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DEPARTMENT OF ENVIRONMENTAL AFFAIRS

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**NATIONAL ENVIRONMENTAL MANAGEMENT: INTEGRATED COASTAL MANAGEMENT ACT, 2008
(ACT NO. 24 OF 2008)****DRAFT UMHLATHUZE/RICHARDS BAY ESTUARINE MANAGEMENT PLAN**

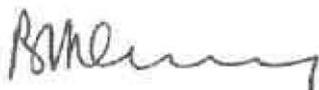
I, Barbara Dallas Creecy, Minister of Environment, Forestry and Fisheries, hereby invite members of the public to comment on the draft uMhlathuze/Richards Bay Estuarine Management Plan (EMP) in terms of section 34(1)(a) read with section 53(1)(c) of the National Environmental Management: Integrated Coastal Management Act, 2008 (No. 24 of 2008). Copies of the draft EMP can be downloaded from the website: https://www.environment.gov.za/legislation/gazetted_notices or can be obtained electronically upon request by email to Rupillay@environment.gov.za.

The EMP is an integrated management planning tool used to understand the ecological health conditions, conservation and biodiversity aspects, and key pressures on estuaries. Its primary intention is to coordinate the implementation of the identified key actions to improve the estuary's ecological health status and ensure goods and services are maintained to support socio-economic benefits. The uMhlathuze/ Richards Bay EMP has identified major threats as impact of sea level rise on mangroves; deterioration of water quality and water abstraction, exploitation of resources (sand mining, harvesting of mangroves, fish) and loss of habitat. This EMP seeks to facilitate cooperative management amongst key sector departments and relevant stakeholders through the implementation of a shared vision and objectives of this plan to improve these estuaries.

Members of the public are invited to submit written representations or objections on the draft EMP, within 30 (thirty) days after the publication of this notice in the *Gazette*, written representations on or objections to the draft EMP received after this time may not be considered. All representations and comments must be submitted in writing to the Deputy Director-General of the Department of Environment, Forestry and Fisheries, Branch Oceans and Coasts:

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MINISTER OF ENVIRONMENT, FORESTRY AND FISHERIES

Final Draft

UMhlathuze & Richards Bay Estuarine Management Plan



environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

Acknowledgements

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A wide range of key stakeholder have contributed towards the development of this management plan, their contributions are greatly appreciated.

This report should be referenced as:

Department of Environmental Affairs, South Africa (DEA). December 2018. Final Draft uMhlathuze & Richards Bay Estuarine Management Plan.

Acronyms

CARA	Conservation of Agricultural Resources Act (Act No. 43 of 1983)
CMP	Coastal Management Programme
CoU	City of uMhlathuze
CSIR	Council for Scientific and Industrial Research
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DEAT	Department of Environmental Affairs and Tourism
Defence Act	Defence Act (Act No. 42 of 2002, amended 2010)
DMR	Department of Mineral Resources
DoT	Department of Transport
DPLG	Department of Provincial and Local government and municipalities
DPW	Department of Public Works
DWA	Department of Water Affairs
DWAF	Department of Water Affairs and Forestry
DWS	Department of Water and Sanitation
EFZ	Estuarine Functional Zone
EIA	Environmental Impact Assessment
EMP	Estuarine Management Plan
Energy Act	National Energy Act (Act No. 34 of 2008)
ICM	Integrated Coastal Management
IDP	Integrated Development Plan
KZN	KwaZulu-Natal
MEC	Member of the Executive Council of a coastal province responsible for designated provincial lead agency in terms of the ICM Act
MLRA	Marine Living Resources Act (Act No. 18 of 1998, amended 2000)
MPRD Act	Mineral and Petroleum Resources Development Act (Act No. 28 of 2002)
MSP	Marine Spatial Planning
Municipal Systems Act	Municipal Systems Act (Act No. 32 of 2000)
National Health Act	National Health Act (Act No.61 of 2003)

NBA 2011	National Biodiversity Assessment 2011 (South Africa)
NCMP	National Coastal Management Programme
NEM: Air Quality Act	National Environmental Management: Air Quality Act (Act No. 39 of 2004)
NEM: Biodiversity Act	National Environmental Management: Biodiversity Act (Act No. 10 of 2004)
NEM: ICM Act	National Environmental Management: Integrated Coastal Management Act (Act No. 24 of 2008), as amended by National Environmental Management: Integrated Coastal Management Amendment Act (Act No. 36 of 2014)
NEM: Protected Areas Act	National Environmental Management: Protected Areas Act (Act No. 57 of 2003)
NEM: Waste Act	National Environmental Management: Waste Act (Act No. 59 of 2008)
NEMA	National Environmental Management Act (Act No. 107 of 1998)
NMU	Nelson Mandela University
NWA	National Water Act (Act No. 36 of 1998)
NWMS	National Waste Management Strategy
PES	Present ecological status
RBCT	Richards Bay Coal Terminal
REC	Recommended ecological category
SALGA	South African Local Government Association
SAMSA	South African Maritime Safety Authority
SAMSA Act	South Africa Maritime Safety Authority Act (Act No. 5 of 1998)
SANBI	South African National Biodiversity Institute
SANParks	South African National Parks
SDF	Spatial Development Framework
SDI Act	Spatial Data Infrastructure Act (Act No. 54 of 2003)
SOPs	Standard Operating Procedures
SPUMLA	Spatial Planning and Land Use Management Act (Act No. 16 of 2013)
“the Protocol”	National Estuarine Management Protocol
Transnet NPA	Transnet National Ports Authority

Table of Content

Contents

Acknowledgements.....	i
Acronyms.....	ii
Table of Content.....	iv
1 Introduction.....	1
1.1 Background.....	1
1.2 Context of the Estuarine Management Plan.....	3
1.3 Structure of this Report.....	3
2 Synopsis of Situation Assessment.....	5
2.1 Geographical Focus for EMP.....	5
2.2 Present Ecological Health Status.....	6
2.3 Ecological Importance and Protection Status.....	6
2.4 Important Ecosystem Services and Existing Use.....	7
2.5 Threats: Biodiversity and Socio-economic Values.....	9
2.6 Opportunities and Constraints.....	10
2.7 Key Information Gaps.....	11
3 Confirmed Geographical Boundaries.....	13
4 Vision, Strategic Objectives and Key Principles.....	15
4.1 Vision.....	15
4.2 Strategic Objectives.....	16
5 Management Objectives and Associated Actions.....	18
5.1 Conservation.....	18
5.2 Utilisation of Living and Non-living Resources.....	19
5.3 Land-use and Infrastructure Planning Development.....	19
5.4 Management of Water Quality and Quantity.....	20
5.5 Socio-Economic Issues.....	20
5.6 Climate Change.....	21
5.7 Education and Awareness.....	21
5.8 Compliance and Enforcement.....	21
5.9 Cooperative Governance.....	22
5.10 Research Needs.....	22
6 Prioritisation of Management Actions.....	23
6.1 Conservation.....	23
6.2 Utilisation of Living and Non-living Resources.....	24
6.3 Land-use and Infrastructure Planning Development.....	25
6.4 Management of Water Quality and Quantity.....	26
6.5 Socio-Economic Issues.....	29

6.6	Climate Change	30
6.7	Education and Awareness.....	30
6.8	Compliance and Enforcement.....	31
6.9	Cooperative Governance.....	31
6.10	Research.....	33
7	Proposed Zonation Plan.....	34
7.1	Introduction.....	34
7.2	Proposed Zonation Plans.....	36
7.2.1	Important administrative boundaries.....	36
7.2.2	Conservation and heritage areas	40
7.2.3	Agriculture and fisheries	42
7.2.4	Tourism-related facilities and recreational activities.....	43
7.2.5	Industries and mining facilities.....	44
8	Integrated Monitoring Plans.....	46
8.1.1	Resource Monitoring Plan.....	46
8.1.2	Compliance Monitoring Plan.....	48
8.1.3	Performance Monitoring Plan.....	49
9	Proposed Institutional Arrangements.....	52
10	References.....	56
11	Appendices.....	58
11.3	Summary of Lake Mzingazi EMP.....	59

1. Introduction

1.1 Background

Sections 33 and 34 of the National Environmental Management: Integrated Coastal Management Act, 2008 (Act No. 24 of 2008) envisage that estuaries are to be managed in a collaborative and co-operative manner through the use of Estuarine Management Plans (EMPs). The Act in turn envisages that EMPs are to be developed in accordance with a National Estuarine Management Protocol (“the Protocol”) published in terms of the Act. This EMP has been developed in accordance with the provisions of the Act and the National Estuarine Management Protocol. The ICM Act recognises the importance of estuaries and their management; and identifies the National Estuarine Management Protocol as a guiding tool to support this. The Protocol identifies the need and minimum requirements for the development of EMPs, and also delegates responsibility to relevant authorities in an attempt to help to align and coordinate estuaries management.

The Mhlathuze/Richards Bay estuary is located to the north of Durban in KwaZulu Natal province. Richards Bay historically qualified as one of three estuarine bays in South Africa, along with Durban Bay and the Knysna estuary, on the basis of its size and strong marine influence. Five rivers flowed into the original system: the Mtantatweni (draining Lake Cubhu), the Mhlathuze (the major river that drained through a delta area of swamp vegetation into the western part of the basin), the Bhizolo and Manzinyama (currently serving as drainage canals) and the Mzingazi (draining Lake Mzingazi).

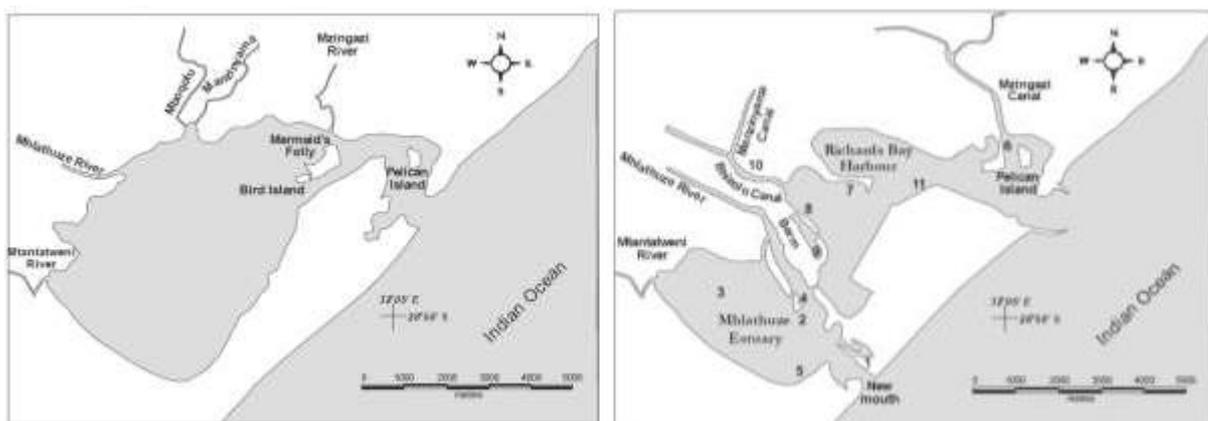


Figure 1: Historical configuration of the uMhlathuze estuarine lake system (left, prior to 1964) and its current configuration (right, post 1976) of an artificially divided system comprising the uMhlathuze and Richards Bay estuaries (Source: Weerts 2002)

Radical transformation of the greater Richards Bay environment began in the 70s with port development, the splitting of the original bay into north and south sections and the redirection of the Mhlathuze River into the southern Sanctuary area as it was initially known. This was followed by all the

activities associated with normal port development in the northern section including i.e. dredging, wharf construction, infilling, mouth widening and stabilisation, breakwater construction and terrestrial infrastructure, all of which have resulted in an environment different from that which existed previously.

Currently Lakes Cubhu and Mzingazi presently function as freshwater lakes as a result of their disconnection from the uMhlathuze/Richards Bay estuarine water bodies. The 2015 Reserve Determination Study conducted in the Usutu-uMhlathuze Water Management Area (WMA) by the Department of Water and Sanitation (DWS) in terms of their water resource protection strategy under the National Water Act (1998) also categorised the lakes as freshwater lakes/pans (DWS water resource: wetlands), separate from the uMhlathuze/Richards Bay systems which were classified as estuaries (DWS water resource: Estuaries) (DWS 2014). Considering this distinction in water resource categorisation, as well as marked differences in current hydrological and ecological processes between the lakes and estuaries, it made practical sense, from a management perspective, to treat Lakes Cubhu and Mzingazi, and the uMhlathuze/Richards Bay estuaries as separate management units, but to still recognise their biological and historical interconnectivity in management decisions and actions.

Despite extensive modification to these systems studied here, these estuaries remain unique and highly productive ecosystems that support complex food webs and functions as a vital spawning and nursery ground for a diverse range of marine and estuarine organisms. Between these two systems they offer almost the complete range of habitat types found in tidal reaches of estuaries, including intertidal and subtidal mudflats, sandbanks, mangroves and seagrass beds.

1.2 Context of the Estuarine Management Plan

To provide guidance in the development of estuarine management plans for individual estuaries, an estuarine management framework has been provided (DEA 2015) structured in terms of the three main phases, namely the Scoping phase, Objective setting phase and the Implementation phase (Figure 1).

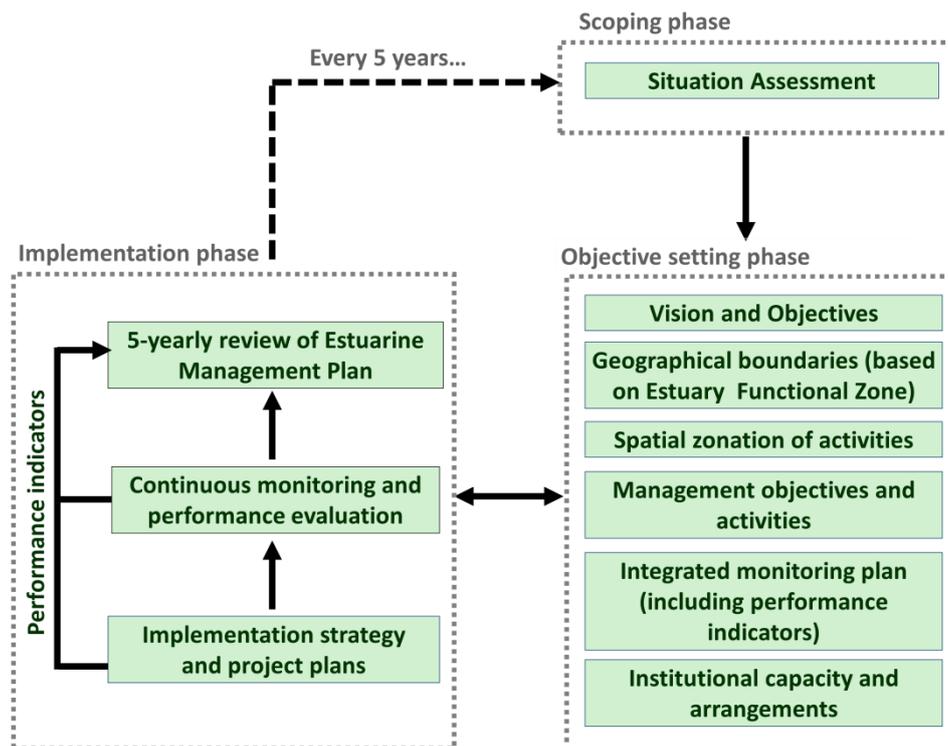


Figure 2: Framework for integrated estuarine management in South Africa (DEA 2015)

1.3 Structure of this Report

This introductory chapter (Chapter 1) is followed by a synopsis of the Situation Assessment Report (DEA 2017), providing context to this management plan (Chapter 2). Then follow a description of the geographical boundaries for this management plan (Chapter 3) and the Vision and Objectives to achieve the vision (or Goals) for estuarine management planning in the uMhlathuze/Richards Bay estuarine systems as developed by the stakeholders (Chapter 4).

Overall management objectives, as well as associated actions to address those objectives are summarised in Chapter 5, including objectives and proposed actions relating to awareness and education. Chapter 6 provides details on each of the proposed management actions to assist with the confirmation of specific priorities for implementation over the next five years. Chapter 7 presents the proposed zonation planning for the uMhlathuze/Richards Bay estuarine system, including the

demarcation of protected areas, sensitive ecosystems as well as different use areas. Chapter 8 presents an integrated monitoring plan, specifically related to environmental management in the uMhlathuze/Richards Bay estuarine system. Finally, Chapter 9 proposes an institutional arrangement to oversee and coordinate the implementation and future reviews of the estuarine management plan, as well as on the importance of estuaries and the need for sound environmental management.

2 Synopsis of Situation Assessment

2.1 Geographical Focus for EMP

During the 2011 National Biodiversity Assessment (Van Niekerk and Turpie 2012), the concept of an estuarine functional zone (EFZ) was introduced to South Africa, where the EFZ defines the functional zone of an estuary not only as its open water area, but also to include adjacent functional estuarine habitat (e.g. sand and mudflats, rock and plant communities and flood plain areas). The EFZ the purposes of this study the EFZs for the uMhlathuze/Richards Bay estuaries was considered to be the area below the 10 m topographical contour (as indicative of +10 m above mean sea level) that include the two adjacent lakes systems, largely reflecting their historical connectivity in the lower uMhlathuze catchment. However, Lakes Cubhu and Mzingazi presently function as freshwater lakes as a result of their disconnection from the uMhlathuze/Richards Bay estuarine water bodies.

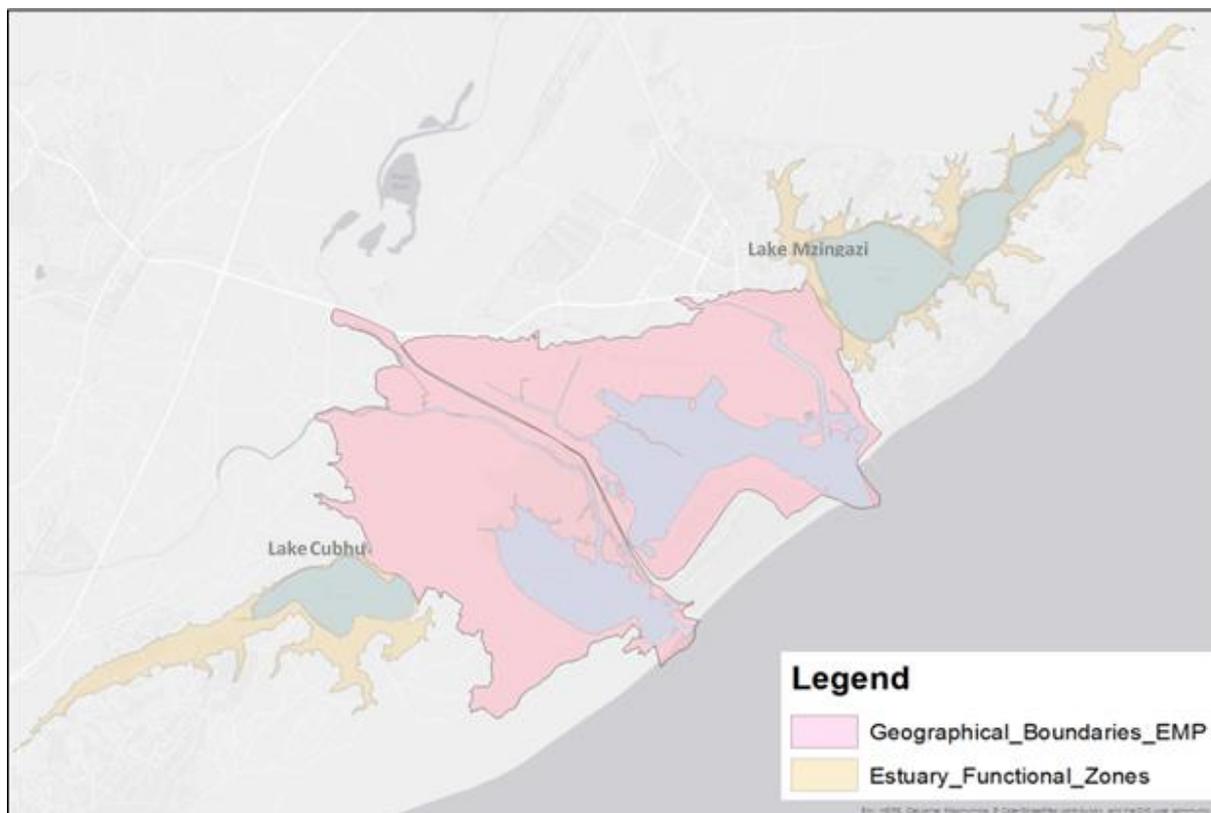


Figure 3: Geographical boundaries for uMhlathuze & Richards Bay estuaries and the EFZ.

2.2 Present Ecological Health Status

An Ecological Freshwater Requirement Study (2000) adopted the following in terms of the Reference Condition (or Natural State) of these estuaries:

“Prior to the creation of the harbour, the estuary was considered an estuarine lake. The present uMhlathuze Estuary is classified as an estuarine embayment. As harbour construction changed the fundamental character of the estuary, the reference state for the uMhlathuze Estuary was considered to be the pristine condition, as an estuarine embayment rather than the pristine condition of an estuarine lake. In other words, the “pristine state” of the estuary assumes that the harbour had always existed and considers the situation prior to any alteration in freshwater flow patterns or volumes”

The National Biodiversity Assessment of 2011 (Van Niekerk and Turpie 2012) included desktop Present Ecological Status (PES) assessments for all South African estuaries, including the uMhlathuze and Richards Bay estuaries (Table 1).

