporting specialist communications where need be)	SANParks
Estuary Information: • Estuary water level heights before breaching • Sandbar heights • Outflow duration (from water level graph) • Lowest water level achieved after breaching (from water level graph) • Did flooding problems arise before or during the breaching? If so, quantify these problems. • Could measures be taken to prevent such problems in the future? For example by protection of low lying properties. Distinguish between short-term and long-term measures. • Date since last breaching	SANParks
Location of channel: • Align with historical position of channels (photographs and GPS location) • Reduce channel length	SANParks
Period for which the mouth stayed open (not required in initial incident report if mouth remain open)	SANParks
Salinity measurement before and after breaching	SANParks
Meeting attendance register or correspondence of subcommittee that approved breaching & Chairperson	SANParks
Other information deemed relevant (eg. the timing and nature of actions undertaken, etc.)	SANParks
Assessment record compiled by: Name: Organization: Date: Contact details:	SANParks

8.2 Feedback on breaching activities

Table 10 below summarises the minimum information required as evidence of breaching feedback reporting. Ideally the breaching report should be provided to the appropriate SANParks Advisory Forum and other interested stakeholders / specialists post breaching. The breaching process should be communicated to the forum on an ongoing basis throughout the process to keep stakeholders abreast of all developments and decisions taken. If this is not possible, such report back sessions should be held at least once a year to ensure that the correct breaching procedures are being followed and that additional interventions are not required.

Table 10: Minimum information required for breaching feedback sessions

ACTIONS	AGENCY RESPOSNSIBLE
Responsible agency /authority	SANParks
Place & meeting venue	SANParks
Date	SANParks
Meeting participants (attach attendance register)	SANParks
Workshop chaired by	SANParks
Key lessons learned that could assist with future breaching	All
Material presented at meeting (including copies of presentations)	All

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APPENDIX 2: RECOMMENDED RESOURCE MONITORING PROGRAMME

Table 12: Recommended long-term monitoring programme for the Groot (Wes) River estuary (priority components are highlighted) (DWS, 2017)

ECOLOGICAL COMPONENT	MONITORING ACTION	TEMPORAL SCALE	SPATIAL SCALE
Hydrology	Record river inflow at head of estuary	Continuous	Head of estuary
Hydrodynamics	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
Sediment dynamics	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
Water quality	Electrical conductivity, pH, inorganic nutrients and organic content (e.g. TP and Kjeldahl N) in river inflow *(preferably also suspended solids and temperature)*	Monthly continuous (as in DHSWS monitoring programme)	Just above head of estuary
	Salinity and temperature profiles (and any other in situ measurements possible e.g. pH, DO, turbidity)	Seasonally, annually	Along entire length of estuary (at least 3 station 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 station 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
Microalgae	Record relative abundance of dominant phytoplankton groups, i.e. flagellates, dinoflagellates, diatoms, chlorophytes and blue-green algae. 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. Intertidal and subtidal benthic chlorophyll-a measurements (4 replicates each) using a recognised technique, e.g. sediment corer or fluoroprobe.	Quarterly for 1st two years and then low flow surveys every 3 years	Along length of estuary minimum 5 stations
Macrophytes	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. 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	Every 3 years in summer	Entire estuary (mapping) Where there is salt marsh (minimum 3 transect sites)

ECOLOGICAL COMPONENT	MONITORING ACTION	TEMPORAL SCALE	SPATIAL SCALE
Invertebrates	Collect duplicate zooplankton samples at night from mid-water levels using WP2 nets (190 um mesh) along estuary Collect sled samples (day) at same zooplankton sites for hyper benthos (190 um) 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). Intertidal invertebrate hole counts using 0.25 m^2 grid (5 replicates per site). Establish the species concerned *(Callichirus kraussi* or *Upogebia Africana*) using a prawn pump. Collect sediment samples using the grab for particle size analysis and organic content (at same sites as zooplankton) (*preferably link with sediment dynamics*)	Quarterly for 1st two years and then Every 2 years mid-summer	Minimum of 3 sites along length of entire estuary For hole counts – three sites in each of muddy or sandy areas,
Fish	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. 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 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 Gill net sampling can be replaced by a large mesh seine (44 mm stretch mesh, 100 m x 2 m) 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	Twice annually Spring/ summer and autumn/ winter	3-5 stns (mouth, mid, top)
Birds	Undertake count of all water birds	Every 2 years mid-summer	Entire estuary