Table 1: Desktop Present Ecological Status, as well as preliminary Recommended Ecological Categories (REC) allocated to uMhlathuze and Richards Bay estuaries in NBA 2011 (adapted from Van Niekerk and Turpie 2012; Turpie et al. 2012)

COMPONENT	MHLATHUZE ESTUARY	RICHARDS BAY ESTUARY
Hydrology	80	80
Hydrodynamics	100	100
Water Quality	62	56
Physical habitat	30	30
Habitat Status	68	67
Microalgae	72	66
Macrophytes	40	20
Invertebrates	60	30
Fish	50	45
Birds	40	80
Biological Status	52	48
PRESENT ECOLOGICAL STATUS	C/D	D
RECOMMENDED ECOLOGICAL CATEGORY (REC)	C	D

2.3 Ecological Importance and Protection Status

Despite extensive modification to these systems studied here, these estuaries remain unique and highly productive ecosystems that support complex food webs and functions as a vital spawning and nursery ground for a diverse range of marine and estuarine organisms. Between these two systems they offer almost the complete range of habitat types found in tidal reaches of estuaries, including intertidal and subtidal mudflats, sandbanks, mangroves and seagrass beds.

The uMhlathuze Estuary is ranked in the top ten (10) most important estuaries in South Africa from a conservation perspective. This ranking was derived by a conservation classification system that takes into account surface area, biodiversity, zonal type rarity and estuarine type of some 250 functional estuaries along the South African coast. By comparison, the Richards Bay Estuary is ranked the 26th

most important estuarine system. Collectively these two estuaries have the largest area of mangroves of all South African estuaries, even larger than at St Lucia. Also, the Richards Bay Estuary is known to have the oldest area of mangroves in the country (Van Niekerk and Turpie 2012).

Along the KZN coast the uMhlathuze and Richards Bay estuaries, together with St Lucia, provide the majority of the suitable nursery habitat for penaeid prawns. Based on expert opinion it can be assumed that these three estuaries each contribute about a third of the nursery function to inshore prawn species (DWA 2010).

The NBA 2011 (Van Niekerk and Turpie 2012) lists both estuaries as very important estuarine nursery areas in South Africa both in terms of protecting biodiversity but also important fisheries. These two systems are viewed as important nurseries for various Kob species, and possibly also for Zambezi sharks. The NBA 2011, therefore, included the uMhlathuze/Richards Bay estuarine system on the list of national priority estuaries for biodiversity conservation. The greater system should, at a minimum, be partially protected with at least 50% of its margins kept undeveloped (Turpie et al. 2012). For this reason, its REC should be a Category A or if not, at least in a Best Attainable State. The uMhlathuze Estuary has already been declared a Marine Protected Area (MPA), managed by Ezemvelo KZN Wildlife (provincial conservation authority).

2.4 Important Ecosystem Services and Existing Use

Natural systems, such as aquatic ecosystems, provide a range of valuable ecosystem services that contribute to the wellbeing of society. The Millennium Ecosystem Assessment (2005) categorised these into (a) Provisioning services, (b) Regulating services and (c) Cultural services. A fourth category, supporting services (e.g. natural nutrient cycling and soil formation), is cross cutting and underpins the ability of systems to provide all of the above service categories. Estuaries, in particular, are recognised as being among the most valuable and productive aquatic ecosystems that are focal points for community and business activities along coasts worldwide. In South Africa, numerous studies have demonstrated the significant contribution of these systems to the local and national economy (e.g. Cooper et al. 2003; Lamberth and Turpie 2003; Turpie and Clark 2007). The ecosystem services provided by estuarine ecosystems, and their relevant importance in South African estuaries have been evaluated previously (Van Niekerk and Turpie 2012; DWA 2010). Specifically, the ecosystem service potential of the uMhlathuze/Richards Bay estuarine system is summarised in Table 2.

Table 2: Important ecosystem service potential of the uMhlathuze/Richards Bay estuaries (DWA 2010)

ECOSYSTEM SERVICE		DESCRIPTION/RELEVANCE	ESTIMATED ANNUAL VALUE in 2009)
Provisioning service	Water	-	
	Food and medicine	Small scale/subsistence fisheries	R 400 K
	Raw materials	Plant resources	R 100 K
Regulating services	Carbon sequestration	Support extensive areas of mangroves and other estuarine vegetation to taking up CO ₂ from the atmosphere through photosynthesis, acting as carbon sinks	R 300 K
	Flood regulation	Harbour development, as well as	Expected loss in value (not

ECOSYSTEM SERVICE		DESCRIPTION/RELEVANCE	ESTIMATED ANNUAL VALUE in 2009)
	Flow regulation	construction on new mouth largely reduced these regulatory services of system which relies on large undeveloped flood plains to enable water and sediment retention	quantified)
	Sediment erosion control/retention		
	Ecological regulation	-	Not valued
	Water purification	Assimilation of contaminated stormwater runoff from harbours areas	Not valued
Supporting services	Biological refuge/Nursery areas	Important nursery and export function for, sediment and nutrient exports, and prawns	R13.5 million (fish)
	Exporting function		R1.6 million (sediment/nutrients)
	Genetic resources	-	R4 million (prawn)
Aesthetic/cultural services	Nature-based tourism	Mostly linked to birding	Not valued
	Property value	-	R 2 million
	Recreational angling	-	Not valued
	Spiritual/cultural value	-	Not valued
	Scientific/educational value	Scientific value (based on research outputs)	Not valued
			R 100 K

Based on the above assessment in 2009, the estimated value of ecosystem services provided by the uMhlathuze/Richards Bay estuarine system comes to more than R22 million per annum (DWA 2010).

The main types of existing uses (or activities) within the geographical boundaries of the uMhlathuze/Richards Bay estuaries - many relying on the ecosystem service potential of the area – include:

- Coastal reserves and conservations areas
- Commercial and subsistence farming
- Port of Richards Bay
- Richards Bay Industrial Development Zone
- Yacht Club Harbour and Sea Rescue
- Marine aquaculture
- Commercial and small-scale farming
- Commercial and recreational areas
- Recreational and subsistence fisheries
- Mining.

2.5 Threats: Biodiversity and Socio-economic Values

The estimated extent of existing (negative) impacts associated with identified threat (or issues) on the biodiversity and socio-economic value of the uMhlathuze/Richards Bay, as well as the status of existing legislation and management responses to mitigate such impacts, are summarised in Table 3.

Table 3: Estimated extent of existing (negative) impacts of identified threats on biodiversity and socio-economical value of the uMhlathuze and Richards Bay estuaries (depicted as H= high; M = medium; L = low), as well the status of existing legislation and management responses to mitigate such impact (G = good; F = fair; P = poor)

GROUPING	EXISTING THREAT/ISSUE	NEGATIVE IMPACT		EXISTING LEGISLATION	MANAGEMENT RESPONSE
		Biodiversity	Socio-Economic		
Loss and destruction of habitat	Dredging activities in Port	H	L	G	F
	New port infra-structure development	H	L	G	P
Exploitation of resources	Illegal gill netting and poaching of fish	H	H	F	P
	Illegal harvesting of mangroves	L	L	F	P
	Sand mining	L	M	P	P
Modification of freshwater inflows	Increased water abstraction	H	M	G	F
	Weirs and barriers in water courses	H	M	P	P
Deterioration of water quality	Contamination of ground water inflow	M	L	F	P
	Pollution from Hillendale Slimes Dam	M	L	G	P
	Pollution from industrial areas (water)	M	L	F	P
	Pollution from industrial areas (air)	M	M	F	P
	Pollution from dredging activities	M	L	G	G
	Pollution from cargo handling activities	M	L	F	P
	Pollution from agricultural activities	M	L	F	P
	Pollution from urban settlements (diffuse stormwater)	L	L	P	P
	Ballast water discharges	L	L	F	F
	Brine discharge (desalination)	L	L	F	F
	Pollution from alien vegetation treatment	H	M	F	P
	Pollution from marine aquaculture	L	L	F	P
Inappropriate Governance	Non-compliance and lack of enforcement	H	H	G	P
	Not fully enclosed formally protected areas	M	L	G	F
	Lack of trust and collaboration among stakeholders	H	H	F	P
	Lack of education and awareness initiatives	M	M	F	P
Climate change	Impact of sea level rise on mangroves	H	L	F	P
	Increased coastal vulnerability (e.g. erosion)	H	H	G	P

2.6 Opportunities and Constraints

Reflecting on the Situational Assessment of the uMhlathuze and Richards Bay estuaries, future planning and development holds several socio-economic opportunities, but a number of potential constraints, both in terms of biodiversity and sustained socio-economic value, pose some challenges.

The ecosystem potential of these systems has been estimated at more than R22 million per annum (based on 2009 data), based on their ability to provide provisioning, regulating services, supporting and aesthetic/cultural services (DWA, 2010). These services are in many ways reliant on the integrity of ecosystem functioning. Thus provided that these services are being utilised in an environmentally sustainable manner, they provide significant opportunities for surrounding communities. The Richards Bay area (including the Richards Bay Estuary) has been identified as a development node within the KZN province, and will therefore benefit from envisaged economic investments with excellent opportunities for socio-economic growth and development for surrounding communities. On the other hand, the uMhlathuze Estuary is largely managed as a conservation area, and present potential opportunities for eco-tourism development, also involving the local communities living along its shores. However, inaccessibility (linked to security but also lack of access routes) is viewed as a key constraint in this regard. It can be argued that if small businesses are given access to share in the eco-tourism potential of the area, they will take co-ownership in terms of its conservation for future generations.

The Richards Estuary has also been earmarked for key development projects under the national government's Operation Phakisa initiative (www.operationphakisa.gov.za) aimed at fast tracking the aims of the National Development Plan (NDP). These include a marine aquaculture development (i.e. cage culture of Dusky kob) and ship repair terminal and dry docking facilities. While initiatives of this nature hold great growth and development opportunities for the area, implementation of environmentally unsustainable practices can hold serious constraints or risks to socio-economic values benefiting other users. Such risks should be mitigated through proper environmental impact assessment (EIA) studies (a legal requirement under the NEMA regulations for any development within the EFZ of estuaries – EIA Regulations Listing Notice 3, Government Gazette No. 33306, 18 June 2010). During EIA studies key risks to biodiversity and socio-economic values can be identified, and mitigate for through proper site selection and suitable technologies/practices for construction, operations and de-commission phases.

A further positive aspect relates to cooperative governance during implementation of the EMP, in that there already are extensive environmental planning and management initiatives ongoing in this area, including those from the DWS, TNPA, Ezemvelo KZN Wildlife, King Cetshwayo District Municipality and uMhlathuze Local Municipality. Therefore, this EMP development process, commissioned by national DEA, largely fulfils a consolidation and coordination function aimed at aligning the various environmental planning and management initiatives in partnership with all the role-players. Cooperative governance is a critical requirement for successful implementation of environmental management in complex multi-sector regions with numerous implementing agents. The challenge (or potential constraint) herein lies in

the ability to ensure buy-in of all role players (or future implementing agents), and it for this reason that a stakeholder consultation is integral to the EMP development process.

Often a major constraint in the effective implementation of environmental management plans relate to lack of resources (both human and financial) in the designated implementing authorities (e.g. conservations bodies and municipalities). To this end the Department of Public Work's Expanded Public Works Programme (EPWP) holds opportunities (www.epwp.gov.za). The EPWP has its origin in the 2003 Growth and Development Summit where it was agreed that public works programmes "can provide poverty and income relief through temporary work for the unemployed to carry out socially useful activities". Currently, the EPWP creates work opportunities in four sectors namely, Infrastructure, Non-State, Environment & Culture, and Social. With specific reference the uMhlathuze/Richards Bay EMP the "Working for the Coast", "Working for Water" and "Working for Wetlands" initiatives coordinated by the DEA (www.environment.gov.za/projectsprogrammes#workingfor) within the Environmental & Culture sector, provide opportunities to gain access to resources that could benefit the implementation of this EMP.

The biggest challenges (or potential constraints) relate to the ability to conduct growth and development in an environmentally sustainable manner. This is especially relevant to the large port, industrial and municipal infrastructure developments planned for the Richards Bay Estuary and its surroundings. While it is recognised that future growth and development for the Richards Bay areas need to have a stronger economic/industrial focus, all efforts must be taken to construct and operate these facilities in an environmentally responsible manner. In turn, the uMhlathuze Estuary retains a stronger ecological conservation function, and its close proximity to this industrial hub does present challenges in terms of, for example contamination either via flows across the tidal barrier between the two water bodies, through the estuary mouth or down its catchment, or as a result of deposition of air borne particulate contaminants.

2.7 Key Information Gaps

This situation assessment identified a number of key knowledge gaps, mainly related to a lack of understanding of ecosystem functioning. Such information is critically important to understand the effect that growth and development has had on the functioning of these systems, but most importantly to provide a sound scientific base to assess/mitigate the influence of extensive future developments in the area. These include:

- A professional quantification and assessment of the changes from natural to present in the freshwater resources hydrological regime (surface and groundwater) in the lower uMhlathuze catchment (including the three lake systems) is urgently required to determine freshwater inflow to the uMhlathuze/Richards Bay estuaries.
- Sedimentation and erosion is a regional concern along the KZN coast (including the Richards Bay area). However, this complex issue is impacted by numerous activities including upstream dams in catchments draining into the sea along this coast, extensive sand mining operations, large

infrastructure development altering sediment transport routes (e.g. ports), but also effects of climate change (e.g. droughts, sea level rise and increased storminess). An extensive, large-scale sediment dynamic research programme is required to inform management interventions to this regional-scale problem effectively.

- Understanding the sources and dynamics of organic and inorganic nutrients to the estuaries (important to quantify appropriate management interventions), as well as confirmation of metal levels in the uMhlathuze Estuary. Such an assessment will benefit greatly by a long-term monitoring programme that record both volume and composition of freshwater inflows and wastewater discharges into these estuaries.
- Detailed surveys of aquatic associated avifauna are required for the uMhlathuze and Richards Bay estuaries, distinguishing between the individual and relative importance of each of these systems. This is required based on the importance of these systems in terms of its water bird populations, both regionally and nationally.
- A long-term ecological monitoring programme for the uMhlathuze Estuary is required (unless already implemented by Ezemvelo KZN Wildlife). This programme, as well as the Richards Bay Estuary's programmes should consider all relevant abiotic and biotic ecological components. Development and implementation of these long-term programmes should be coordinated and shared across the responsible agents.
- Confirmation of the PES, REC and Resource Quality Objectives (RQOs) for the uMhlathuze and Richards Bay estuaries is required. This must be addressed in the resource Classification process of the Usutu-uMhlathuze WMA (when commissioned by DWS).

3 Confirmed Geographical Boundaries of EMP

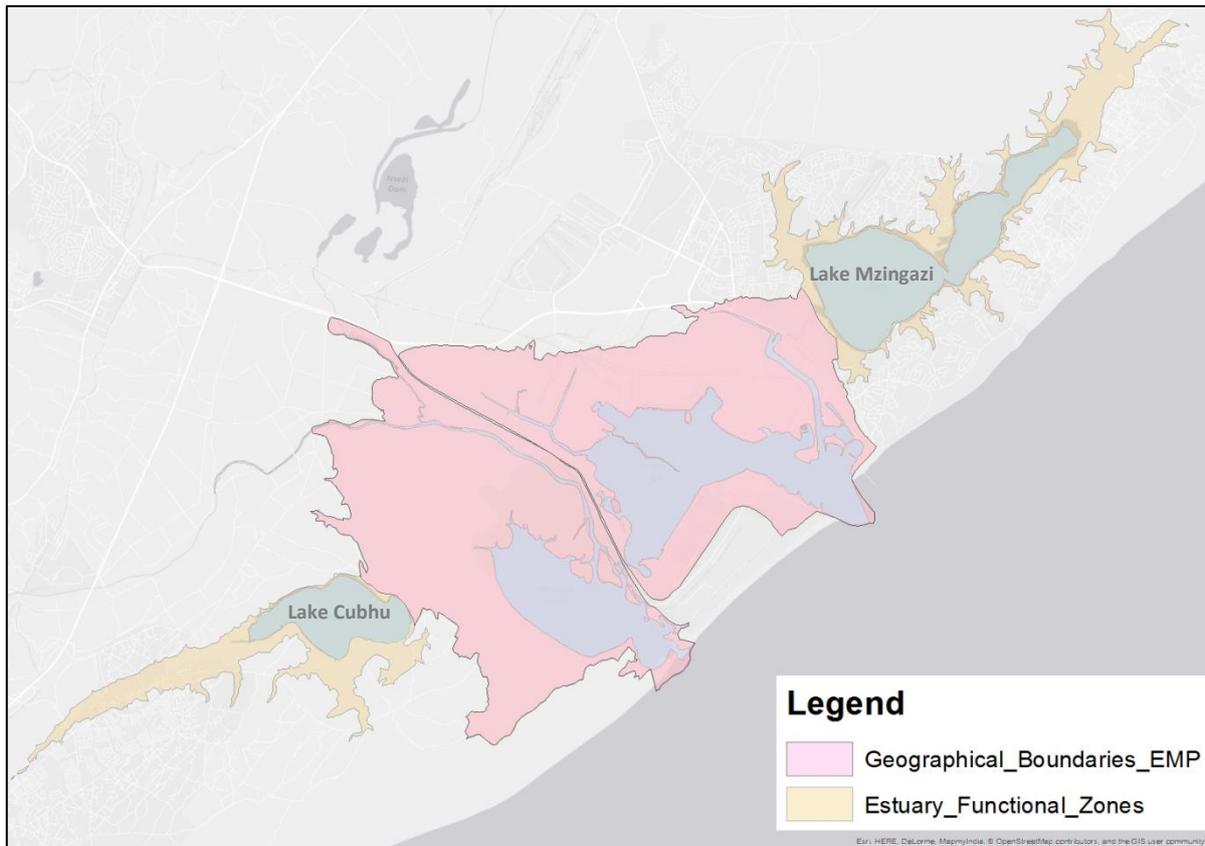


Figure 3: Demarcation of the geographical boundaries for this EMP (up to the weirs separating Lakes Mzingazi and Cubhu) (highlighted area) superimposed on larger EFZs the uMhlathuze/Richards Bay estuaries

Considering this distinction in water resource categorisation, as well as marked differences in current hydrological and ecological processes between the lakes and estuaries, it made practical sense, from a management perspective, to treat Lakes Cubhu and Mzingazi, and the uMhlathuze/Richards Bay estuaries as separate management units, but to still recognise their biological and historical interconnectivity in management decisions and actions.

In one of the stakeholder meeting it was confirmed to set the geographical boundaries of the management unit for EMP as the uMhlathuze/Richards Bay estuaries as defined by the EFZs up to the weirs separating Lakes Cubhu and Mzingazi, and to include Thulazihleka pan (Figure 3).

A Management Plan for Lake Mzingazi has already been developed by the City of uMhlathuze in 2015 (CSIR 2015, as summarised in Appendix 11.1), following the management planning framework as proposed for estuaries (DEA 2015). The municipality also aims to develop management plans for Lake Cubhu (and Lake Nsezi) pending availability of budgets. Both these lakes fall within the municipal boundaries of the City of uMhlathuze, with only a small portion of Lake Mzingazi falling within the boundaries of the Mfolozi Local Municipality.

4 Vision, Strategic Objectives and Key Principles

4.1 Vision

For estuarine management to be effective, it is very important that responsible management authorities and other key stakeholders have a common understanding of what they are trying to accomplish. Without a clear idea of where the management of a particular estuary is heading, there will be no sound basis for collaboration and prioritisation of management decisions. For this reason it is important that the vision for an EMP be developed jointly by the stakeholders so as to truly reflect the shared environmental, social and economic expectations within limits for sustainable development. In the case of the uMhlathuze/Richards Bay estuaries this was achieved at a stakeholder meeting and a shared vision emerged as follows:

VISION FOR uMHLATHUZE/RICHARDS BAY EMP

“The uniqueness and socio-economic values of our beautiful estuaries are sustainably protected for future generations through responsible, holistic and inclusive management approaches”

It echoes the sentiments of the visions put forward for South Africa Ports (including the Port of Richards Bay) (Department of Transport 2002):

“South Africa’s commercial ports system should be globally competitive, safe and secure, operating at internationally accepted levels of operational efficiency consistent with the goals and objectives of the Government’s macro-economic strategies. The commercial ports system must serve the economy and meet the needs of port users in a manner which is economically and environmentally sustainable.”

Also, the Vision of the City of uMhlathuze is reflected (City of uMhlathuze 2017)

“The Port City of uMhlathuze offering improved quality of life for all its citizens through sustainable development”

And, finally that of Ezemvelo KZN wildlife:

“To be a world renowned leader in the field of biodiversity conservation”

4.2 Strategic Objectives

In the context of a vision, strategic objectives (or goals) are generally phrased as statements that translate the values defined in the shared vision into tangible outcomes, rather actions of how to achieve them. “The Protocol” (2013) provides a list of national objectives which national government views as desired outcomes of estuarine management in South Africa. These outcomes reflect the estuarine environment in a holistic context, considering not only ecological values (biodiversity, conservation), but also social (heritage areas, archeologically, baptism areas, sense of place) and economic values (property/ land use planning, ecotourism, recreation).

National Objectives for Estuarine Management in South Africa (NEMP 2013):

- To conserve, manage and enhance sustainable economic and social use without compromising the ecological integrity and functioning of estuarine ecosystems,
- To maintain and/or restore the ecological integrity of South African estuaries by ensuring that the ecological interactions between adjacent estuaries, between estuaries and their catchments, and between estuaries and other ecosystem, are maintained,
- To manage estuaries co-operatively through all spheres of government and to engage the private sector/entities and civil society in estuarine management,
- To protect a representative sample of estuaries (such protection could range from partial protections to full protection) in order to achieve overall estuarine biodiversity targets as determined by the NBA 2011 and the subsequent updates,
- To promote awareness, education and training that relate to the importance, value and management of South African estuaries,
- To minimize the potential detrimental impacts of predicted climate change through a precautionary approach to development in and around estuaries and with regard to the utilization of estuarine habitat and resources.

In the case of the uMhlathuze/Richards Bay estuaries the strategic objectives for the EMP were discussed and articulated during the consultations conducted with the relevant stakeholders. Based on the outcome of these discussions a set of strategic objectives were distilled as presented in Table 4. Also presented are useful performance indicators that can be used to monitoring the degree of success in achieving the individual strategic objectives.

Table 4: Strategic Objectives for the uMhlathuze/Richards Bay EMP

		PERFORMANCE INDICATOR
Ecological	<ul style="list-style-type: none"> Estuarine ecological health meets the desired ecological state (e.g. agreed upon during Classification process), including successful rehabilitation of unacceptably impacted areas in EFZ 	<ul style="list-style-type: none"> Resource Quality Objectives (RQOs) for a C Category are achieved
	<ul style="list-style-type: none"> Important estuarine habitats are fully enclosed within the Richards Bay Game Reserve, and granted formal protected area status 	<ul style="list-style-type: none"> Full protection status granted including zonation of no-take areas.
Social	<ul style="list-style-type: none"> Community youth understand and value the ecological importance and socio-economic benefits of estuaries 	<ul style="list-style-type: none"> No. of youth education and training programmes
	<ul style="list-style-type: none"> Socially dependent communities benefit from estuarine resources through sustainable practices 	<ul style="list-style-type: none"> No. of subsistence initiatives enabled through EMP
	<ul style="list-style-type: none"> Communities and public have access to share in estuarine resource values through safe and sustainable access routes 	<ul style="list-style-type: none"> Controlled, safe access Numbers of users/visitors/tourists accessing system annually
Economic	<ul style="list-style-type: none"> Small businesses, with strong local community involvement, benefit from estuarine ecosystem services in a responsible manner (e.g. non-destructive eco-tourism) 	<ul style="list-style-type: none"> No. of small businesses No. jobs created (permanent and non- permanent)
	<ul style="list-style-type: none"> Large-scale industrial development contribute to economic growth in an environmentally - and socially sound manner (i.e. balancing ecological-social-economic benefits) 	<ul style="list-style-type: none"> Number of projects or development with approved Environmental Authorisation Extent of compliance
Governance	<ul style="list-style-type: none"> Successful cooperative management are achieved, involving all spheres of government, and based on mutual agreement on implementation of EMP 	<ul style="list-style-type: none"> Established Municipal sub-committee Sector feedback on attendance of meetings and/or feedback provided (reports/emails/presentations) Extent of authority participation
	<ul style="list-style-type: none"> Empowered local communities participating in management decisions and implementation of EMP 	<ul style="list-style-type: none"> Established advisory forum Local community membership No. of awareness programmes
	<ul style="list-style-type: none"> Private sector participate in cooperative management, sharing their skills and resources to ensure protection of biodiversity and socio-economic value 	<ul style="list-style-type: none"> Established advisory forum Private sector membership No. of public-private sector partnerships
	<ul style="list-style-type: none"> Environmental integrity is ensured through effective compliance informed by continuous, science-based monitoring programmes 	<ul style="list-style-type: none"> No. and extent of monitoring programmes No. of illegal activities vs successful prosecution/mitigations

5 Management Objectives and Associated Actions

The aim of the chapter on Management Objectives and Associated Actions is to present a holistic perspective of the range of issues, impact or threats that should be addressed in the uMhlathuze/Richards Bay estuaries in order to achieve the vision and strategic objectives. The management objectives and proposed actions listed here arose from management issues and associated actions identified during stakeholder consultation. This information was supplemented by issues identified by the project team during the Situation Assessment phase (see Chapter 2.5).

“The protocol” (2013) puts forward the following categories within which to address Management Objectives for estuaries, including:

Conservation

Utilisation of living and non-living resources

Land-use and infrastructure planning development

Management of water quality and quantity

Social issues

Climate change

Education and awareness

Compliance and enforcement

These categories, plus two additional categories were used to provide structure to the Management Objectives for the uMhlathuze/Richards Bay EMP over the next 5 years, as depicted in the following sections. The additional categories are:

Cooperative governance (including institutional arrangements)

Research needs.

5.1 Conservation

The following management objectives, and associated actions, relate to conservation:

Objective 1:	Obtain formal conservation protection status for areas of biodiversity importance within uMhlathuze/Richards Bay Estuarine System in accordance with national biodiversity targets
Action 1.1:	Confirm extended boundaries of habitat areas still requiring formal protection (also considering important bird habitats such as Thulazihleka Pan)
Action 1.2:	Survey designated areas based on confirmed extended boundaries and get formal protection status (i.e. gazette as protected areas).
Action 1.3:	Identify critical habitats that may require no-take zonation (e.g. seagrass beds, nursery habitat).
Objective 2:	In accordance with Resource Protection Measures under National Water Act formally set Management Classes, Reserves and Resource Quality Objectives for uMhlathuze/Richards Bay estuaries at for a Category C
Action 2.1:	Conduct a hydrological assessment of the change in the flow regime of freshwater resources

(surface and groundwater) in lower uMhlathuze catchment (including the three lake systems) to determine freshwater inflow to uMhlathuze/Richards Bay estuaries.

Action 2.2: Conduct a comprehensive Classification study (National Water Act) for the uMhlathuze and Richards Bay catchments that address both surface and sub-surface (ground water) resources for rivers, wetlands, lakes and estuaries.

5.2 Utilisation of Living and Non-living Resources

The following management objectives, and associated actions, relate to utilisation of estuarine resources:

Objective 3:	Ensure sustainable exploitation of living resources within uMhlathuze/Richards Bay EFZs
Action 3.1:	Agree on, and formally document, standard operational procedures (SOPs) for exploitation of living resources (e.g. fish and bait) in uMhlathuze/Richards Bay system, in terms of zonation, responsible/delegated authorities in terms of approval, compliance, monitoring, compliance and enforcement.
Action 3.2:	Agree on, and formally document, standard operational procedures (SOPs) for removal/harvesting of mangroves and other ecologically important vegetation in uMhlathuze/Richards Bay EFZ, explicitly stating relevant legislation, targeted species (if any), allowable zones, limits in terms of quantities taken, responsible authorities in terms of permitting, monitoring, compliance and enforcement.
Action 3.3:	Demarcate agreed living resource exploitation zones (as per above) in final Zonation Plan of EMP.

Objective 4:	Control mining activities within uMhlathuze/Richards Bay EFZ and adjacent catchment where these may impact on estuaries
Action 4.1:	Agree on, and formally document, standard operational procedures (SOPs) for mining activities in uMhlathuze/Richards Bay EFZ and surrounds, explicitly stating relevant legislation, approval and permitting processes, responsible authorities in terms of approval, monitoring, compliance and enforcement.
Action 4.2:	Demarcate detailed agreed mining zones (as per above) in final Zonation Plan of EMP.

5.3 Land-use and Infrastructure Planning Development

The following management objectives, and associated actions, relate to land-use and infrastructure planning development:

Objective 5:	Ensure that planning and operations of marine aquaculture in Richards Bay EFZ is undertaken in an environmentally sustainable manner to protect biodiversity and socio-economic values benefiting other users.
Action 5.1:	Conduct appropriate EIA studies for future marine aquaculture development in Richards Bay EFZ as per requirements under the NEMA EIA regulations Notice 3.
Action 5.2:	Ensure that "tidal gates" separating uMhlathuze and Richards Bay is permanently sealed (walled off) to prevent contamination and reduce the risk of parasite and pathogen transfer to the uMhlathuze protected area associated with Dusky Kob marine aquaculture in Richards Bay Estuary.

Objective 6:	Ensure that planning, construction, maintenance of infrastructure in uMhlathuze/ Richards Bay EFZs e.g. in Port of Richards Bay, Richards Bay IDZ and Waterfront Development, is undertaken in an environmentally sustainable manner to protect biodiversity and socio-economic values benefiting other users.
Action 6.1:	Conduct strategic planning for future port development, Richards Bay IDZ and Waterfront development taking into consideration biodiversity requirements and socio-economic values benefiting other users in uMhlathuze/Richards Bay estuaries
Action 6.2:	Conduct appropriate EIA studies for infrastructure developments in port (e.g. boat repair and

dry dock facilities), IDZ and waterfront for future marine aquaculture development in Richards Bay EFZ as per requirements under the NEMA EIA regulations Notice 3.

Action 6.3: Maintain infrastructure in the study area so as to not detrimentally impact on biodiversity and socio-economic values benefiting other users in uMhlathuze/Richards Bay estuaries.

5.4 Management of Water Quality and Quantity

The following Management Objectives, and associated actions, relate to management of water quality and quantity:

Objective 7:	Ensure appropriate pollution prevention/mitigation measures are implemented in uMhlathuze/Richards Bay estuaries
Action 7.1:	Prepare standard operational procedures (SOPs) for pollution management and control in uMhlathuze/Richards Bay system, explicitly stating relevant legislation applying to atmospheric emissions, wastewater discharges (both point and diffuse stormwater runoff) and solid waste disposal, specifying approval and permitting processes, operational requirements, as well as responsible authorities in terms of approval, compliance and enforcement.
Action 7.2:	Prepare an inventory of sources of atmospheric emissions originating within uMhlathuze/Richards Bay EFZs and stipulate mitigation actions where required in accordance with SOPs.
Action 7.3:	Prepare an inventory of sources and location of wastewater discharges into uMhlathuze/Richards Bay estuaries (surface and sub-surface runoff) and stipulate mitigation actions, where required, in accordance with SOPs.
Action 7.4:	Prepare an inventory of sources and location of solid waste disposal within uMhlathuze/Richards Bay EFZs and stipulate mitigation actions, where required, in accordance with SOPs
Action 7.5:	Prepare/revise oil spill contingency plan for uMhlathuze/Richards Bay estuaries, including disaster management planning, and handling and disposal of waste originating from clean-up
Action 7.6:	Instate a ballast water auditing programme for vessels entering Port of Richards Bay.
Action 7.7:	Ensure that “tidal gates” separating uMhlathuze and Richards Bay are permanently sealed (walled-off) to prevent leakage of potentially contaminated water (e.g. oil slicks) from port into sanctuary.
Action 7.8:	Develop and implement a rehabilitation plan for Hillendale Slimes Dam to mitigate risk of pollution/damage to uMhlathuze/Richards Bay estuaries.

Objective 8:	Ensure that water resource management strategies for uMhlathuze/Richards Bay area include freshwater requirements for aquatic ecosystem functioning
Action 8.1:	Align Water Resource Planning of uMhlathuze area with estuarine resource protection objectives which is set at a Category C (see Action 2.2)
Action 8.2:	Implement “Reserve” (i.e. freshwater allocation to aquatic ecosystems) as stipulated in the Classification process under the National Water Act (see Action 2.2)
Action 8.3:	Ensure that weirs between Lakes Cubhu and Mzingazi and estuaries are regularly serviced to ensure freshwater flows reach estuaries as stipulated (see Action 2.2).

5.5 Socio-Economic Issues

The following management objectives, and associated actions, relate to important socio-economic issues:

Objective 9:	Provide safe and equitable access to coastal public property within uMhlathuze/Richards Bay EFZ
Action 9.1:	Provide public access to uMhlathuze/Richards Bay at appropriate locations, as per government norms and standards, considering relevant environmental, financial and social aspects
Action 9.2:	Maintain, manage and monitor public access (including boat launching sites) to minimise

adverse impacts on environment and public safety and to resolve incompatible uses

Objective 10: Create opportunities for small businesses and local communities to benefit from socio-economic values of uMhlathuze/Richards Bay estuaries, and to grow economy and improve livelihoods

Action 10.1: Explore opportunities for small business development to grow eco-tourism in uMhlathuze/Richards Bay area and contribute to job creation.

Action 10.2: Explore opportunities for local communities to participate in growing eco-tourism in uMhlathuze/Richards Bay area, e.g. tour guides, crafters, local accommodation as sustainable, alternative livelihoods (e.g. rather than relying on illegal fishing and removal of mangroves for banana growing).

5.6 Climate Change

The following management objective, and associated actions, relate to climate change:

Objective 11: Address coastal vulnerability to climate change in uMhlathuze/Richards Bay estuaries

Action 11.1: Establish appropriate management lines in terms of the ICM Act to reduce hazard risks (e.g. flooding) and to ensure environmentally suitable development in uMhlathuze/Richards EFZs to assist with preventing “coastal squeeze” under future sea level rise conditions.

Action 11.2: Prepare and implement coastal defence strategies (e.g. retreat, environmental engineering) to ensure community safety and protect infrastructure from potential climate change impacts (e.g. increased storminess, sea level rise, fluvial flooding) in uMhlathuze/Richards EFZs.

5.7 Education and Awareness

The following management objective, and associated actions, relate to education and awareness:

Objective 12: Establish training and education programmes to create awareness of importance and value of estuaries so as to obtain buy-in and empower local communities to participate in protection of these resources

Action 12.1: Develop innovative youth training and education programmes - in collaboration with willing local community organisation – to instil a respect and appreciation for estuaries from an early age.

Action 12.2: Develop education and awareness programmes aimed at informing and empowering local communities to participate and share in protection and management decisions relating to uMhlathuze/Richards Bay estuaries.

5.8 Compliance and Enforcement

The following management objectives, and associated actions, relate to compliance and enforcement:

Objective 13: Establish a coordinated environmental monitoring programme among various mandated authorities within uMhlathuze/Richards Bay estuaries to share and optimise limited human and financial resources.

Action 13.1: Prepare standard operational procedures (SOPs) on agreed roles and responsibilities to implement environmental monitoring programmes (as proposed in this EMP), so as to optimally utilise limited resources across various mandated authorities.

Objective 14: Establish a coordinated compliance and enforcement programme among relevant

authorities mandated to do so within uMhlathuze/Richards Bay estuaries to share and optimise limited human and financial resources.

Action 14.1: Prepare standard operational procedures (SOPs) on compliance and enforcement within the uMhlathuze/Richards Bay EFZ, specifying roles and responsibilities that will effectively utilise the limited available resources across various mandated authorities.

5.9 Cooperative Governance

The following management objectives, and associated actions, relate to cooperative governance (including institutional arrangements):

Objective 15: Establish appropriate institutional mechanism for estuarine management, facilitating dialogue, collaboration and implementation of EMP

Action 15.1: Formally establish a sub-committee - under KZN Provincial Coastal Committee – to coordinate and facilitate implementation and review of uMhlathuze/Richards Bay EMP, EMPs of adjacent Lakes Cubhu and Mzingazi, as well as Protected Areas Management Plan, where appropriate.

Action 15.2: Formally establish an advisory forum, comprising members of local industries, private sector, non-government organisation and civil society (amongst others) to support and advise responsible authorities on environmental matters pertaining to protection and management of uMhlathuze/Richards Bay estuaries, and surrounding lake systems. If similar forums exist, e.g. protected areas forum, consider coordinating these efforts.

Activity 15.3: Establish relationship with Tribal Authorities to liaise and collaborate in supporting of sustainable use of resources and opportunities for local communities through EMP.

Objective 16: Ensure that necessary capacity and financial resources are available within spheres of government to conduct compliance and enforcement as mandated under various pieces of legislation

Action 16.1: Establish collaborative partnerships with local industries and community organisation to share resources for effective implementation of EMP

Action 16.2: Investigate opportunities to access national government's Expanded Public Works Programme (EPWP) as a supplementary resource-base for effective implementation of EMP (e.g. Working for Water and Working for the Coast) as a means to support community-based resourced management initiatives.

Action 16.3: Investigate opportunities to gain support from relevant provincial and national departments where local capacity and/or resources are insufficient to provide effective compliance and enforcement for protection of biodiversity and socio-economic values of uMhlathuze/Richards Bay estuaries.

5.10 Research Needs

The following management objective, and associated actions, relate to research needs:

Objective 17: Encourage collaboration with tertiary education and other scientific research institutions to strengthen research initiatives within the uMhlathuze/Richards Bay study area so as to build a stronger evidence-based knowledge system in support of the EMP

Action 17.1: Establish an extensive, large-scale sediment dynamic research programme to inform management interventions to the regional-scale problem affecting sediment processes across the KZN coastal region, including the uMhlathuze/Richards Bay area.

6 Prioritisation of Management Actions

This chapter provides details on each of the listed proposed actions (linked to Management Objectives in Chapter 5). Information includes the relevant legislation and responsible management agent, as well as existing risks that may be posed if the action is not executed. Its relative priority, as informed by stakeholders and the situation assessment study, is also indicated, together with the performance indicators against which progress could be tracked.

During the implementation phase of the EMP, the information provided in this chapter, therefore will form the basis for the development of the implementations plans when their prioritisation and execution must be confirmed with various responsible agents. It is important to note that many of the proposed actions reside with existing mandates of the responsible agents and should therefore be considered in the business plans of such authorities (e.g. IDPs, Water Resource Plans and Port Management Plan) over the next 5 years so as to ensure that the necessary resources will be allocated for the successful execution thereof.

6.1 Conservation

Action 1.1: Confirm extended boundaries of habitat areas still requiring formal protection (also considering important bird habitats such as Thulazihleka Pan)

Relevant legislation	NEM: Biodiversity Act; NEM: Protected Areas Act
Responsible agent	Ezemvelo KZN Wildlife in collaboration with CoU and National DEA
Existing risk to biodiversity	High
Existing risk to socio-economics	Low
Resource requirements	Staff from responsible authorities
Estimated budget	No outsourcing required, costs related to organising and attending meetings
Performance indicator	Agreed boundaries for protected areas
PRIORITY	HIGH

Action 1.2: Survey designated areas based on confirmed extended boundaries and get formal protection status (i.e. gazette as protected areas)

Relevant legislation	NEM: Biodiversity Act; NEM: Protected Areas Act
Responsible agent	Ezemvelo KZN Wildlife in collaboration with CoU and National DEA
Existing risk to biodiversity	High
Existing risk to socio-economics	Low
Resource requirements	Staff from responsible authorities Service provider: Professional surveyor
Estimated budget	No outsourcing required, costs related to organising and attending meetings Service provider: ~R 100 000
Performance indicator	Agreed boundaries for protected areas
PRIORITY	HIGH

Action 1.3: Identify critical habitats that may require no-take zonation (e.g. seagrass beds, nursery habitat).

Relevant legislation	NEM: Biodiversity Act; NEM: Protected Areas Act; Marine Living Resources Act (nursery habitat)
Responsible agent	Ezemvelo KZN Wildlife (uMhlathuze Estuary)/DAFF (nursery areas)

Prioritisation of Management Actions

Existing risk to biodiversity	High
Existing risk to socio-economics	Medium
Resource requirements	Staff from responsible authorities
Estimated budget	No outsourcing required, costs related to organising and attending meetings
Performance indicator	No-take zones demarcated on final zonation plan
PRIORITY	HIGH

Action 2.1: Conduct a hydrological assessment of the change in the flow regime of freshwater resources (surface and groundwater) in lower uMhlathuze catchment (including the three lake systems) to determine freshwater inflow to uMhlathuze/Richards Bay estuaries.

Relevant legislation	National Water Act; Water Services Act
Responsible agent	DWS, together with uMhlathuze Water
Existing risk to biodiversity	High
Existing risk to socio-economics	Medium
Resource requirements	Professional hydrologist
Estimated budget	~ R 150 000
Performance indicator	Completed hydrological study
PRIORITY	HIGH

Action 2.2: Conduct a comprehensive Classification study (National Water Act) for the uMhlathuze and Richards Bay catchments that address both surface and sub-surface (ground water) resources for rivers, wetlands, lakes and estuaries.

Relevant legislation	National Water Act
Responsible agent	DWS: Classification
Existing risk to biodiversity	High
Existing risk to socio-economics	Medium
Resource requirements	Service provider with experience in running classification study, including specialist teams
Estimated budget	~ R 3 million
Performance indicator	Gazetted classification study (i.e. overall Management Class/es, Target Ecological Category, Reserve and RQOs)
PRIORITY	HIGH

6.2 Utilisation of Living and Non-living Resources

Action 3.1: Agree on, and formally document, standard operational procedures (SOPs) for exploitation of living resources (e.g. fish and bait) in uMhlathuze/Richards Bay system, in terms of zonation, responsible/delegated authorities in terms of compliance, monitoring and enforcement.

Relevant legislation	Marine Living Resources Act
Responsible agent	DAFF (Fisheries), in collaboration with Ezemvelo KZN Wildlife and TNPA
Existing risk to biodiversity	High
Existing risk to socio-economics	High
Resource requirements	Staff from responsible authorities
Estimated budget	R150 000 - R250 000 towards salary of dedicated compliance/monitoring personnel
Performance indicator	Documented SOPs
PRIORITY	HIGH

Action 3.2: Agree on, and formally document, standard operational procedures (SOPs) for removal/harvesting of mangroves and other ecologically important vegetation in uMhlathuze/Richards Bay EFZ, explicitly stating relevant legislation, targeted species (if any), allowable zones, limits in terms of quantities taken, responsible authorities in terms of permitting, monitoring, compliance and enforcement.

Relevant legislation	Conservation of Agricultural Resources Act
Responsible agent	DAFF (Forestry), in collaboration with Ezemvelo KZN Wildlife and TNPA
Existing risk to biodiversity	Medium
Existing risk to socio-economics	Low
Resource requirements	Staff from responsible authorities
Estimated budget	No outsourcing required, costs related to organising and attending meeting
Performance indicator	Documented SOPs

Prioritisation of Management Actions

PRIORITY	LOW
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Action 3.3: Demarcate agreed living resource exploitation zones (as per above) in final Zonation Plan of EMP.

Relevant legislation	Conservation of Agricultural Resources Act
Responsible agent	DAFF (Forestry), in collaboration DEA (as responsible authority for EMP)
Existing risk to biodiversity	High (fishing)/ Low (harvesting)
Existing risk to socio-economics	High (fishing)/ Low (harvesting)
Resource requirements	Staff from responsible authorities
Estimated budget	No outsourcing required, costs related to organising and attending meetings
Performance indicator	Living resource exploitation zones demarcated on final zonation plan
PRIORITY	HIGH

Action 4.1: Agree on, and formally document, standard operational procedures (SOPs) for mining activities in uMhlathuze/Richards Bay EFZ and surrounds, explicitly stating relevant legislation, approval and permitting processes, responsible authorities in terms of approval, monitoring, compliance and enforcement.