APPENDIX 3: ECOLOGICAL SPECIFICATIONS

Table 13: EcoSpecs and Thresholds of Potential Concern for the Groot (Wes) River estuary (Category A) (DWS, 2017)

ECOLOGICAL COMPONENT	RECOMMENDED ECOSPECS	THRESHOLD OF POTENTIAL CONCERN
Hydrology	• Maintain present day base flows	• MAR do not vary by more than 10% • Floods (indicated by 1:10 year event) do not reduce by more than 5% from present. • Base flows do not increase by more than 50% from present
Hydrodynamics	• Maintain mouth state to create the required habitat for birds, fish, macrophytes, microalgae and water quality	• Closed mouth state increase by 10% from present • Average water level in system > 10% from present • Tidal amplitude (when open) < 20%
Water Quality	• Salinity distribution not to cause exceedance of TPCs for fish, invertebrates, macrophytes and microalgae • Turbidity and Dissolved oxygen not to cause exceedance of TPCs for biota • Dissolved Inorganic Nitrogen (DIN)/ Dissolved Inorganic Phosphorous (DIP) concentrations not to cause in exceedance of TPCs for macrophytes and microalgae • Toxic substances not to cause exceedance of TPCs for biota	• Average salinity along estuary decrease by 5 below baseline average (to be determine) • Average salinity < 10 at the head of the estuary (expected average range 5-10 for most of the system) • Dissolved Oxygen (DO) < 5 mg/ℓ in estuary • Turbidity > 10 Nephelometric Turbidity Units (NTU) in low flow • Secchi: to bottom • DIN >100 µg/ℓ once off • DIP > 20 µg/ℓ once off • Concentrations in water column exceed target values as per SA Water Quality Guidelines for coastal marine waters (DWAF, 1995) • Concentrations in sediment exceed target values as per WIO Region guidelines (UNEP/Nairobi Convention Secretariat and CSIR, 2009)
Sediment dynamics	• Flood regime to maintain the sediment distribution patterns and aquatic habitat (instream physical habitat) so as not to exceed TPCs for biota • Changes in sediment grain size distribution patterns not to cause exceedance of TPCs in benthic invertebrates • Change in average sediment composition and characteristics • Change in average bathymetry	• Average sediment composition (% fractions) along estuary change from baseline (to be measured) by 30% (per survey) • 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)

ECOLOGICAL COMPONENT	RECOMMENDED ECOSPECS	THRESHOLD OF POTENTIAL CONCERN
Microalgae	• Maintain median phytoplankton/benthic microalgae biomass • Prevent formation of phytoplankton blooms	• Phytoplankton >3.5 µg/ℓ (median) • Benthic microalgae >11 mg/m^2 (median) • Phytoplankton >20 ug/ℓ and/or cell density >10 000 cells/ml (once-off)
Macrophytes	• Maintain distribution of macrophyte habitats. • Prevent an increase in nutrient input leading to macroalgal blooms. • Control the spread of invasive plants in the riparian zone.	• Greater than 20 % change in the area covered by macrophytes (reeds and sedges currently cover 2.54 ha salt marsh 0.76 ha). • Macroalgal blooms cover > 50% of the open water area during closed mouth conditions. • Invasive plants cover >5% of total habitat.
Invertebrates	• Establish presence absence of sand prawn *Callichirus kraussi* on sand banks in lower estuary • Establish presence absence of the copepod *Pseudodiaptomus hessei* or estuarine congeneric in the zooplankton of the estuary	• If present populations deviate from average baselines (as determined in first 3 visits) by more 30%
Fish	Fish assemblage should comprise the 5 estuarine association categories in similar proportions (diveristy and abundance) to that under the reference. Numerically assemblage should comprise: • Ia estuarine residents (50-80% of total abundance) • Ib marine and estuarine breeders (5-20%) • IIa obligate estuarine-dependent (10-20%) • IIb estuarine associated species (5-15%), • IIc marine opportunists (20-80%) • III marine vagrants (not more than 5%) • IV indigenous fish (1-5%) • V catadromous species (1-5%) Category Ia species should contain viable populations of at least 2 species (*G.aestuaria, & Hyporamphus capensis,* Category IIa obligate dependents should be well represented by at least 2 large exploited species (*L. lithognathus, Lichia amia*). REI species dominated by both *Myxus capensis* and *G. aestuaria*.	• Ia estuarine residents <50% • Ib marine and estuarine breeders <10% • IIa obligate estuarine-dependent <10% • IIb estuarine associated species <5% • IIc marine opportunists < 20% • III marine vagrants > 5% • IV indigenous fish <1% • V catadromous species <1%

ECOLOGICAL COMPONENT	RECOMMENDED ECOSPECS	THRESHOLD OF POTENTIAL CONCERN
Birds	• Maintain population of original groups of birds present on the estuary	• 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.