Relevant legislation	Mineral and Petroleum Resources Development Act
Responsible agent	Department of Mineral Resources, in collaboration with DEA (as responsible authority for EMP)
Existing risk to biodiversity	Medium
Existing risk to socio-economics	Medium
Resource requirements	Staff from responsible authorities
Estimated budget	No outsourcing required, costs related to organising and attending meetings
Performance indicator	Documented SOPs
PRIORITY	MEDIUM

Action 4.2: Demarcate detailed agreed mining zones (as per above) in final Zonation Plan of EMP.

Relevant legislation	Mineral and Petroleum Resources Development Act
Responsible agent	Department of Mineral Resources, in collaboration with DEA (as responsible authority for EMP)
Existing risk to biodiversity	Medium
Existing risk to socio-economics	Medium
Resource requirements	Staff from responsible authorities
Estimated budget	No outsourcing required, costs related to organising and attending meetings
Performance indicator	Mining zone demarcated on zonation plan
PRIORITY	MEDIUM

6.3 Land-use and Infrastructure Planning Development

Action 5.1: Conduct appropriate EIA studies for future marine aquaculture development in Richards Bay EFZ as per requirements under the NEMA EIA regulations Notice 3.

Relevant legislation	National Environmental Management Act (NEMA Regulations)
Responsible agent	Provincial DEA/Developer
Existing risk to biodiversity	High (important nursery for Dusky kob, concern over disease/parasite transfer and genetic contamination)
Existing risk to socio-economics	Low
Resource requirements	Service provider to conduct EIA studies (to be paid by developer)
Estimated budget	Depend on scale of study required
Performance indicator	Completed EIA study with Record of Decision (ROD)
PRIORITY	When required, HIGH

Action 5.2: Ensure that "tidal gates" separating uMhlathuze and Richards Bay is permanently sealed (walled off) to prevent contamination and reduce the risk of parasite and pathogen transfer to the uMhlathuze protected area associated with Dusky Kob marine aquaculture in Richards Bay Estuary.

Relevant legislation	National Ports Act
Responsible agent	TNPA
Existing risk to biodiversity	Medium
Existing risk to socio-economics	Low

Prioritisation of Management Actions

Resource requirements	Service provider: construction
Estimated budget	To be confirmed
Performance indicator	Tidal gates permanently sealed off
PRIORITY	MEDIUM

Action 6.1: Conduct strategic planning for future port development, Richards Bay IDZ and Waterfront development taking into consideration biodiversity requirements and socio-economic values benefiting other users in uMhlathuze/Richards Bay estuaries.

Relevant legislation	National Ports Act; Municipal Systems Act; Spatial Planning and Land Use Management Act (IDPs/SDFs)
Responsible agent	TNPA & CoU
Existing risk to biodiversity	High
Existing risk to socio-economics	Low
Resource requirements	As per existing resources allocated to strategic planning within responsible authorities
Estimated budget	As per existing budgets allocated for strategic planning
Performance indicator	Completed strategic plans
PRIORITY	HIGH

Action 6.2: Conduct appropriate EIA studies for infrastructure developments in port (e.g. boat repair and dry dock facilities), IDZ and waterfront for future marine aquaculture development in Richards Bay EFZ as per requirements under the NEMA EIA regulations Notice 3.

Relevant legislation	National Environmental Management Act (NEMA Regulations)
Responsible agent	KZN Provincial Department responsible for EIAs/Developer together with TNPA
Existing risk to biodiversity	High
Existing risk to socio-economics	Medium
Resource requirements	Service provider to conduct EIA studies (to be paid by developer)
Estimated budget	Depend on scale of study required
Performance indicator	Completed EIA study with Record of Decision (ROD)
PRIORITY	When required, HIGH

Action 6.3: Maintain infrastructure in the study area so as to not detrimentally impact on biodiversity and socio-economic values benefiting other users in uMhlathuze/Richards Bay estuaries.

Relevant legislation	National Ports Act; National Building Regulations and Building Standards Amendment Act
Responsible agent	TNPA together with tenants in Port/CoU together with developers
Existing risk to biodiversity	High
Existing risk to socio-economics	Medium
Resource requirements	Depends on maintenance requirements
Estimated budget	Depends on maintenance requirements
Performance indicator	Well-maintained infrastructure
PRIORITY	When required, HIGH

6.4 Management of Water Quality and Quantity

Action 7.1: Prepare standard operational procedures (SOPs) for pollution management and control in uMhlathuze/Richards Bay system, explicitly stating relevant legislation applying to atmospheric emissions, wastewater discharges (both point and diffuse stormwater runoff) and solid waste disposal, specifying approval and permitting processes, operational requirements, as well as responsible authorities in terms of approval, compliance and enforcement.

Relevant legislation	National Water Act, NEM: Waste Management Act, NEM: ICM Act, NEM: Air quality Act
Responsible agent	DEA (responsible authority) together with CoU and TNPA
Existing risk to biodiversity	Medium
Existing risk to socio-economics	Low
Resource requirements	Staff from responsible authorities
Estimated budget	No outsourcing required, costs related to organising and attending meetings
Performance indicator	Documented SOPs
PRIORITY	MEDIUM

Prioritisation of Management Actions

Action 7.2: Prepare an inventory of sources of atmospheric emissions originating within uMhlathuze/Richards Bay EFZs and stipulate mitigation actions where required in accordance with SOPs.

Relevant legislation	NEM: Air quality Act
Responsible agent	DEA (responsible authority) together with CoU and TNPA
Existing risk to biodiversity	Medium
Existing risk to socio-economics	Low
Resource requirements	Staff from responsible authorities
Estimated budget	No outsourcing required, costs related to organising and attending meetings
Performance indicator	Documented Inventory of sources
PRIORITY	MEDIUM

Action 7.3: Prepare an inventory of sources and location of wastewater discharges into uMhlathuze/Richards Bay estuaries (surface and sub-surface runoff) and stipulate mitigation actions, where required, in accordance with SOPs.

Relevant legislation	National Water Act, NEM: ICM Act
Responsible agent	DEA (responsible authority) together with DWS, CoU and TNPA
Existing risk to biodiversity	Medium
Existing risk to socio-economics	Low
Resource requirements	Staff from responsible authorities
Estimated budget	No outsourcing required, costs related to organising and attending meetings
Performance indicator	Documented Inventory of sources
PRIORITY	MEDIUM

Action 7.4: Prepare an inventory of sources and location of solid waste disposal within uMhlathuze/Richards Bay EFZs and stipulate mitigation actions, where required, in accordance with SOPs.

Relevant legislation	NEM: Waste Management Act
Responsible agent	DEA (responsible authority) together with CoU and TNPA
Existing risk to biodiversity	Medium
Existing risk to socio-economics	Low
Resource requirements	Staff from responsible authorities
Estimated budget	No outsourcing required, costs related to organising and attending meetings
Performance indicator	Documented Inventory of sources
PRIORITY	MEDIUM

Action 7.5: Prepare/revise oil spill contingency plan for uMhlathuze/Richards Bay estuaries, including disaster management planning, and handling and disposal of waste originating from clean-up.

Relevant legislation	Marine Pollution (Prevention of Pollution from Ships) Act
Responsible agent	DEA (Pollution), in collaboration with TNPA and CoU
Existing risk to biodiversity	High if spill occurs
Existing risk to socio-economics	High if spill occurs
Resource requirements	Staff from responsible authorities
Estimated budget	No outsourcing required, cost related to revision of plan by staff
Performance indicator	Updated oil spill contingency plan
PRIORITY	HIGH

Action 7.6: Instate a ballast water auditing programme for vessels entering Port of Richards Bay.

Relevant legislation	Marine Pollution (Prevention of Pollution from Ships) Act, National Ports Act
Responsible agent	TNPA, in collaboration with DEA (Pollution)
Existing risk to biodiversity	Medium
Existing risk to socio-economics	Low
Resource requirements	Staff from responsible authorities
Estimated budget	No outsourcing required, cost related to development of auditing programme
Performance indicator	Auditing programme implemented
PRIORITY	MEDIUM/LOW

Prioritisation of Management Actions

Action 7.7: Ensure that “tidal gates” separating uMhlathuze and Richards Bay are permanently sealed (walled-off) to prevent leakage of contaminated water (e.g. oil slicks) from port into sanctuary.

Relevant legislation	National Ports Act
Responsible agent	TNPA
Existing risk to biodiversity	Medium
Existing risk to socio-economics	Low
Resource requirements	Service Provider for construction
Estimated budget	To be confirmed
Performance indicator	Tidal gates permanently sealed off
PRIORITY	MEDIUM

Action 7.8: Develop and implement a rehabilitation plan for Hillendale Slimes Dam to mitigate risk of pollution/damage to uMhlathuze/Richards Bay estuaries.

Relevant legislation	National Water Act
Responsible agent	Owner of slimes dam, together with DWS and CoU
Existing risk to biodiversity	High
Existing risk to socio-economics	High
Resource requirements	Service Provider: construction (for account of owner of slimes dam)
Estimated budget	To be confirmed
Performance indicator	Rehabilitated slimes dam
PRIORITY	HIGH

Action 8.1: Align Water Resource Planning of uMhlathuze area with estuarine resource protection objectives which is set at a Category C (see Action 2.2)

Relevant legislation	National Water Act; Water Services Act
Responsible agent	DWS, together with uMhlathuze Water
Existing risk to biodiversity	High
Existing risk to socio-economics	Medium
Resource requirements	Resources from responsible authorities tasked with water resource planning
Estimated budget	As per existing budgets allocated for water resource planning
Performance indicator	Aligned water resource plans
PRIORITY	HIGH

Action 8.2: Implement “Reserve” (i.e. freshwater allocation to aquatic ecosystems) as stipulated in the Classification process under the National Water Act (see Action 2.2).

Relevant legislation	National Water Act
Responsible agent	DWS, together with uMhlathuze Water
Existing risk to biodiversity	High
Existing risk to socio-economics	Medium
Resource requirements	Resources from responsible authorities tasked with implementation of Act
Estimated budget	As per existing budgets allocated to implementation of Act
Performance indicator	Implemented ‘Reserve’ and achieve Target Ecological Categories for estuaries
PRIORITY	HIGH

Action 8.3: Ensure that weirs between Lakes Cubhu and Mzingazi and estuaries are regularly serviced to ensure freshwater flows reach estuaries as stipulated (see Action 2.2).

Relevant legislation	National Water Act
Responsible agent	DWS, together with uMhlathuze Water and CoU
Existing risk to biodiversity	Medium
Existing risk to socio-economics	Low
Resource requirements	Maintenance as per staff from responsible authorities
Estimated budget	Depends on maintenance requirements
Performance indicator	Maintained weirs
PRIORITY	HIGH

6.5 Socio-Economic Issues

Action 9.1: Provide public access to uMhlathuze/Richards Bay at appropriate locations, as per government norms and standards, considering relevant environmental, financial and social aspects.	
Relevant legislation	NEM: ICM Act
Responsible agent	KZN Provincial Department responsible for coastal management, in collaboration with CoU and TNPA
Existing risk to biodiversity	Low
Existing risk to socio-economics	High
Resource requirements	Staff from responsible authorities (planning) Service Provider: Construction
Estimated budget	Depends on type of access required
Performance indicator	Access provide to public through appropriate access routes
PRIORITY	HIGH

Action 9.2: Maintain, manage and monitor public access (including boat launching sites) to minimise adverse impacts on environment and public safety and to resolve incompatible uses.	
Relevant legislation	NEM: ICM Act
Responsible agent	KZN Provincial Department responsible for coastal management, in collaboration with CoU, Ezemvelo KZN wildlife and TNPA
Existing risk to biodiversity	Low
Existing risk to socio-economics	High
Resource requirements	Staff from responsible authorities (consider also EPWP with local community)
Estimated budget	Depends on type of access required
Performance indicator	Maintained and monitored access routes
PRIORITY	HIGH

Action 10.1: Explore opportunities for small business development to grow eco-tourism in uMhlathuze/Richards Bay area and contribute to job creation.	
Relevant legislation	Cross cutting to numerous Act
Responsible agent	DEA (responsible authority), together with CoU, Ezemvelo KZN wildlife and TNPA
Existing risk to biodiversity	Low
Existing risk to socio-economics	Low
Resource requirements	Staff from authorities and potential small businesses
Estimated budget	No outsourcing required initially, costs related to organising and attending meetings (cost of setting up business will be for developer)
Performance indicator	Small businesses established
PRIORITY	MEDIUM

Action 10.2: Explore opportunities for local communities to participate in growing eco-tourism in uMhlathuze/Richards Bay area, e.g. tour guides, crafters, local accommodation as sustainable, alternative livelihoods (e.g. rather than relying on illegal fishing and removal of mangroves for banana growing).	
Relevant legislation	Cross cutting to numerous acts
Responsible agent	DEA (responsible authority for EMP)), together with CoU, Ezemvelo KZN Wildlife and TNPA and NGOs
Existing risk to biodiversity	Medium
Existing risk to socio-economics	High
Resource requirements	Staff from authorities and potential small businesses
Estimated budget	No outsourcing required initially, costs related to organising and attending meetings Funding for eco-tourism initiatives may need to be sourced
Performance indicator	Local communities share in economic growth
PRIORITY	MEDIUM/HIGH

6.6 Climate Change

Action 11.1: Establish appropriate management lines (or setback lines) to reduce hazard risks (e.g. flooding) and to ensure environmentally suitable development in uMhlathuze/ Richards EFZs to assist with preventing “coastal squeeze” under future sea level rise conditions.	
Relevant legislation	NEM: ICM Act
Responsible agent	KZN Provincial Department responsible for coastal management, in collaboration with CoU and TNPA, with guidance from DEA
Existing risk to biodiversity	Low
Existing risk to socio-economics	High
Resource requirements	Service provider with experience in coastal set-back lines
Estimated budget	~R 500 000
Performance indicator	Management lines determined and enforced
PRIORITY	HIGH

Action 11.2: Prepare and implement coastal defence strategies (e.g. retreat, environmental engineering) to ensure community safety and protect infrastructure from potential climate change impacts (e.g. increased storminess, sea level rise, fluvial flooding) in uMhlathuze/Richards EFZs.	
Relevant legislation	National Building Regulations and Building Standards Amendment Act, National Ports Act
Responsible agent	CoU and TNPA
Existing risk to biodiversity	Low
Existing risk to socio-economics	High
Resource requirements	Service provider to construct defences
Estimated budget	Depend on type of defences required
Performance indicator	Management lines determined and enforced
PRIORITY	HIGH

6.7 Education and Awareness

Action 12.1: Develop innovative youth training and education programmes - in collaboration with willing local community organisation – to instil a respect and appreciation for estuaries from an early age.	
Relevant legislation	NEM: ICM Act
Responsible agent	DEA (responsible authority for EMP), in collaboration with together with CoU, Ezemvelo KZN Wildlife and TNPA and NGOs/local communities/scientific community
Existing risk to biodiversity	Medium
Existing risk to socio-economics	Low
Resource requirements	Staff from responsible authorities and NGOs/local communities/scientific community
Estimated budget	To be confirmed but sponsor can be sourced (e.g. local business)
Performance indicator	Youth training and education programmes established
PRIORITY	MEDIUM

Action 12.2: Develop education and awareness programmes aimed at informing and empowering local communities to participate and share in protection and management decisions relating to uMhlathuze/Richards Bay estuaries.	
Relevant legislation	NEM: ICM Act
Responsible agent	DEA (responsible authority for EMP), in collaboration with together with CoU, Ezemvelo KZN Wildlife and TNPA and NGOs/local communities/scientific community
Existing risk to biodiversity	Medium
Existing risk to socio-economics	Low
Resource requirements	Staff from responsible authorities and NGOs/local communities/scientific community
Estimated budget	To be confirmed but sponsor can be sourced (e.g. local business)
Performance indicator	Education and awareness programmes established
PRIORITY	HIGH

6.8 Compliance and Enforcement

Action 13.1: Prepare standard operational procedures (SOPs) on agreed roles and responsibilities to implement environmental monitoring programmes (as proposed in this EMP), so as to optimally utilise limited resources across various mandated authorities.	
Relevant legislation	Various NEM Acts, Marine Living Resources Act
Responsible agent	DEA (responsible authority for EMP), in collaboration with together with DAFF, DWS, uMhlathuze Water, CoU, Ezemvelo KZN Wildlife and TNPA
Existing risk to biodiversity	Medium
Existing risk to socio-economics	Low
Resource requirements	Staff from responsible authorities
Estimated budget	No outsourcing required, costs related to attending meetings and prepare SOP
Performance indicator	Documented SOPs
PRIORITY	MEDIUM

Action 14.1: Prepare standard operational procedures (SOPs) on compliance and enforcement within the uMhlathuze/Richards Bay EFZ, specifying roles and responsibilities that will effectively utilise the limited available resources across various mandated authorities.	
Relevant legislation	Various NEM Acts, Marine Living Resources Act
Responsible agent	DEA (responsible authority for EMP), in collaboration with together with DAFF, DWS, uMhlathuze Water, CoU, Ezemvelo KZN Wildlife and TNPA
Existing risk to biodiversity	High
Existing risk to socio-economics	Medium
Resource requirements	Staff from responsible authorities
Estimated budget	No outsourcing required, costs related to attending meetings and prepare SOP
Performance indicator	Documented SOPs
PRIORITY	HIGH

6.9 Cooperative Governance

Action 15.1: Formally establish a sub-committee - under KZN Provincial Coastal Committee – to coordinate and facilitate implementation and review of uMhlathuze/Richards Bay EMP, EMPs of adjacent Lakes Cubhu and Mzingazi, as well as Protected Areas Management Plan, where appropriate.	
Relevant legislation	NEM: ICM Act
Responsible agent	DEA (responsible authority for EMP)
Existing risk to biodiversity	High
Existing risk to socio-economics	High
Resource requirements	Staff from responsible authorities
Estimated budget	No outsourcing required, costs related to attending meetings
Performance indicator	Established sub-committee
PRIORITY	HIGH

Action 15.2: Formally establish an advisory forum, comprising members of local industries, private sector, non-government organisation and civil society (amongst others) to support and advise responsible authorities on environmental matters pertaining to protection and management of uMhlathuze/Richards Bay estuaries, and surrounding lake systems. If similar forums exist, e.g. protected areas forum, consider coordinating these efforts.	
Relevant legislation	NEM: ICM Act
Responsible agent	DEA (responsible authority for EMP)
Existing risk to biodiversity	Medium
Existing risk to socio-economics	Medium
Resource requirements	Staff from responsible authorities
Estimated budget	No outsourcing required, costs related to attending meetings
Performance indicator	Established advisory forum
PRIORITY	MEDIUM

Action 15.3: Establish relationship with Tribal Authorities to liaise and collaborate in supporting of sustainable use of resources and opportunities for local communities through EMP.

Relevant legislation	NEM: ICM Act
Responsible agent	DEA (responsible authority for EMP)
Existing risk to biodiversity	Medium
Existing risk to socio-economics	Medium
Resource requirements	Staff from responsible authorities
Estimated budget	No outsourcing required, costs related to attending meetings
Performance indicator	Established relationship with Tribal Authorities
PRIORITY	MEDIUM

Action 16.1: Establish collaborative partnerships with local industries and community organisation to share resources for effective implementation of EMP.

Relevant legislation	Cross cutting to numerous acts
Responsible agent	DEA (responsible authority for EMP), together with CoU, Ezemvelo KZN Wildlife and TNPA and NGOs
Existing risk to biodiversity	Low
Existing risk to socio-economics	Low
Resource requirements	Staff from authorities local industries and community organisation
Estimated budget	No outsourcing required initially, costs related to organising and attending meetings
Performance indicator	Collaboration established
PRIORITY	MEDIUM

Action 16.2: Investigate opportunities to access national government's Expanded Public Works Programme (EPWP) as a supplementary resource-base for effective implementation of EMP (e.g. Working for Water and Working for the Coast).

Relevant legislation	Cross cutting to numerous acts
Responsible agent	DEA (responsible authority for EMP), in consultation with Department of Public Works
Existing risk to biodiversity	Medium
Existing risk to socio-economics	Low
Resource requirements	Staff from authorities
Estimated budget	No outsourcing required, costs related to organising and attending meetings
Performance indicator	EPWP programmes established
PRIORITY	MEDIUM

Action 16.3: Investigate opportunities to gain support from relevant provincial and national departments where local capacity and/or resources are insufficient to provide effective compliance and enforcement for protection of biodiversity and socio-economic values of uMhlatuze/ Richards Bay estuaries.

Relevant legislation	Cross cutting to numerous acts
Responsible agent	DEA (responsible authority for EMP), in consultation with Department of Public Works
Existing risk to biodiversity	High
Existing risk to socio-economics	Medium
Resource requirements	Staff from authorities
Estimated budget	No outsourcing required, costs related to organising and attending meetings
Performance indicator	Support sourced from various sources
PRIORITY	HIGH

6.10 Research

Action 17.1:	Establish an extensive, large-scale sediment dynamic research programme to inform management interventions to the regional-scale problem affecting sediment processes across the KZN coastal region, including the uMhlatuze/Richards Bay area.
Relevant legislation	Support management decisions linked to ICM Act (e.g. coastal erosion)
Responsible agent	DEA (as responsible authority for EMP), together with KZN Province (EDTEA) and affected coastal municipalities
Existing risk to biodiversity	Medium
Existing risk to socio-economics	High
Resource requirements	Researchers at appropriate tertiary education institution/s
Estimated budget	~ R 5 million (source through research funding bodies e.g. NRF)
Performance indicator	Completed sediment study
PRIORITY	HIGH, but at KZN provincial scale not only for this EMP

7 Proposed Zonation Plan

7.1 Introduction

Legislation governing zonation or spatial planning in the EFZs of estuaries is extensive, occurring through an array of spatial planning initiatives as indicated in Table 6. Zonation that have been promulgated under any of these spatial planning processes, therefore, should be considered in the finalisation of the zonation plan as part of the EMPs.

Table 5: Important spatial planning processes relevant to zonation in estuaries

SPATIAL PLANNING PROCESS	KEY LEGISLATION/PLAN	RESONSIBLE AUTHORITY
Coastal Access	ICM Act (2008)	Municipalities/ Responsible provincial authority/ National Department: Environment
Biodiversity protection area as informed by biodiversity planning processes	National Environmental Management: Biodiversity Act (2004)	National Department: Environment South African National biodiversity Institute (SANBI)
	Protected Areas Act (2003)	SANParks
	National Protected Area Strategy	National Department: Environment
Marine Protected Areas (MPAs) and Protected Areas (PAs)	Protected Areas Act	National Department: Environment
Special Management Areas	ICM Act (2008)	National Department: Environment
Fishing zones	MLRA	National Department: Fisheries
Mining and exploration concessions	Mineral and Petroleum Resources Development Act (2002)	National Department: Mining
Shipping and navigation routes	Marine Traffic Act (1981)	National Department: Transport
	National Ports Act (2005)	Transnet NPA
	Port Expansion Strategies, e.g. Strategic Infrastructure Projects (SIPS)	Transnet NPA
National Water Resource Strategy	National Water Act (1998)	National Department: Water
Agricultural spatial plans	Conservation of Agricultural Resources Act) (1983)	National Department: Agriculture
Heritage areas	National Heritage Resources Act (1999)	National Department: Environment through South African Heritage Resources Agency (SAHRA)
Coastal management lines	The ICM Act (2008) requires the establishment of these lines. In estuaries, considerations for management lines require inclusion of physical processes (e.g. flood lines) as well as ecological processes (e.g. as defined by the EFZ) and socio-economic uses.	Provincial departments (MEC)
Ports	National Ports Act (2005)	Transnet NPA
Municipal SDFs	Municipal Systems Act (2000),	Municipalities
	Spatial Planning and Land Use Management Act (2013) (SPLUMA)	

A powerful, pro-active manner in which to promote sustainable use of estuaries is to set specification for conditions of use within specific zoned areas. These are stipulated in acts, regulations or protocols, and several of these have been issued by authorities as indicated in Table 7. Provinces and municipalities may also specify condition of use of areas within the coastal zone under their jurisdiction, provided that those specifications are aligned with these national specifications on conditions of use. Such information can be consulted to define conditions of use (e.g. target/limits) for various activities or uses in estuaries.

Table 6: National acts, regulations, protocols and gazetted notices, as well as national plans and guidelines expressing conditions of use related to zoned areas in uMhlathuze/Richards Bay estuaries

ZONATION	NORM AND STANDARD/PLAN/GUIDELINE/NOTICE
Estuarine aquatic ecosystems	Management Class, Reserve and Resource Quality Objectives (i.e. defining the ecological condition and ecological flow requirements) (Chapter 3: Protection of water resources under National Water Act)
Protected areas	National Estuary Biodiversity Plan proposed as part of NBA 2011 (Turpie et al., 2012) Ezemvelo KZN Wildlife zonation for marine and estuary protected areas (see Table 6)
Wastewater discharges	National Guideline for the Discharge of Effluent From Land-based Sources into the Coastal Environment www.environment.gov.za/sites/default/files/legislations/nationalguideline_landbasedinfluent_dischargecoastal.pdf Conditions of use as set out in coastal waters discharge permits (Section 69 of ICM Act) Conditions of use as set out in water use licences (Section 21 of Water Act)
Solid waste disposal	National Norms and standards for disposal of waste to land fill (Waste Act 2008) (www.environment.gov.za/sites/default/files/gazetted_notices/nemwa59of2008_norms_standards_fordisposa.pdf)
Fishing	Regulations on Recreational fisheries, as summarised in Recreational fisheries brochure 2016/2017 (www.daff.gov.za/daffweb3/Branches/Fisheries-Management/Small-Scale-Fishing) (MLR Act) Policy for small scale fisheries sector in South Africa (MLR Act) (www.daff.gov.za/daffweb3/Branches/Fisheries-Management/Small-Scale-Fishing)
Water and sediment quality	Water quality guidelines for the coastal environment: Recreational use (www.environment.gov.za/sites/default/files/legislations/water_qualityguidelines.pdf) (ICM Act) Water quality guidelines for coastal environment: Natural Environment, Marine aquaculture and Industrial use (being revised by DEA under ICM Act)
Marine aquaculture	Guidelines for Marine Finfish Farming in South Africa This document provides guidelines for finfish farming, including land-based farming (DAFF, 2012a) Guidelines for Aquaculture Better Management Practices in South Africa (DAFF, 2012b)
Ports	Port Regulations 2007 (www.transnetnationalportsauthority.net/Pages/default.aspx) (National Ports Act 2005) Port Rules 2009 (www.transnetnationalportsauthority.net/Pages/default.aspx) (National Ports Act) TNPA Environmental Policy (www.transnetnationalportsauthority.net/DoingBusinesswithUs/SafetyHealthEnvironment/Pages/Introduction.aspx) Marine Traffic Regulations (1981) (under Marine Traffic Act) National action list for the screening of dredge material proposed for marine disposal (www.environment.gov.za/sites/default/files/docs/nationalactionlist_marinedisposal_technicalreport.pdf) (Section 73 of ICM Act).
Shipping and boating	Merchant Shipping (Small Vessel Safety) Regulations 2007(www.samsa.org.za/merchant-shipping-regulations) (Merchant Shipping Act (1957))
Mining	Mining and Biodiversity Guideline: Mainstreaming biodiversity into the mining sector (DEA, DMR, Chamber of Mines, South African Mining and Biodiversity Forum & SANBI, 2013) (www.environment.gov.za/sites/default/files/legislations/miningbiodiversity_guidelines2013.pdf)
Infrastructure development	Building Regulations and Standards prepared by the South African Bureau of Standards (SABS) setting standards for the technical performance for all buildings constructed in South Africa, mainly to ensure the health and safety of occupants (https://www.sabs.co.za/) Provincial planning legislation and SDFs Municipal IDPs and SDF, as well as related by-laws

The following sections present proposed zonation plans within the geographical boundaries of the uMhlathuze/Richards Bay EMP, as obtained through stakeholder consultation and the situation assessment study. This proposed zonation plans need to be confirmed during subsequent implementation of the EMP.

7.2 Proposed Zonation Plans

7.2.1 Important administrative boundaries

The boundaries of the uMhlathuze/Richards Bay EMP overlap with numerous authority boundaries as indicated in Figure 4, namely:

- City of uMhlathuze (CoU)
- Tribal Authority Land
- Transnet National Ports Authority (TNPA)
- Ezemvelo KZN Wildlife.

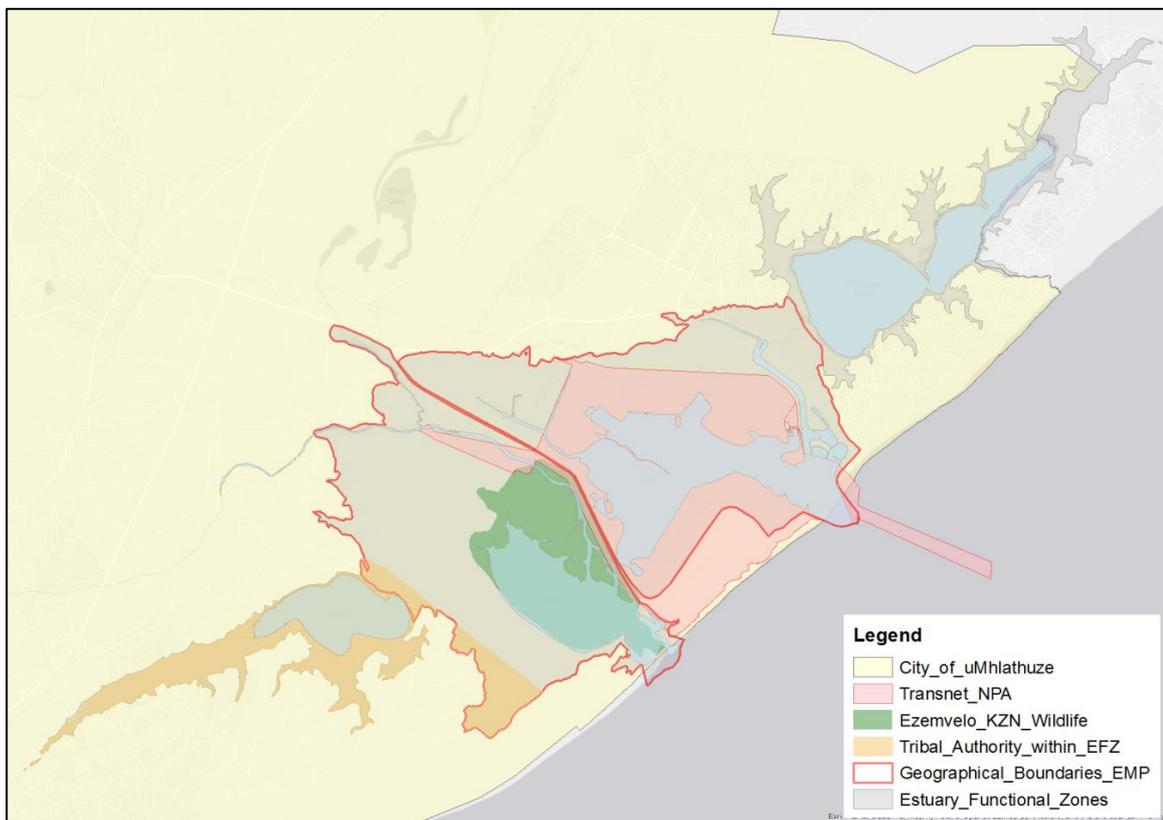


Figure 1: Important authority boundaries overlapping with the geographical boundaries of the uMhlathuze/Richards Bay EMP

Their various jurisdictions within these areas are important to consider in the implementation and allocation of responsibilities within the EMP. The various responsibilities within these areas are discussed in greater detail in the various proposed zonation plans that follows. Sensitive and important estuarine habitats. The geographical boundaries within the EFZ support several sensitive and important estuarine habitats as zoned in Figure 5. These include:

- Mangroves
- River-Estuary-Interface zones (overlapping with important prawn breeding area)
- Seagrass beds
- Coastal forests
- Important reed beds (reed frog habitat)
- Oyster beds
- Important habitats for aquatic and marine mammals and crocodiles
- Productive mudflat areas.

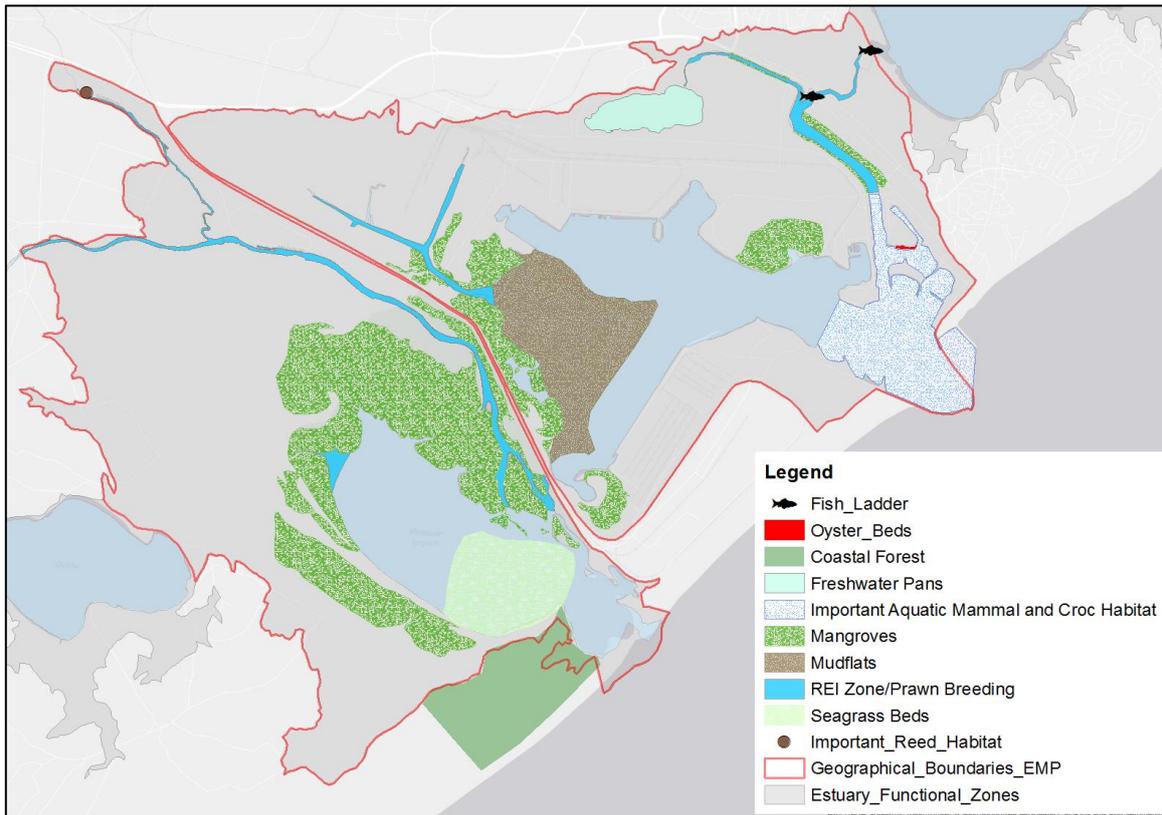


Figure 2: Zonation of sensitive and important estuarine habitats within geographical boundaries of the uMhlathuze/Richards Bay EMP

Fish ladders between the uMhlathuze and Richards Bay estuaries and adjacent lakes provide for migration of fish across several weirs that currently separate the estuarine and lake habitats.

In accordance with the National Water Act, Resource Quality Objectives (RQOs) need to be set for every estuary in South Africa to ensure the protection of these important aquatic resources. In the case of the uMhlathuze Estuary, preliminary objectives (referred to as ecological specifications) have been specified for the uMhlathuze Estuary during a DWA study conducted in 2003 (DWA 2003). These are presented in Table 8.

Table 7: Proposed ecological specification and targets for uMhlathuze EFZ (DWA 2003)

COMPONENT	ECOLOGICAL SPECIFICATION	PROPOSED ECOLOGICAL TARGET
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COMPONENT	ECOLOGICAL SPECIFICATION	PROPOSED ECOLOGICAL TARGET
Birds	Retain a species rich bird community (diversity and density) representative of paelearctic migrant wader, water birds (e.g. herons, cormorants, pelican) and waterfowl groups	<ul style="list-style-type: none"> Diversity and density maintained at determined composition (to be determined)
Fish	Retain present fish species assemblage (2002)	<ul style="list-style-type: none"> At least 80% of 2002 assemblage must be present of following genera: <i>Ambassis</i>, <i>Glossogobius</i>, <i>Oligolepis</i>, <i>Favonigobius</i>, <i>Pomadasys</i>, <i>Liza</i>, <i>Myxus</i>, <i>Valamugil</i>, <i>Rhabdosargus Terapon</i>, <i>Chelonodon</i> Following species should not be absent for more than two consecutive years: <i>Lutjanus fulvivflamma</i>, <i>Caranx spp.</i>, <i>Acanthopagrus berda</i>
	Maintain abundances of Clupeids and Engraulids (plankton feeders) in open waters, piscivorous fish species (predators) in estuarine basin and <i>Microphis</i> spp. in upper reaches of estuary	<ul style="list-style-type: none"> Maintain abundance of following taxa: Clupeids and Engaulids at least 50%, piscivorous fish species at least 70%, <i>Microphis</i> spp. in upper reaches of estuary at least 25%
	Maintain fish immigration and migration of catadromous species to freshwater habitats	<ul style="list-style-type: none"> No decreased abundance of newly recruited juvenile fishes Reductions in <i>Myxus capensis</i> and other marine spawned fishes in lower reaches of the Mhlathuze River and Lake Cubhu not to exceed 30%.
	Maintain fish species completing their life cycles in estuary throughout the year	<ul style="list-style-type: none"> No reduced presence of goby species including <i>Glossogobius</i> spp., <i>Oligolepis</i> spp, <i>Mugilgobius</i> sp., <i>Caffrogobius</i> sp., <i>Pandaka silvana</i>
	Maintain habitat diversity in the system	<ul style="list-style-type: none"> Areas covered by <i>Zostera capensis</i> in basin area not to decrease by more than 50%, and not more than 25% in sand flat habitat
	Retain rare, endangered and endemic species.	<ul style="list-style-type: none"> No loss or reduction in following species: <i>Oligolepis keiensis</i>, <i>Favonigobius reichei</i>, <i>Glossogobius biocellatus</i>, <i>Croilia mossambica</i>, <i>Rhabdosargus holubi</i>, <i>Solea bleekeri</i>
Invertebrates	<p>Benthic invertebrates:</p> <ul style="list-style-type: none"> Zoobenthic community to be representative of at least four phyla, including Annelida, Crustacea and Mollusca Maintain current level of zoobenthic productivity including seasonal variation Maintain diversity and abundance of taxa in River Estuary Interface (REI) Taxa indicative of stressed and/or organically enriched sediments should not dominate benthic abundance Maintain species of southern African and regionally endemic benthic Amphipoda, Polychaeta, Isopoda and Brachyura 	<ul style="list-style-type: none"> No less than seven Polychaete, three Amphipod, two Isopod and three Bivalva taxa Decrease in average abundance (over entire estuary) of no more than 20% Loss of more than 2 endemic southern African taxa representing this zone (e.g. <i>Ceratoneries keiskama</i>, <i>Grandidierella</i> sp., <i>Desdemona ornata</i>, <i>Hymenosoma orbiculaire</i>) over 2 consecutive surveys. <i>Capitella capitata</i>, <i>Prionospio sexoculata</i> or <i>Oligochaeta</i> at least 50% of abundance at any site during any season. No absence of <i>Grandidirella</i> sp., <i>Ceratoneries keiskama</i> and <i>Lepthura laevigata</i> from any survey. No absence of <i>Desdomona ornata</i>, <i>Dendronereides zululandica</i>, <i>Ancistrocyllis parva</i> or <i>Hymenosoma orbiculaire</i> from two consecutive seasonal surveys.
	<p>Macrocrustaceans:</p> <ul style="list-style-type: none"> No loss of estuarine or marine Macrocrustacea from the basin and channel areas of the estuary (3.6) Ensure Macrocrustacea are represented by catadromous prawns and crabs (<i>Macrobrachium</i>, <i>Varuna litterata</i>) (3.7) 	<ul style="list-style-type: none"> No more than 30% loss of current species richness over four consecutive surveys No absence of <i>Macrobrachium</i> or <i>Varuna</i> adults from lower estuarine surveys in summer and <i>Varuna megalopae</i> from estuarine channel during late autumn/early winter surveys for two consecutive years.

COMPONENT	ECOLOGICAL SPECIFICATION	PROPOSED ECOLOGICAL TARGET
	<p>Zooplankton:</p> <ul style="list-style-type: none"> Maintain estuarine zooplankton community, in terms of abundance and diversity in the upper estuary and northern side of the basin 	<ul style="list-style-type: none"> No greater than 25% loss of diversity and abundance over two consecutive surveys (taking into account time of year)
Macrophytes	<p>Maintain the present distribution and abundance, the approximate area covered by the different plant community types (i.e. mangroves 650 ha, swamp forest, submerged macrophytes, salt marsh 60 ha, reeds and sedges 300 ha, phytoplankton measured as open surface water area 680 ha, intertidal benthic microalgae measured as exposed intertidal sand and mud banks 90 ha), in particular:</p> <ul style="list-style-type: none"> Ensure the growth and survival of <i>Rhizophora</i> (red mangrove) and <i>Bruguiera</i> (black mangrove) mangrove stands. Increase the area covered by reeds and sedges in the upper reaches along an established natural elevation gradient. Encourage establishment and expansion of <i>Zostera capensis</i> in the basin 	<ul style="list-style-type: none"> No loss of plant community type richness (e.g. loss of swamp forest). No greater than 20 % change in the area covered by a plant community type. Seedling and juvenile mangrove trees must be present. No greater than 50 % decrease in the area covered by <i>Zostera capensis</i> in basin area.
Microalgae	<p>Phytoplankton:</p> <ul style="list-style-type: none"> Phytoplankton biomass must be present in upper reaches of the estuary. Maintain phytoplankton group diversity (diatoms, dinoflagellates, flagellates, greens etc.) 	<ul style="list-style-type: none"> Phytoplankton biomass not to decrease below 5 µg/ℓ in upper reaches of estuary. No dominance of dinoflagellates or blue green algae.
	<p>Benthic microalgae:</p> <ul style="list-style-type: none"> Benthic microalgal biomass must be present in calm sheltered areas. Maintain benthic microalgal species diversity. 	<ul style="list-style-type: none"> Benthic microalgal biomass not to decrease below 20 mg/m² No less than 10 taxa for any sampling session and a lack of a dominant taxon (> 10 % cell counts) or no dominance by nuisance taxa e.g. blue-green algae.
Water quality	Water quality of river inflow not to cause impact on biota	<ul style="list-style-type: none"> Meet 'Reserve for Water Quality' (still to be set for the Mhlathuze system)
	Salinity gradient (or absence thereof) not to cause impact on biota	<ul style="list-style-type: none"> Salinity gradient should not extend from upstream channel into basin area during low flow periods
	System variables (pH, turbidity, dissolved oxygen) should not to cause impact on biota	<ul style="list-style-type: none"> pH should range between 8.5 and 6.5 Turbidity in estuary during low flow periods (to be determined). Dissolved oxygen concentrations greater than 5 mg/ℓ
	Nutrient concentrations not to cause impact on macrophytes and microalgae	<ul style="list-style-type: none"> DIN concentration (to be determined) DIP concentration (to be determined)
	Presence of toxic substances not to cause impact on biota	<ul style="list-style-type: none"> Toxin accumulation in sediments not to exceeds present baseline concentrations (to be determined) or as per quality guidelines for coastal environments (DEA)
Hydrodynamics	Maintain a flow regime typical of the reference habitat for birds, fish, macrophytes, microalgae and water quality	<ul style="list-style-type: none"> 'Reserve for Water Quantity' (to be determined)

COMPONENT	ECOLOGICAL SPECIFICATION	PROPOSED ECOLOGICAL TARGET
	Maintain as a permanently open estuarine bay to allow for habitat requirements and migratory functions of birds, fish, macrophytes, microalgae and water quality	<ul style="list-style-type: none"> • 'Reserve for Water Quantity' (to be determined)
	Flood regime to maintain the sediment distribution patterns and aquatic habitat (instream habitat) for birds, fish, macrophytes and microalgae	<ul style="list-style-type: none"> • 'Reserve for Water Quantity' (flood component) (to be determined)
Sediments	Organic content in sediments not to cause impact on benthic invertebrates	<ul style="list-style-type: none"> • To be determined
	Changes in sediment grain size distribution patterns not to cause impacts on benthic invertebrates	<ul style="list-style-type: none"> • Sediment distribution patterns in estuary not to deviate from present. Present = mud (not clay) to medium grain sands in the upper to middle reaches, coarser grain sizes at mouth and clays and fines confined to upper, northern section in main estuary.
	Changes in water depth in estuary not to cause impact on invertebrates and fish	<ul style="list-style-type: none"> • No greater than 10 cm change in sediment deposition/erosion in basin area. • Allowable % variation in diameter of narrow channel area calculated over entire (channel) area (to be determined)

These ecological specifications, however, need to be confirmed through a formal Classification process by DWS in accordance with the National Water Act (see Action 2.2). Currently there are no ecological specifications set for the Richards Bay Estuary under the National Water Act. These need to be determined as part of this EMP (see Action 2.2).