APPENDIX 4: PERFORMANCE MONITORING

Table 14: Recommended Performance Monitoring for the Groot (Wes) River estuary

MANAGEMENT OUTPUT	PERFORMANCE INDICATOR	TEMPORAL SCALE (frequency)	RELEVANT LEGISLATION	RESPONSIBLE AUTHORITY
1. ESTUARINE HEALTH AND FUNCTION				
1.1. Secure adequate quantity and quality of freshwater input to maintain ecosystem health and functioning	• Recommended reserve(s) signed off and implemented • Sustained river flow & natural mouth dynamics • Good water quality • Water quality monitoring programme established, and data generated • Good annual report card • Ecological condition maintained at A/B	• Biannually for DHSWS	NWA	DHSWS, BGCMA, SANParks (RMA)
1.2. Ensure sustainable and effective mouth management	• MMP approved and implemented • Main MP developed and approved • Execution of science based artificial breaching / mouth manipulation • Ongoing stakeholder engagement	• As required	ICMA, NEMA	SANParks (RMA)
1.3. Ensure estuary requirements are integrated into catchment processes to ensure healthy water quality	• Updated catchment maps provided • Catchment water quality programme developed and implemented • Good catchment water quality • Participation in in BGCMA activities	• Biannually	NWA, NEM: PAA	SANParks (RMA), BGCMA, DHSWS
1.4. Pollution inputs to the Groot (Wes) River estuary are reduced	• Pollution sources identified • Mitigation measures implemented • Improved water quality	• Monthly	NWA,	Bitou LM, DHSWS, SANParks (RMA), BGCMA
1.5. Control and where possible eliminate, alien vegetation	• IAPs eradication programme implemented • Increased area of IAPs cleared • Re-establishment of natural biodiversity pattern and process in invaded areas	• Biannually	CARA, NWA, NEM: PAA	SANParks (RMA), BGCMA, DEFF: WfW, DALRRD
1.6. Ensure and promote sustainable use of living resources within and	• Monitoring programme implemented to determine estuarine resource use • Increased patrols undertaken, and findings reported on	• Biannually	NEM: PAA, ICMA, MLRA, NEM:BA	SANParks (RMA), DEFF

	adjacent to the Groot (Wes) River estuary	• Improved compliance with MLRA • Healthy populations of target species • Coordinated joint compliance and enforcement operations with relevant authorities			
2. BIODIVERSITY CONSERVATION					
2.1.	Ensure the conservation of natural estuarine habitats and indigenous species	• Spatial zonation plan adopted and enforced • All developments comply with environmental legislation and environmental best practice / risk aversion approach • Reduced habitat loss/degradation and disturbance, and inappropriate behaviour • Biodiversity surveys and monitoring programmes implemented • Faunal species lists compiled, and Species of Special Concern identified • Reduction in alien fish species populations	• Annually	NEM: PAA, ICMA, NEM:BA, MLRA	SANParks (RMA), DEFF, SANBI
2.2.	Regulate recreational use of the Groot (Wes) River estuary	• Recreational activities within carrying capacity, and controlled through specific regulations • Reduced disturbance and degradation caused by boating and recreational activities	• Biannually	NEM: PAA, ICMA, MLRA	SANParks (RMA), DEFF
3. LAND-USE AND INFRASTRUCTURE PLANNING AND DEVELOPMENT					
3.1.	Ensure appropriate and sustainable coastal development in and around the Groot (Wes) River estuary, considering ecosystem services and sense of place	• EMP and spatial zonation adopted and incorporated into GRNP MP and all relevant planning documents • Committee partakes in development planning affecting the estuary • Signed stewardship agreements/MOUs • No new development, infilling or land transformation in the EFZ • Inspections undertaken, transgressors prosecuted, and remedial actions implemented	• Ad hoc	ICMA, NEMA, NEM: PAA	SANParks (RMA), Bitou LM, DEA&DP