7.2.2 Conservation and heritage areas

Two formally proclaimed conservation areas fall within the geographical boundaries on this EMP (Figure 6), namely:

- Richards Bay Game Reserve
- Echwebeni Natural Heritage Area
- Proposed expansion of Richards Bay Game Reserve
- Proposed ecological support buffers (as per SDF of City of uMhlatuze 2017).

Further areas within the study area are being proposed for conservation status, but these are dealt with in Section 7.3 (Proposed expansions and/or new activities).

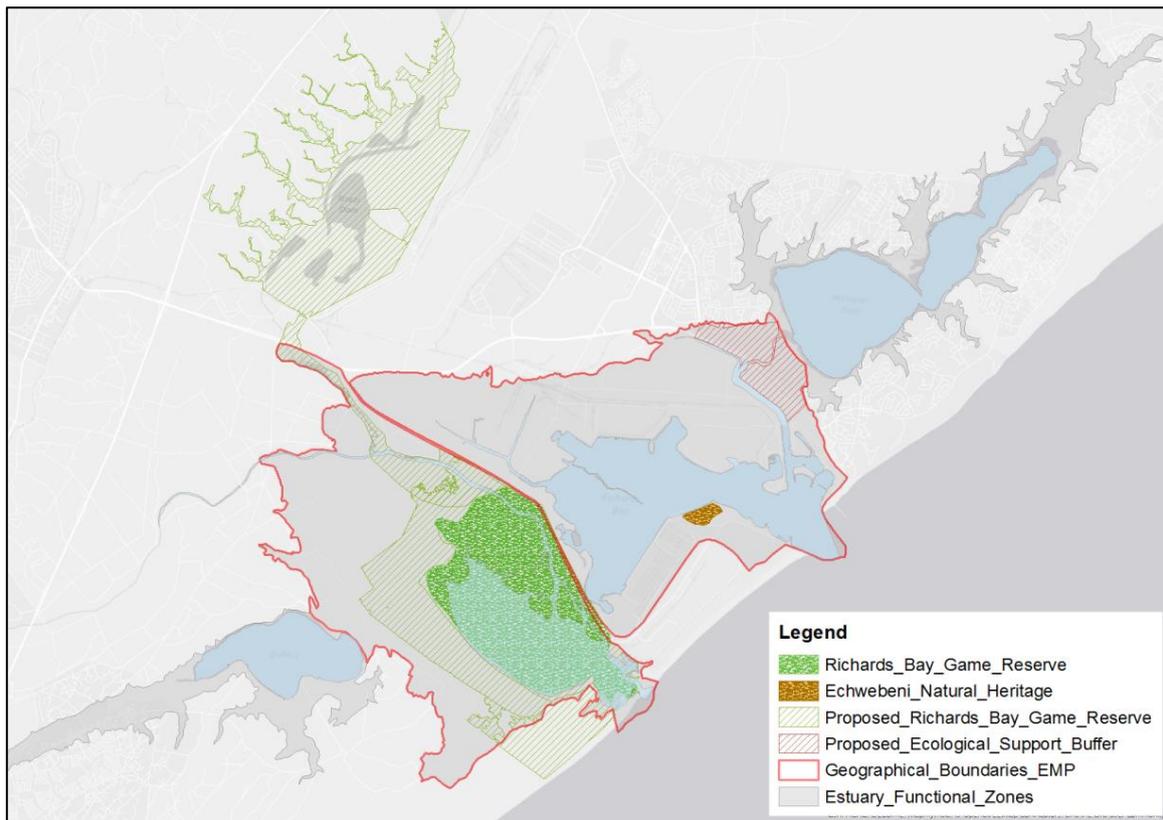


Figure 3: Proclaimed conservation areas within the geographical boundaries of the uMhlatuze/Richards Bay EMP

Conditions of use within these protected areas need to be set by Ezemvelo KZN Wildlife in accordance with the Protected Areas legislation. Ezemvelo KZN Wildlife typically sets generic conditions of use for areas under their protection, for example specification for “sanctuary zones” as would apply to the Richards Bay Game Reserve is indicated in Table 9 within the uMhlatuze Estuary.

Table 8: Ezemvelo KZN Wildlife zonation for marine and estuary protected areas (sanctuary zones)

PERMISSIBLE USES & ACTIVITIES	NON-PERMISSIBLE USES & ACTIVITIES
<ul style="list-style-type: none"> ✓ Research and monitoring ✓ Guided educational tours on foot ✓ Scientific and monitoring research beach driving ✓ Walking on beaches and swimming ✓ Limited traditional subsistence resource harvesting and use by local communities under strict regulation and control ✓ Essential management activities 	<ul style="list-style-type: none"> ✗ Harvesting of intertidal or shallow subtidal organisms, excluding subsistence fishing in demarcated areas ✗ Fossil and shell collecting ✗ Launching of boats ✗ Walking on intertidal rocks ✗ Riding of bikes ✗ Horse-riding ✗ Surfing, surf-skiing, snorkelling, rock and surf angling, or use of jet-skis

Ezemvelo KZN Wildlife is also envisaging expansion of the Richards Bay Game Reserve towards a more holistic approach for conservation of ecosystem types within the region. The City of uMhlatuze, in their SDF, also recognised the importance of a more holistic approach to environmental protection, in

the form of proposed ecological support buffers. Once the zonation of the proposed expansion and buffers have been finalised the zonation plan for this EMP needs be updated accordingly.

7.2.3 Agriculture and fisheries

Proposed zonation relating to commercial and small-scale farming is indicated in Figure 7, as per the SDF of the City of uMhlathuze (City of uMhlathuze 2017).

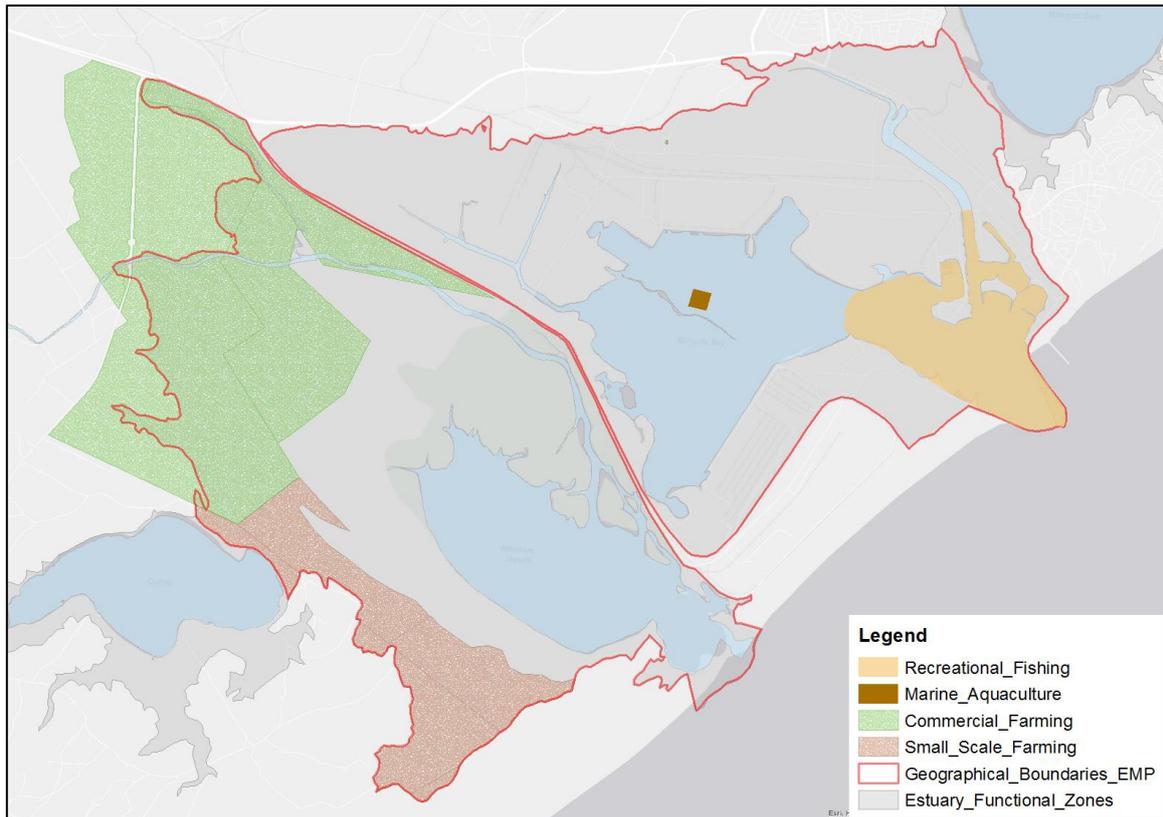


Figure 4: Proposed zonation of agricultural and fisheries activities within geographical boundaries of the uMhlathuze/Richards Bay EMP

The conditions of use within these agricultural areas are primarily dictated by Conservation of Agricultural Resources Act under the jurisdiction of provincial agricultural departments.

Although extensive illegal fishing activities occur throughout the geographical boundaries of this EMP, allowable fishing activities are limited to recreational fishing in the Richards Bay Estuary, as demarcated in Figure 7. The conditions of use that apply to the recreational fisheries, such as species bag limits and gear restrictions as set out in Regulations on Recreational Fisheries, as summarised in the recreational fisheries brochure produced annually by DAFF under the Marine Living Resources Act (www.daff.gov.za/daffweb3/Branches/Fisheries-Management/Small-Scale-Fishing).

An area of 7 hectares in the Port of Richards Bay has been leased out for a commercial marine sea finfish farm, using Dusky Kob (Figure 7), a collaborative undertaking between the Department of

Science and Technology (DST), the Department of Agriculture, Forestry and Fisheries (DAFF) and the University of Stellenbosch as part of Operation Phakisa.

7.2.4 Tourism-related facilities and recreational activities

The Richards Bay Estuary is a popular tourist destination and support several tourist-related facilities and recreational activities, including (Figure 8):

- Tuzi Gazi Waterfront development
- Yacht harbour
- National Sea Rescue Institute (NSRI)
- Recreational activities (e.g. ski-boats and canoeing).

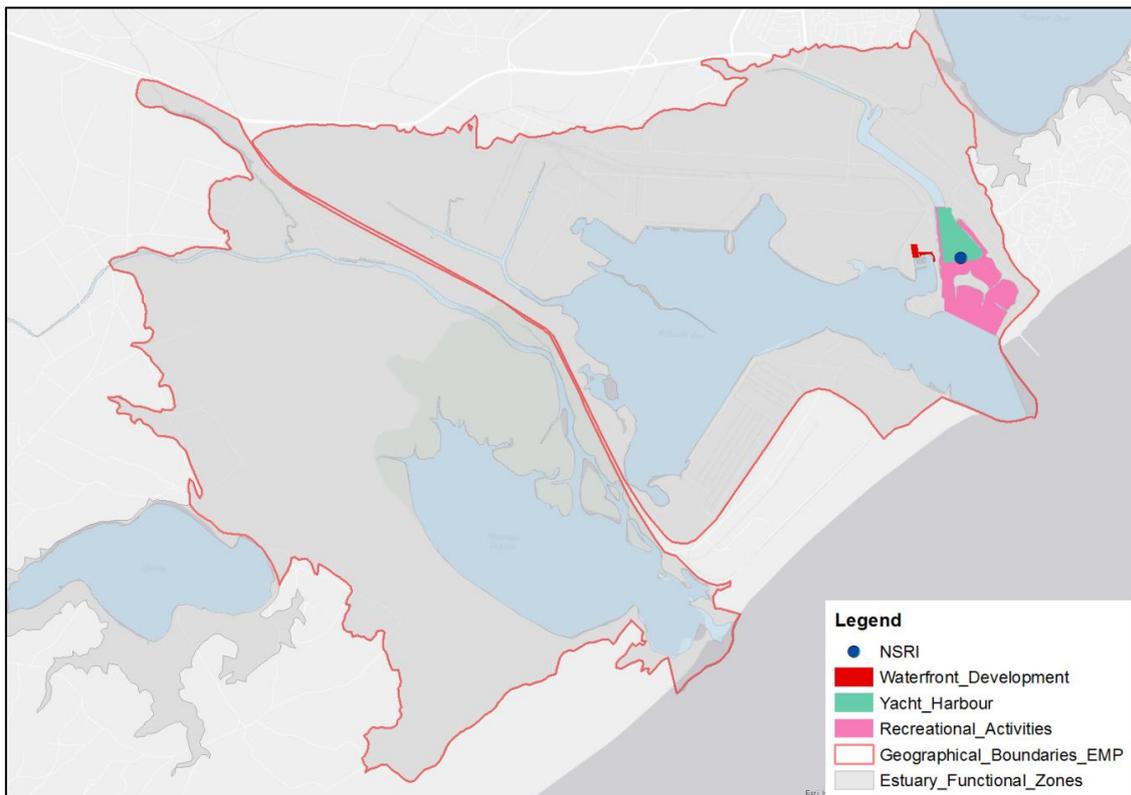


Figure 5: Tourism-related facilities and recreational activities within geographical boundaries of the uMhlatuze/Richards Bay EMP

The City of uMhlathuze is planning extensive expansions for the Tuzi Gazi waterfront, including a Convention Centre (City of uMhlathuze 2017). However, these proposed expansions need to be assessed against current zonation within the study area to address any potential conflicts to other uses, and once finalised, such zonation should be incorporated in the EMP zonation plan. The northern corner of the Richards Bay Estuary is used extensively for recreational activities such as boating and canoeing, supported by ski-boat and angling club facilities in the area. One of the stations of the NSRI is also located in this part of the estuary.

Access to the uMhlathuze Estuary is very limited and as a result the area currently does not support any tourism-related or recreational activities. However, a management objective of the EMP is to investigate responsible public access to this estuary, to allow local communities to share in the potential tourism and recreational values. Such access must be provided in accordance with the DEA's coastal access strategy under the ICM Act (DEA 2014), and once finalised the appropriate zonation of allowable access and activities need to be demarcated on the EMP zonation map.

7.2.5 Industries and mining facilities

The Richards Bay Estuary supports the commercial Port of Richards Bay with numerous associated industrial facilities as indicated in Figure 9. These include:

- Multipurpose terminal
- Coal terminal
- Small craft harbour
- Tank terminal.

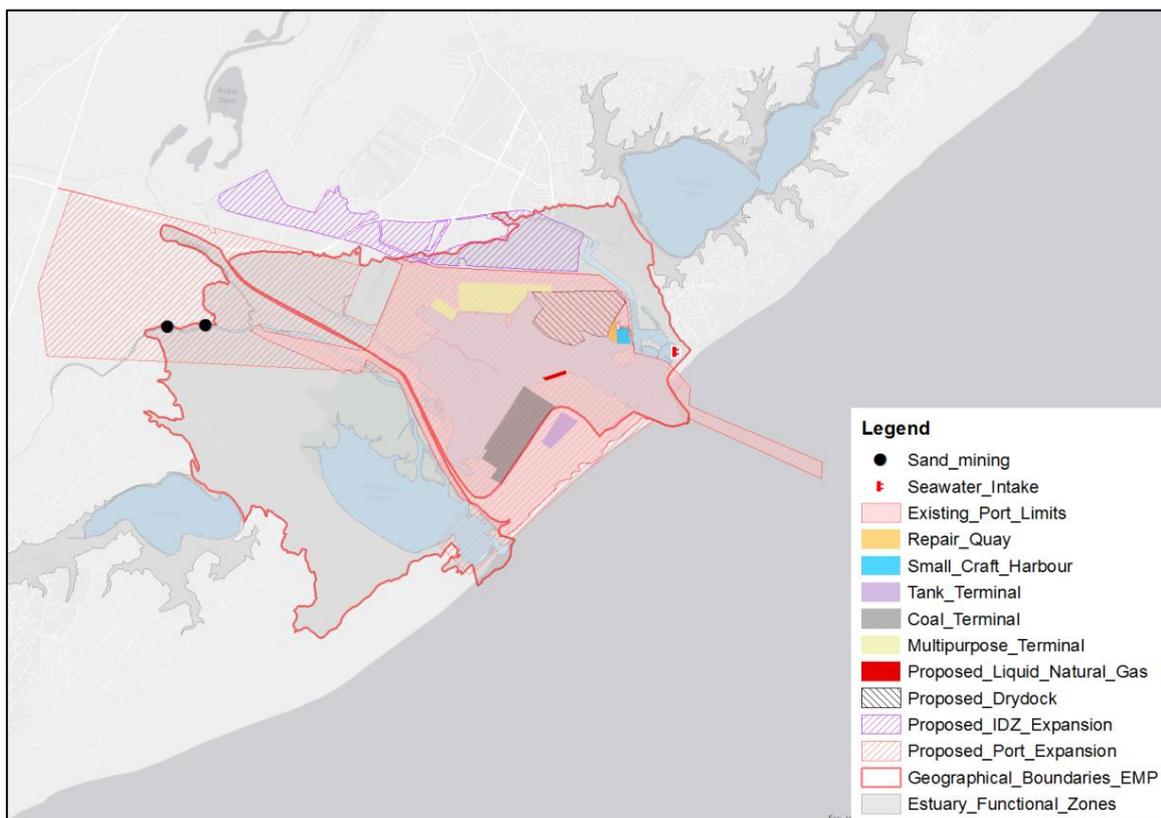


Figure 6: Industrial and mining facilities within the geographical boundaries of the uMhlathuze/Richards Bay EMP

The Richards Bay IDZ is a major industrial facility within the study area, and proposed expansions are indicated in Figure 9. Seawater intakes for desalination and and uMhlathuze outfall system are located towards the north-eastern corner of the Richards Bay Estuary.

Mining activities within the geographical boundaries of the EMP primarily relate to sandmining occurring within the REI zone of the uMhlathuze Estuary. However, the EMP aims to facilitate engagement with the Department of Mineral Resources to determine whether these type of activities in sensitive habitats, such as REI zones can be sustainable, in which case the zonation of mining within the uMhlathuze/Richards Bay EFZ need to be adjusted.

Several proposed industrial facilities also are being planned for the area, specifically in the Richards Bay Estuary (Figure 9). These include a new dry dock and a liquefied natural gas (LNG) terminal. Major port expansions are also on the cards which will expand port limits further into the EFZ of both the uMhlathuze and Richards Bay estuaries. Of critical importance is that the environmental sustainability of these proposed developments be thoroughly investigated through dedicated environmental impact assessment (EIA) studies. Specifically, these assessments need to be considered potential conflicts with existing zoned use (e.g. potential conflict with tourism activities and recreational facilities – see Figure 8), as well as proposed use (e.g. potential conflict with proposed expansion of the Richards Bay Game Reserve in the uMhlathuze Estuary [see Figure 6], as well as the proposed waterfront expansions [see Figure 8]). Once finalised the appropriate zonation of new industrial facilities on the EMP zonation map need to be amended.

8 Integrated Monitoring Plans

In the context of estuarine management planning for individual estuaries, an integrated monitoring plan should comprise three broad categories, namely (DEA 2015):

Resource monitoring, which is directed at specific ecological indicators (to monitoring the state or health of the natural resource)

Compliance monitoring, which relates to the intensity and character of activities/uses of the resource so as to test compliance with relevant laws and policies, as well as timeously identify potential threats

Performance monitoring, which is aimed at gauging progress in terms of achieving the management objectives, and ultimately, the vision (and associated outcomes) for a particular estuary.

8.1.1 Resource Monitoring Plan

The primary aim of resource monitoring is to collect and evaluate data that will inform management on the ecological health of an estuary, as well as the intensity and nature of uses/activities that potentially influence its health state. Requirements for the ecological monitoring of estuaries as described in the Methods for the Determination of the Ecological Water Requirements Reserve for Estuaries (DWA 2013 or future updates thereof) provides a suitable guideline for the ecological health component. For example the resource quality objectives (ROQs) as defined for estuaries in terms of water resource classification under the National Water Act, provide the ecological targets against which to assess ecological health.

A resource monitoring programme was developed for the uMhlathuze Estuary as part of a DWS ecological water requirement study in 2003 (DWA 2013) and is presented in Table 10.

The 2003 study also recommended ecological specification against which to assess ecological health (see Table 8). This monitoring plan, therefore as developed under the National Water Act with the DWS as responsible authority. However, the implementation of this plan may well be shared with other authorities responsible for components of resource monitoring in the estuary, namely Ezemvelo KZN Wildlife (inside Richards Bay Game Reserve) and DAFF (fish component). This coordination of resource monitoring has been identified as a management objective for this EMP (see Chapter 5, Management Objective 13).

Table 9: Resource monitoring plan for uMhlathuze Estuary (DWA 2003), as well as interim resource plan for Richards Bay Estuary

ECOLOGICAL COMPONENT	INDICATOR	TEMPORAL SCALE	PROPOSED SPATIAL SCALE
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		(frequency and when)	(No. Stations)
BIRDS	Bird counts	Every 2 years (summer and winter)	Whole estuary
FISH	Fish survey of estuary (including REI's and main basin). Sample variety of habitats (including <i>Zostera</i> beds) using a large and small seines, as well as gill nets. Cohort analysis.	Annually, mid-summer. Repeat late summer if at risk of reaching any TPC	5 large seine, 5 small seine, 5 gill net (including <i>Zostera</i> beds and REI's)
	Fish survey of small, cryptic species using structured habitats such as mangroves, reeds and <i>Zostera</i> beds	Once, mid-summer every three years	10 stations reflecting habitat variability and salinity gradient
INVERTEBRATES	Benthic invertebrates survey of upper estuary (into freshwater and Mtantatweni Channel) using Zabalocki-type Eckman grab) with 5 reps at each site	Annually, summer and winter	3 stations
	Benthic invertebrates survey of intertidal wader feeding sites	Annually, summer and winter	3 stations
	Invertebrate survey of <i>Zostera</i> beds (grabs and trawl)	Seasonal (x4) every 3 rd year	3 stations
	Benthic invertebrate survey (balance of system - basin area)	Annually, summer and winter	3 stations
	Macrocrustacea survey beam trawls (and bycatch of fish sampling)	Annually, summer and winter	3 stations
	Zooplankton survey in upper estuary and basin (Bongo net hauls after dark, 2 reps)	Annually, summer and winter	3 stations
MACROPHYTES	Measure area covered by different plant community types from aerial photographs including <i>Zostera capensis</i> beds (preferably from summer). Ground truth areas covered by different plant community types. Produce a GIS map.	Summer, every 3 rd year	Whole estuary
	Measure area covered by different plant community types from aerial photographs including <i>Zostera capensis</i> beds (preferably from summer). Ground truth areas covered by different plant community types. Produce a GIS map.	Annually, summer	Whole estuary
	<i>In situ</i> measurement of black and red mangrove population structure (size class distribution) using transects and quadrats	Annually, summer	Mangrove area, minimum 20 x 25m ² quadrats
MICROALGAE	Measure phytoplankton biomass and group composition during low flow conditions.	Low flow conditions, every 2 nd year	5 stations (basin) + 3 stations (upper estuary)
	Measure benthic microalgal biomass and species composition during low flow conditions.	Low flow conditions, every 2 nd year	5 stations (basin) + 3 stations (upper estuary)
WATER QUALITY	<i>In situ</i> measurements of system variables (DO [mg/l % sat], pH, turbidity, TDS, salinity, temperature) at benthic invertebrate sites (upper estuary and basin), as well as each invertebrate site in <i>Zostera</i> beds	Annually, summer and winter	5 stations (basin) + 3 stations (upper estuary)
	System variables (pH, DO, turbidity, suspended solids, TDS and temperature), nutrients (inorganic nitrogen, reactive phosphate and silicate) and toxins (where relevant) in river inflow at heads of estuary	At least monthly	1 station just above head of estuary

ECOLOGICAL COMPONENT	INDICATOR	TEMPORAL SCALE (frequency and when)	PROPOSED SPATIAL SCALE (No. Stations)
	System variables (pH, DO, salinity, temperature, turbidity/light penetration and suspended solids), nutrients (dissolved inorganic nitrogen, phosphate and silicate) in surface and bottom waters along length of estuary and along cross sections in basin (to establish relationship between salinity distribution and WQ. Salinity and temperature profiles to be collected at 0.5 m depth intervals.	Once every 5 years	6 – 10 stations
	Baseline survey of trace metal and hydrocarbon concentrations in sediments (including analyses of grain size distribution and organic content)	Once every 5 years	6 – 10 stations
HYDRODYNAMICS	Water level recordings	Continuous	1 station at mouth
	Flow gauging	Continuous	1 station at head of estuary
SEDIMENT	Bathymetric survey (relative to MSL) including sediment distribution (grain size analyses)	Every 3 years or after a flood event	Entire estuary (repeat old survey grid), including upper section (every 300m in top)
	Sediment grain size analysis and organic content at benthic invertebrate sites (upper estuary and basin), as well as each invertebrate site in <i>Zostera</i> beds	Annually, summer and winter	6-10 stations

Currently, the Richards Bay Estuary does not have an existing, comprehensive resource monitoring plan, e.g. as required under the National Water Act. Such a plan still needs to be developed by the DWS as part of the Water Resource Classification for the area and is being proposed as a Management Objective for this EMP (see Chapter 5, Management Objective 2). In the interim, it is proposed that a similar resource monitoring plan as presented for the uMhlathuze Estuary (e.g. indicators, temporal and spatial scales) (Table 10) be adopted for the Richards Bay Estuary. While the DWS will be the primary responsible authority for the development and implementation of a resource monitoring plan for the Richards Bay Estuary, the implementation of such a plan may well be shared with other authorities responsible for components of resource monitoring in the estuary, namely Port of Richards Bay (inside the Port of Richards Bay) and DAFF (fish component).

8.1.2 Compliance Monitoring Plan

Compliance monitoring primarily comprises the monitoring of intensity and character of relevant uses/activities in the estuary. Such monitoring is usually specified in relevant laws, regulations, policies, standards, guidelines and/or permits and licence agreements. The aim of this monitoring component is to test for compliance as well as to assess timeously for potential pressures on the resource. The indicators (or monitoring parameter/s) for various activities/uses usually are specified in relevant statutes as listed above. Often these statutes also specify frequency of sampling/monitoring, but the frequency of monitoring typically depends on the variability of activity/use (e.g. seasonal or throughout the year; variability in flow rates and effluent composition). Reporting mechanism for compliance monitoring is mostly stipulated in the laws and policies governing various uses/activities in and around estuaries and such information should be sourced for the uses/activities relevant to a particular estuary,

and included in the integrated monitoring plan. Key activities/uses that need compliance monitoring in the uMhlathuze/Richards Bay systems are indicated in Table 11 below.

Table 10: Key activities/uses that need compliance monitoring plans as part of uMhlathuze/Richards Bay EMP

USE/ACTIVITY	INDICATOR	TEMPORAL SCALE	TARGET/ LIMIT	RELEVANT LEGISLATION	RESPONSIBLE AUTHORITY
Wastewater discharges	Effluent constituents and volume of wastewater	As per permit requirements		NEM: ICM Act/ National Water Act	DEA/DWS/ Discharger
Stormwater discharges	Constituents and volume of stormwater	Not specified, but must ensure that RQOs for estuaries are complied with		NEM: ICM Act/ National Water Act/ Municipal Bylaws	DEA/DWS/ City of uMhlathuze
Atmospheric emissions	Constituents in emission	As per permit agreement		NEM: Air Quality Act/ Municipal Bylaws	DEA/City of uMhlathuze
Solid waste disposal	Operations	As per permit requirements		NEM: Waste Act	DEA
Fishing	No. and type of fish	As per Recreational Fisheries Regulations		Marine Living Resource Act	DAFF
Port Facilities	Depends on facility, as specified by TNPA	As per requirements specified by TNPA		National Ports Act	TNPA
Dredging	Toxic substances in sediment	As per Dumping at Sea Action List under Act (DEA 2012)		NEM: ICM Act	DEA/TNPA
Mining	Operations	As per agreement under Act		Mineral Resources Act	DMR

8.1.3 Performance Monitoring Plan

Performance monitoring is primarily aimed at assessing the effectiveness with which planned management objectives and associated actions are being performed (outputs), and ultimately, to gauge progress in achieving the overall vision and strategic objectives (outcomes). Here the performance indicators defined earlier for the strategic objectives (see Table 4) and management actions (see Chapter 6) come to use. Ideally, targets should also be set for each of the performance indicators. Most important for performance monitoring is temporal scales at which data on the selected indicators should be collected. This will obviously depend on the type of indicator and expected rate of progress. A preliminary performance monitoring plan for the uMhlathuze/Richards Bay EMP is presented in Table 12, but will need to be refined during the implementation phase. Performance monitoring components need to be addressed in key performance assessments of the responsible authorities, and could be consolidated in an annual performance assessment report for the uMhlathuze/Richards EMP, prepared by the proposed uMhlathuze/Richards EMP Steering Committee (refer to Chapter 9). Overall performance of the EMP can also be tracked through status on achieving the Strategic Objectives as part of annual reporting.

Table 11: Preliminary performance monitoring plan for consideration in the uMhlathuze/Richards Bay EMP

MANAGEMENT OBJECTIVE	PERFORMANCE INDICATOR	RELEVANT LEGISLATION	RESPONSIBLE AUTHORITY
1: Conservation protection status	Agreed boundaries for protected areas	NEM: Biodiversity Act/ Protected Areas Act	Ezemvelo KZN Wildlife/CoU/DEA
	No-take zones determined and demarcated on final zonation plan	NEM: Protected Areas Act/ MLRA	Ezemvelo KZN Wildlife/DAFF
2: uMhlathuze/Richards Bay	Completed hydrological study	National Water Act; Water Services Act	DWS/uMhlathuze Water

Integrated Monitoring Plan

MANAGEMENT OBJECTIVE	PERFORMANCE INDICATOR	RELEVANT LEGISLATION	RESPONSIBLE AUTHORITY
estuaries protect as Category C	Completed classification study (i.e. Management Class, Reserve and RQOs)	National Water Act	DWS: Classification
3: Living resource exploitation	Documented SOPs for living resource exploitation	MLRA	DAFF/Ezemvelo KZN Wildlife/TNPA
	Documented SOPs for mangrove harvesting	CARA	DAFF/Ezemvelo KZN Wildlife/TNPA
	Living resource exploitation zones demarcated on final zonation plan	CARA	DAFF/Ezemvelo KZN Wildlife/TNPA
4: Mining activities	Documented SOPs for mining activities	MPRD Act	DMR/DEA
	Mining zone demarcated on zonation plan		
5: Marine aquaculture	Completed EIA study with Record of Decision (ROD) for any new activities	NEMA	Provincial DEA/Developer
	Tidal gates permanently sealed off	National Ports Act	TNPA
6: Infrastructure development	Completed strategic development plans addressed environmental considerations	National Ports Act Municipal Systems Act; SPLUMA (IDPs/SDFs)	TNPA & CoU
	Completed EIA study with Record of Decision (ROD) for any new infrastructure developments	NEMA	Provincial DEA/Developer
	Well-maintained infrastructure	National Ports Act National Building Regulations and Building Standards Amendment Act Municipal Bylaws	TNPA/CoU
7: Pollution prevention	Documented SOPs for pollution management	National Water Act, NEM: Waste Act, NEM: ICM Act, NEM: Air quality Act	DEA/CoU/TNPA
	Documented Inventory of air pollution sources	NEM: Air quality Act	
	Documented Inventory of wastewater and stormwater sources	National Water Act NEM: ICM Act	DEA/DWS/uMhlathuze Water/CoU/TNPA
	Documented Inventory of solid waste sources	NEM: Waste Act	DEA/CoU/TNPA
	Updated oil spill contingency plan	Marine Pollution (Prevention of Pollution from Ships) Act	
	Ballast water auditing programme implemented	Marine Pollution (Prevention of Pollution from Ships) Act, National Ports Act	TNPA/DEA
	Tidal gates permanently sealed off	National Ports Act	TNPA
Rehabilitated slimes dam	National Water Act	DWS/CoU	
8: Freshwater requirements	Aligned water resource plans	National Water Act Water Services Act	DWS/uMhlathuze Water
	Implemented 'Reserve' and achieve Target Ecological Categories for estuaries	National Water Act	
	Maintained weirs		
9: Coastal public access	Access provided to public through appropriate access routes	NEM: ICM Act	Provincial DEA/CoU/ TNPA
	Maintained and monitored access routes		
10: Socio-economic growth	Small businesses established	Cross-cutting	DEA
	Local communities share in economic growth	Cross-cutting	DEA
11: Climate change	Management lines determined and enforced Prepared/ developed coastal defence	NEM: ICM Act Climate change policy	Provincial DEA/CoU/ TNPA

MANAGEMENT OBJECTIVE	PERFORMANCE INDICATOR	RELEVANT LEGISLATION	RESPONSIBLE AUTHORITY
	strategies and implement.		
12: Training, education and awareness	Youth training and education programmes established	NEM: ICM Act	DEA
	Education and awareness programmes established	NEM: ICM Act	DEA
13: Environmental monitoring	Documented SOPs for monitoring coordination	NEM Acts/MLRA	DEA/DAFF/CoU/ Ezemvelo KZN Wildlife/TNPA
14: Compliance and enforcement	Documented SOPs for coordination of compliance and enforcement		
15: Inclusive institutional mechanisms	Established sub-committee for EMP	NEM: ICM Act	DEA/Tribal Authority
	Established advisory forum		
	Established relationship with Tribal Authorities		
16: Capacity and finances	EPWP programmes established	Cross cutting to numerous acts	DEA/Dept of Public Works
	Sourced support from various sources		EA/CoU/ TNPA
17: Research collaboration	Completed sediment dynamic study for KZN region	Linked to ICM Act (coastal erosion)	DEA/Provincial DEA/ Coastal municipalities

STRATEGIC OBJECTIVE	PERFORMANCE INDICATOR	TARGETS
Ecological	<ul style="list-style-type: none"> Resource Quality Objectives (RQOs) for a C Category are achieved Full protection status granted including zonation of no-take areas 	To be confirmed during implementation phase
Social	<ul style="list-style-type: none"> No. of youth education and training programmes No. of subsistence initiatives enabled through EMP Controlled, safe access No of users/visitors/tourists accessing system annually 	
Economic	<ul style="list-style-type: none"> No. of small businesses No. jobs created (permanent and non- permanent) Status of EIA studies Extent of compliance 	
Governance	<ul style="list-style-type: none"> Established Municipal sub-committee Sector feedback on attendance of meetings and/or feedback provided (reports/emails/ presentations) Extent of authority participation Established advisory forum Local community membership No. of awareness programmes Established advisory forum Private sector membership No. of public-private sector partnerships No. and extent of monitoring programmes No. of illegal activities vs successful prosecution/ mitigations 	

9 Proposed Institutional Arrangements

Effective institutional arrangements are crucial in ultimately achieving the vision and strategic objectives of an EMP. The implementation of various activities, as set out in the EMP, need to be overseen by a group of dedicated people, coordinated through a formally established institutional structure/s. Chapter 5 of the ICM Act provides direction on institutional arrangements that would contribute to cooperative coastal governance in South Africa. According to the ICM Act, the embodiment of cooperative coastal governance is vested in coastal committees that are established at national, provincial and municipal levels. The Protocol does not propose new institutional arrangements specifically aimed at estuarine management. Rather the Protocol states that provincial or municipal coastal committees shall serve as the formal institutions for overseeing the implementation of EMPs as well as for reporting on progress and achievements related to EMPs. Continuous stakeholder engagement remains critical into the implementation phase of EMPs and the NEMP also recognizes this by promoting the establishment of estuary forums. The NEMP regards these as the important informal, advisory bodies with the purpose of supporting effective facilitation and implementation of EMPs. These advisory stakeholder bodies also fulfil a role in terms of the participatory, cooperative governance promoted in legislation such as NEMA and the ICM Act.

In the case of the uMhlathuze/Richards Bay EMP, the selection of the management institution is more complex, as the development of the EMP resides with national government (i.e. DEA), but the key implementing agents spans a local municipality (City of uMhlathuze), a provincial authority (e.g. Ezemvelo KZN Wildlife), a port authority (Richards Bay TNPA) and a water resource protection and planning authority (Department of Water and Sanitation). Given this complexity, it is recommended that an uMhlathuze/Richards Bay EMP steering committee formally be established under the KZN Provincial Coastal Committee specifically tasked to oversee and coordinate the implementation and future review of the EMP. As a minimum, the executive team of this steering committee should comprise representative/s from the responsible national authority (i.e. DEA: Oceans and Coasts), as well as representatives from the relevant departments in the four key implementing agents, that is Department of Water and Sanitation (through uMhlathuze Water), City of uMhlathuze, Ezemvelo KZN Wildlife, Port of Richards Bay (considering the connectivity between the uMhlathuze/Richards Bay management unit for EMP, and that of Lakes Cubhu and Mzingazi, it may even be wise to extend the brief of such a technical sub-committee to oversee and coordinate the implementation of all three EMPs). The executive team would then appoint additional members to the technical sub-committee comprising other role players having responsibilities in the execution of this EMP. As a component within the KZN provincial coastal committee such as steering committee will have access to a provincial-level platform to table progress, but also to raise concerns pertaining to governmental (and other) non-performance in terms of implementation, and compliance and enforcement as agreed upon in the EMP. Formal connection to a provincial platform provides an incremental institutional stepping stone to a national

platform where provincial coastal committees have representation, that is Working Group 8 (that fulfils the role of the national coastal committee in terms of the ICM Act). Therefore, the technical sub-committee can table issues at provincial coastal committee meetings and request that these be referred to the national coastal committee (Working Group 8), especially pertaining to issues of non-performance by other national authorities.

In addition to the formal institutional structure detailed above, it is recommended that an informal environmental advisory body - the uMhlathuze/Richards Bay Advisory Forum - also be established. During the uMhlathuze/Richards Bay EMP development process valuable contributions were received from local stakeholders, spanning local industries, non-government organisations, and community organisations. Thus continuous stakeholder buy-in, involvement and engagement can be fostered through the establishment of such a forum, also providing a platform to facilitate innovative private-public partnerships to further the visions and objectives of the EMP. Indeed, the vision for the uMhlathuze/Richards Bay EMP, aspires to "... responsible, holistic and inclusive management approaches". The advisory forum, as proposed here, could also be extended to fulfil a broader, joint environmental advisory role in the region. Alternatively, the role of a similar, existing advisory forum could be extended to fulfil this role under the EMP implementation process. The value of motivated and dedicated stakeholder advisory forums has been demonstrated in the late 2000s during the development and implementation of EMP for estuaries in the Cape Floristic Region as part of the GEF funded CAPE Estuaries Programme. In this pre-NEMP era, so-called "estuary forums", chaired by enthusiastic and dedicated community members and comprising mostly local stakeholders, took cooperative governance of estuaries in South Africa to the next level. Members of the advisory body may include representatives from, for example:

- Local Tourism Body
- Heritage Association
- Ratepayers' Association
- Local developers and industries
- Local angling or fishing groups
- Non-governmental organisations (NGOs)
- Community-based organisations (CBOs);
- Ecological and social and resource-economic specialists
- Tribal authorities.

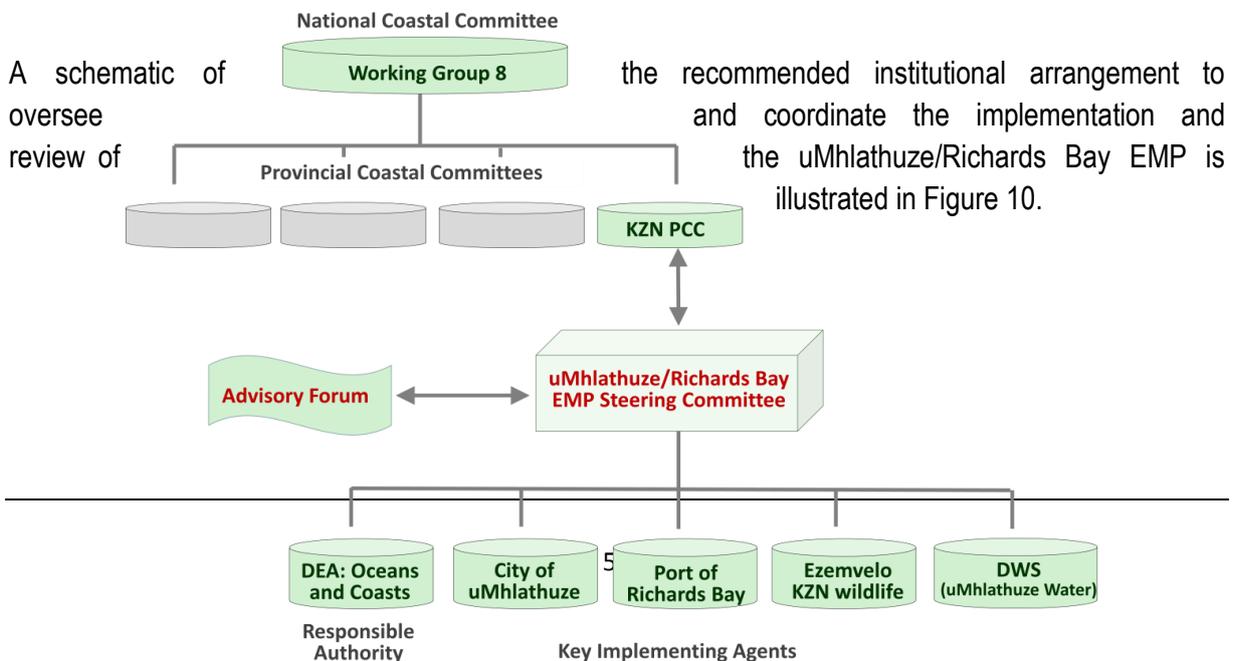


Figure 7: Schematic illustration contextualising proposed institutional arrangements for the coordination and implementation of uMhlathuze/Richards Bay EMP

A public meeting could be convened to establish the uMhlathuze/Richards Bay Advisory Forum, as well as to select a chairperson and core (executive) team. Agreement on the role and responsibilities of the forum must be obtained in collaboration with the uMhlathuze/Richards Bay steering committee (the forum chairperson also should have representation on the technical sub-committee). An important role envisaged for the uMhlathuze/Richards Bay Advisory Forum, amongst others, is the coordination and facilitation of training, awareness and education programmes. These type of initiatives are often most successfully undertaken as private-public partnerships, where local community organisations and private sector sponsors take hands with the authorities to build environmentally responsible values in local communities and the youth, often themselves relying on the sustainability of estuarine resources for their livelihoods.