4. INSTITUTIONAL AND MANAGEMENT STRUCTURES				
4.1. Ensure effective co-ordination of estuarine management responsibilities	• EMP and spatial zonation adopted and incorporated into GRNP MP • Regional estuarine management function established and EMC appointed • SANParks well-capacitated with personnel who are trained and knowledgeable • Funding secured for 5 year cycle • Good communication and working relationship established/maintained with implementing agencies • Annual reporting undertaken by SANParks on state of the estuary and progress of EMP achievements	• Biannually	ICMA, NEM: PAA	SANParks (RMA), DEA&DP
4.2. Maintain and support mechanisms for representative cooperation and interaction	• MOUs signed between SANParks and spheres of government and participating agencies • Committee functional and effective • Active collaboration of various institutions, private and civil stakeholders • Individual agencies knowledgeable and with capacity and resources to carry out mandated actions • Formal review of EMP every 5 years	• Quarterly	ICMA, NEM: PAA	SANParks (RMA) supported by all authorities
5. SOCIO-ECONOMIC CONSIDERATIONS				
5.1. Rediscover, rehabilitate and protect all cultural heritage resources	• Cultural Heritage Plan in place, with site specific management guidelines for all sites	• Annually	NHRA	SANParks (RMA)
5.2. Encourage involvement of HDIs in the utilization and service provision of tourism & recreation products in Park	• HDI opportunities identified and implemented • Increased employment opportunities	• Annually	ICMA, NEM: PAA	SANParks (RMA)
5.3. Contributor to the local and regional economy	• EPIP programmes adopted and implemented • Increased employment opportunities • Increased employment of local suppliers	• Annually	ICMA, NEM: PAA	SANParks (RMA)
5.4. Facilitate and maintain PPP	• Identified business opportunities within the park taken up by local stakeholder(s) • Business plans/APOs developed and adopted	• Annually	ICMA, NEM: PAA	SANParks (RMA)
6. EDUCATION & AWARENESS				

6.1. Provide a structured basis for environmental interpretation and education	• Value and importance of estuaries included in all environmental education programmes and campaigns • Educational signage erected, educational resources and interpretive materials developed • Information disseminated	• Every 3 years	ICMA, NEM: PAA	SANParks (RMA), NVT
7. DISASTER RISK MANAGEMENT				
7.1. Disaster prevention and preparedness	• All developments comply with environmental legislation and environmental best practice / risk aversion approach • Risk assessment portfolio compiled, and priority areas identified • Local and regional authorities engaged irt to water quality monitoring and disaster management • Health incident evacuation plan developed • Integrated SSP developed, inclusive of the GRNP Disaster Response and Recovery plan • Emergency response networks established	• Every 2 years	DMA, NEM:WA, NEMA, NWA, ICMA, NEM: PAA	Bitou LM, DHSWS, DEA&DP, BGCMA, SANParks (RMA), WC Dept of Local Gov: Disaster Management
7.2. Mitigate areas of high risk	• Feasibility of retreat/relocation investigated • Rehabilitation programme developed &implemented • Critical infrastructure appropriately protected	• Every 2 years	DMA, NEMA, ICMA	SANParks (RMA), Bitou LM

APPENDIX 5: PROJECT PLAN TEMPLATE

ACTION	**Describe the action to be undertaken**
COMPLETION DATE	**Provide date of expected completion**
PERFORMANCE INDICATOR	
Requirements stipulated in policy and legislation	
Available methods, protocols and best practice-guides	
Spatial zonation consideration (e.g. limits/targets)	
Detailed work plan	Task 1: Task 2: Task 3: Task 4:
Scheduling	
Milestone/interim performance indicator	
Responsibilities for different tasks	E.g. Identify specific departments, personnel and/or service providers responsible for execution of this action
Monitoring and reporting plan	E.g. • Define data and information to measure in order to monitor performance indicator/s • Specify frequency at which data/information should be collected/monitored • Where and when to report on progress
Human resource plan	
Financial resource plan	

TASK	TIME (months)								
	1	2	3	4	5	6	7	8	9
1									
2									
3									
4									

MILESTONE	INTERIM PERFORMANCE INDICATOR	DUE DATE
1		
2		
3		

HUMAN RESOURCE	WEEKS PER TASK			
	1	2	4	4
Staff member 1				
Staff Member 2				
Service provider				

TASK	COST (ZAR)
1	
2	
3	
4	
TOTAL	

Source: DEA (2015)