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11 Appendices

11.1 LIST OF FIGURES

Figure 1: Historical configuration of the uMhlathuze estuarine lake system (left, prior to 1964) and its current configuration (right, post 1976) of an artificially divided system comprising the uMhlathuze and Richards Bay estuaries (Source: Weerts 2002).....	3
Figure 2: Framework for integrated estuarine management in South Africa (DEA 2015)	1
Figure 3: Demarcation of the geographical boundaries for this EMP (up to the weirs separating Lakes Mzingazi and Cubhu) (highlighted in red)	36
Figure 4: Important authority boundaries overlapping with the geographical boundaries of the uMhlathuze/Richards Bay EMP	36
Figure 5: Zonation of sensitive and important estuarine habitats within geographical boundaries of the uMhlathuze/Richards Bay EMP	36
Figure 6: Proclaimed conservation areas within the geographical boundaries of the uMhlathuze/Richards Bay EMP	412
Figure 7: Proposed zonation of agricultural and fisheries activities within geographical boundaries of the uMhlathuze/Richards Bay EMP	412
Figure 8: Tourism-related facilities and recreational activities within geographical boundaries of the uMhlathuze/Richards Bay EMP	412
Figure 9: Industrial and mining facilities within the geographical boundaries of the uMhlathuze/Richards Bay EMP	445
Figure 10: Schematic illustration contextualising proposed institutional arrangements for the coordination and implementation of uMhlathuze/Richards Bay EMP	445

11.2 LIST OF TABLES

Table 1: Desktop Present Ecological Status, as well as preliminary Recommended Ecological Categories (REC) allocated to uMhlathuze/Richards Bay Estuary	7
Table 2: Important ecosystem service potential of the uMhlathuze/Richards Bay estuaries (DWA 2010)	7
Table 3: Estimated extent of existing (negative) impacts of identified threats on biodiversity and socio-economical value of the uMhlathuze/Richards Bay Estuary	7
Table 4: Strategic Objectives for the uMhlathuze/Richards Bay EMP	17
Table 5: Key principles for the uMhlathuze/Richards Bay EMP Strategic objectives	Error
Table 6: Important spatial planning processes relevant to zonation in estuaries	34
Table 7: National acts, regulations, protocols and gazetted notices, as well as national plans and guidelines expressing conditions of use of the uMhlathuze/Richards Bay Estuary	34
Table 8: Proposed ecological specification and targets for uMhlathuze EFZ (DWA 2003)	37
Table 9: Ezemvelo KZN Wildlife zonation for marine and estuary protected areas (sanctuary zones)	41
Table 10: Resource monitoring plan for uMhlathuze Estuary (DWA 2003), as well as interim resource plan for Richards Bay Estuary	41
Table 11: Key activities/uses that need compliance monitoring plans as part of uMhlathuze/Richards Bay EMP	49
Table 12: Preliminary performance monitoring plan for consideration in the uMhlathuze/Richards Bay EMP	49

11.3 Summary of Lake Mzingazi EMP

(Extracted from City of uMhlathuze, 2014b)

Vision:

“The beautiful and tranquil Lake Mzingazi offers community members an improved quality of life through the implementation of sustainable environmental management practices and sustained service delivery whilst ensuring social and economic development and the promotion.

Strategic Objectives:

Ecological	<ul style="list-style-type: none"> Promote sustainable methods of environmental management within the vicinity of the lake system Tranquil, beautiful, safe and unpolluted lake system Respectful utilisation of the lake for diverse activities within the boundaries of the ecosystem Providing livelihoods derived from the improvement and restoration of the natural environment
Heritage	<ul style="list-style-type: none"> Protect and enhance the historical, archaeological and architectural values of the area.
Socio-economic	<ul style="list-style-type: none"> Active development and participation in Lake Forum Sustainable service delivery and social and economic development in communities within the vicinity of the lake environment Education and awareness around the value and processes of Lake Mzingazi The vision and objectives of our LMP will be well communicated to the general public, will be linked up in a proper manner with other strategies and management plans and inform future prospects Lake Mzingazi will fully support tourism in a sustainable manner in the region

Management Objectives and Associated Actions:

Conservation

Objective:	Provide protection for the biodiversity of the lake (e.g. species, populations, communities, habitats, ecological processes and ecosystem services) from pollution, habitat loss, over-exploitation and other negative impacts.
Action 1.1:	Proclaim Lake Mzingazi as a Nature Reserve (a goal specified in uMhlathuze Municipality’s Environmental Services Management Plan (ESMP)).
Action 1.2:	Sediment input into the lake should be quantified and monitored as sedimentation of the lake systems has a significant impact on the capacity of the lake.
Action 1.3:	Spatially monitor the encroachment of reeds over time using GIS and remote sensing. This will provide a good indication of the extent of segmentation that is taking place within the lake.
Action 1.4:	Develop and implement best practice guidelines for riparian protection (addressing reed removal, grazing and burning). The clearing of indigenous vegetation along the periphery of the lake should be monitored to assess the extent of bank destabilization and surface modifications.
Action 1.5:	The ecological water requirement (EWR) of Lake Mzingazi has been determined (DWA, 1999). A follow-on study should be conducted to determine/confirm the EWR of Lake Mzingazi with a medium to high confidence level, focusing on both surface and groundwater resources. It should include a comprehensive evaluation of the freshwater input to the lake, lake hydrodynamics, water quality, sediment processes, microalgae, vegetation, invertebrates, fish and birds of Lake Mzingazi. It should also consider the minimum water level for fish way operation (equal to and greater than 3m above mean sea level). The EWR should be formally allocated (gazetted) following the procedures stipulated under the National Water Act (No. 36 of 1998).The EWR confirmed by the follow-on study should be released at all times, allowing the system to mitigate against negative impacts e.g. those associated with drought events.
Action 1.6:	A study should be conducted to determine the extent of dune barrier erosion that has taken place over the last decade, identify areas of dune that are particularly susceptible to erosion, and recommend management

- and monitoring measures to reduce the potential adverse impacts of dune erosion on Lake Mzingazi.
- Action 1.7: Frequent inspection of the dam wall and the submission of inspection reports to the Department of Water Affairs is recommended with the aim of preventing the remobilisation of sediments which leads to increased turbidity in the lake; and modifications in lake and lakeshore morphology.
- Action 1.8: It is recommended that the lake shoreline be delineated using ground reconnaissance, with the aim of increasing the accuracy of desktop findings. Changes in shoreline should thereafter be monitored. This will inform future management and conservation measures recommended for Lake Mzingazi

Environmental Hazards

Objective: Identify environmental hazards that may impact on the lake system; including floods, droughts and climate change; and recommend management and mitigation measures that can be employed to minimise the associated environmental and socioeconomic losses.

- Action 2.1: Wetlands in the catchment and endemic riparian vegetation in the floodplains should be conserved for their mitigation of erosion of the lakeshore banks by waves and attenuating floods.
- Action 2.2: Enforcing the recommended set-back lines and allocating freshwater flows will ensure that Lake Mzingazi is buffered as much as possible against climate pressures and climate change.
- Action 2.3: The current cycles of dry and wet spells experienced in southern Africa is expected to change drastically as per current Climate Change model predictions. These need to be incorporated into finer resolution modelling to build in lake responses to the regional climate model predictions.

Land use and infrastructure development

Objective: Assess and control all developments, both current and proposed, including infrastructural and residential, which impact or could impact on the sustainability of the system, its biodiversity and aesthetic integrity.

- Action 3.1: The establishment of a land use setback would address the issues of uncontrolled and inappropriate crop production and their impacts on Lake Mzingazi and connected hydrological features.
- Action 3.2: Fires should be prohibited within the ecological buffers around environmentally sensitive features and Lake Mzingazi. Should such restrictions not be adhered to, a penalty system will be put in place such that perpetrators will have to pay a fine for non-compliance.
- Action 3.3: Ecological setback lines should be established for all sensitive features within the catchment, including Lake Mzingazi and its lakeshore environment, and must be considered in conjunction with the 1:100m flood line in all future development initiatives. These setback lines must be complied with (refer to Wetland Management Plan being driven by uMhlathuze Municipality which provides feature-specific wetland buffers).
- Action 3.4: Identify and review land use in high vulnerability areas identified by Worthington (1978) and educate and plan development within areas. This will assist in reducing groundwater contamination. Increase scope of study to include areas falling within the uMfolozi Municipality that surround and therefore impact on the lake system.
- Action 3.5: Reduce rural land-use adjacent to Lake Mzingazi by establishing fences along borders of rural settlements and lake for monitoring of potential encroachment.
- Action 3.6: Review all sand mining permits and ensure that area and volume of abstraction, waste disposal, effluent release, and emission limits are adhered to. Institute monitoring and regular checks of permits.
- Action 3.7: Formalise all informal areas within the uMhlathuze and uMfolozi Municipalities surrounding Lake Mzingazi.
- Action 3.8: Relocate homes where necessary i.e. where in-situ upgrading is not possible the provision of services is not possible and environmental conditions prevent upgrading.
- Action 3.9: Ensure appropriate development in and around Lake Mzingazi through environmental authorization and implementation of IDP/SDF - considering ecosystem services and sense of place.
- Action 3.10: Implement agricultural best practice, specifically to reduce nutrient enriched return flow and sediment erosion from surrounding farms in the catchment.
- Action 3.11: Minimize the extent of natural vegetation and trees that are removed along the periphery of the lake. Existing cleared areas and stabilised banks should be evaluated and improved or rehabilitated where necessary to prevent slumping.
- Action 3.12: Sand mining of the peripheral areas of the lake need to be controlled to specified limits as determined from a thorough study.
- Action 3.13: Sand mining activities should not encroach upon ecologically sensitive areas and should be prohibited within ecological buffers defined. Non-compliers must be penalised through payment of a fine.
- Action 3.14: Banks along the periphery of the lake should be monitored to identify areas of human induced slumping and natural slumping. Once identified, these areas should be remediated.

- Action 3.15: Future road infrastructure developments should be guided by the appropriate authorisation process (e.g. the BA and/or EIA process) so as to avoid additional impacts on the system.
- Action 3.16: All developments must be subject to BA/EIA approval and this BA/EIA approval needs to take into account the new LMP.
- Action 3.17: Waste Water Treatment Works and industries must comply with effluent release limits (quantity and quality limits) specified in the general authorisations and waste licences issued. Compliance must be monitored by the municipality through continued implementation of the Waste Water Monitoring Programme. Non-compliers must be penalised through payment of a fine.
- Action 3.18: Industries must comply with their Air Emission Licence (AEL) limits. The municipality must initiate a monitoring programme to ensure that emission limits are complied with. Non-compliers must be penalised through payment of a fine.
- Action 3.19: The detection and monitoring of specific chemicals known to be associated with pollutants released from industries should be included in the existing WQMP being implemented by uMhlathuze Municipality.
- Action 3.20: It is proposed that an air pollution study be undertaken to determine the impact of air pollution on the water quality of Lake Mzingazi, and connected wetlands and feeder systems, ascertain the significance of identified impacts, and recommend management and mitigation measures.
- Action 3.21: Increase security around the lake to reduce the number and frequency of illegal activities taking place (local community members can be employed to fulfil this role). Culprits must be penalised through payment of a fine.
- Action 3.22: Organise monthly meetings with representatives of relevant government departments, municipal officials, traditional authorities and green scorpions to discuss ways in which to resolve the problems being faced regarding land tenure, the illegal sub-division of land plots, and the formalisation of informal residential areas (agri-villages).
- Action 3.23: A meeting should be held between the officials of the uMhlathuze Municipality, KZN Ezemvelo Wildlife, KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs (DEDTEA) and seniors of the Church of Nazareth to discuss the Mpuza Hill mass gathering and confirm whether or not such a gathering is likely to take place in future. The uMhlathuze Municipality must proceed with planning and allocating the required finances and resources to constructing the necessary facilities to accommodate the mass gathering i.e. parking spaces; ablution facilities etc. before the next mass gathering event. Should the Church of Nazareth indicate that the event was a “once-off” event it is imperative that a rehabilitation plan be developed and implemented as soon as possible in an attempt to restore the area to its original state (or as close as possible to its original state).
- Action 3.24: Basic services (potable water, waterborne sewerage, electricity and solid waste removal) must be provided to all informal areas in the uMhlathuze and uMfolozi Municipalities as a matter of urgency once all approvals and resources have been obtained with the aim of reducing further adverse impacts on Lake Mzingazi.
- Action 3.25: No new low-lying developments should be established without the appropriate authorisation (e.g. environmental authorisation through the EIA process). Developments in this area should be restricted to essential infrastructure (e.g. bridges).
- Action 3.26: The effects of the constructed weir on Lake Mzingazi must be monitored, and the findings utilised to identify and encourage implementation of appropriate management actions at ground-level.
- Action 3.27: The depth of the entire lake should be monitored on a regular basis to determine the yield of the lake.
- Action 3.28: Frequent audits of compliance with Environmental Authorisations obtained by developments in the area must be undertaken.
- Action 3.29: The effect of proposed future Port development and/or expansion on drainage canals, and Lake Mzingazi itself, needs to be determined as part of the necessary EIA/BA process and requisite studies.

Water quantity and quality

Objective: Ensure improvement of the present highly degraded state of the lake by increasing water quantity and improving water quality to enhance ecosystem functioning, as well as reduce the risk of flooding.

- Action 4.1: Maintain ecological functionality of feeder systems by active exotic weed control; storm water dissipation methods and vegetation management within systems. Compile management programmes for Lake Mzingazi feeder streams.
- Action 4.2: Reduce impact of plantations on recharge volumes by promoting and establishing withdrawal of plantations from 100m of shoreline and discourage and prevent plantations within catchment (i.e. actively dissuade or remove exotic Eucalypt or Pine plantation from catchment).
- Action 4.3: Provision of waterborne sewerage within the informal residential areas of the uMhlatuze and uMfolozi Municipalities would contribute significantly to the protection of Lake Mzingazi from the negative impacts of raw sewerage generated by these areas.
- Action 4.4: Upgrade and maintain existing waterborne sewerage in formal residential areas. Appropriate planning should provide additional capacity to accommodate an increase in population growth and to provide for projected future growth of the area.
- Action 4.5: Develop and implement a water resource utilisation plan for surface and ground water resources (including registration & licensing).
- Action 4.6: Continue implementation of current Water Quality Monitoring Programme (WQMP) for Lake Mzingazi. When elevated pollutant concentrations are detected in the system the source should be detected and necessary steps taken against transgressors.
- Action 4.7: Conserve and restore wetlands in the catchment to ensure summer base flows.
- Action 4.8: Restrictions on water abstraction would need to be implemented to ensure the health status of the lake is maintained and lake capacity is at its maximum. Industries should be encouraged to recycle or re-use, and adopt alternative practices to minimising the quantity of water utilised, through the implementation of an incentive-based system.
- Action 4.9: A separate more detailed study for the development of a reconciliation strategy should be commissioned within the short-term.
- Action 4.10: The development and initiation of a groundwater monitoring programme is also recommended. This may be done by identifying strategic areas within the catchment to locate boreholes for sample collection and analysis. The data will assist in identifying appropriate management actions in the long-term.
- Action 4.11: Best farming practices with minimal chemical usage should be promoted in the catchment area. The use of agrichemicals within a set distance of the water's edge should be prohibited. The establishment of a land use setback and the maintenance of the riparian buffer zone that filters return flow from adjacent land could address this issue.
- Action 4.12: Develop and initiate a systematic alien vegetation removal programme to clear the riparian and near shore zones of the lake of exotic vegetation. Wherever possible, indigenous vegetation should be planted to promote soil stability and increase flow.
- Action 4.13: Felled alien vegetation should be removed from the floodplain immediately to avoid it from being washed down to the lake and sea during floods.
- Action 4.14: The clearance of alien vegetation, planting of indigenous vegetation and policing of this area could be undertaken by residents of the local area.
- Action 4.15: The provision of suitable solid waste removal services needs to be implemented within the informal residential areas.
- Action 4.16: The Municipal by-laws need to be enforced with regards to inappropriate disposal of waste and fines need to be administered to residents of the formal residential areas who are caught illegally dumping waste within the informal residential areas. Policing of these areas needs to occur in order to ensure that no illegal dumping occurs, especially within sensitive areas.
- Action 4.17: Waste minimisation strategies should be implemented throughout the Municipality to reduce the volume of waste being generated. Furthermore, a recycling initiative could be implemented on behalf of local communities whereby communities can benefit directly from the collection and sorting of different wastes.
- Action 4.18: Provision of attenuation systems at points of discharge, which would maintain and promote percolation, or active planting of these systems with appropriate, endemic species, where required.
- Action 4.19: Develop and implement a storm water management plan within the uMhlatuze and uMfolozi Municipalities. Furthermore, storm water screening systems should be used within municipal areas.

Living resource management

Objective: Promote proper management and sustainable use of the living resources that constitute the lake ecosystem, with the object of averting species extinction and the concomitant loss of ecosystem functionality.

- Action 5.1: Maintain ecological functionality of lake system through active rehabilitation efforts at points of erosion & exotic weed control.
- Action 5.2: Implement Lake Mzingazi LMP in conjunction with uMhlathuze Municipality’s Environmental Services Management Plan (ESMP). The Lake Mzingazi LMP should also be aligned with uMfolozi Municipality’s ESMP once developed.
- Action 5.3: Monitor illegal gill netting (verifying the extent of problem) and maintain compliance with fisheries laws and regulations.
- Action 5.4: Undertake a detailed study, using information provided as part of this LMP as a baseline, on the terrestrial and aquatic ecology of Lake Mzingazi and conduct monitoring to show benefits associated with implementation of the LMP.
- Action 5.5: The burning of reeds and sedges should not be tolerated. Fire-making should be restricted to certain areas within the catchment only and strictly prohibited within the ecological set-back line established for Lake Mzingazi and ecological buffers for other sensitive features within the catchment.
- Action 5.6: Harvesting of vegetation should be controlled. Riparian vegetation should not be harvested, as they are “critically endangered”. However, the harvesting of other vegetation within the catchment can be allowed, but should be controlled such that over-harvesting and degradation of habitats do not ensue. Seasonal harvesting should be encouraged to dissuade the possible obliteration of species during “out of season” periods. The coverage of vegetation within the peripheral areas of Lake Mzingazi should be monitored using GIS.
- Action 5.7: Hunting of faunal species that inhabit the lake and its surrounds should be prohibited.
- Action 5.8: A thorough investigation of the lake should be undertaken to identify the presence/absence of exotic floral and faunal species. Should such flora or fauna be identified, it is recommended that consideration be given to the management or removal of such species.
- Action 5.9: The grazing of vegetation within a set distance from Lake Mzingazi should be prohibited. A land use setback would address this issue

Recreational activities

Objective: Advocate the continuation of restrictions placed on recreational activities in Lake Mzingazi, with the aim of preventing ecosystem degradation and irreversible damage to/depletion of natural resources provided by the lake system.

- Action 6.1: Continued enforcement of the ban on recreational activities within Lake Mzingazi is recommended. Non-compliant individuals must be fined.
- Action 6.2: Recreational activities such as nature walks and bird watching in areas surrounding Lake Mzingazi should be encouraged with the aim of promoting tourism in the region. Areas in which such activities should be promoted include the controlled access, walkways, roads and viewing platforms.

Funding and educational awareness

Objective:	Enhance public awareness of the importance and economic value of Lake Mzingazi, the ecosystem goods and services it provides, the current threats it faces, the applicable legislation, and the necessity for active management of human activities impacting on the lake and the need for restorative intervention.
Action 7.1:	Ensure that funds generated through river management in the catchment (licence fees) are spent on the conservation and management of Lake Mzingazi.
Action 7.2:	Ensure that the Lake Mzingazi Lake Forum and Lake Management Plan interests are represented in other existing structures (e.g. Organised Agriculture, Aesthetics Committee, Catchment Forum, IDP/SDF) through shared membership or clear lines of communication.
Action 7.3:	Educational campaigns must be organised with the intent of promoting environmentally friendly practices (waste management and the importance of properly utilizing municipal waste collection systems, land use, agricultural and development).
Action 7.4:	Education/awareness programmes need to be organised and run in both the formal and informal residential areas of the uMhlathuze and uMfolozi Municipalities, with the aim of educating community members on the existing By-laws, Plans and Strategies, the importance of each, and the community's role in ensuring that these Bylaws, Plans and Strategies are respected and implemented.

Institutional and management structure

Objective:	Secure co-operative governance and active management of Lake Mzingazi through the efficient operation of a Lake Forum which will include active involvement by the uMhlathuze Municipality, uMfolozi Municipality and relevant spheres of government, parastatals and civil society.
Action 8.1:	Improve the enforcement of laws and by-laws. The relevant government department, municipal officials, traditional authorities and green scorpions should be involved in ensuring enforcement of all relevant laws and by-laws.
Action 8.2:	Organise quarterly meetings with representatives of relevant government departments, municipal officials, traditional authorities and green scorpions to discuss progress regarding implementation of existing Plans and Strategies (ESMP, SDF, IDP, WMP and LUMS). Factors to be included/amended in existing Plans and Strategies should also be discussed. These discussions will then inform the refinement of these Plans and Strategies by the relevant municipalities.
Action 8.3:	Introduce an incentive-based system – community members should be rewarded for complying with By-laws and promoting the success of Plans and Strategies.
Action 8.4:	Mzingazi catchment Environmental Officers should be appointed to ensure that By-laws regarding recreational activities, land use etc. around the Lake system are complied with; and ensuring the proper implementation of management measures proposed in the LMP.