Durban Bay

Estuarine Management Plan

environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

FOREWORD

It is an exciting time to present the Durban Bay (Port of Durban) Estuarine Management Plan 2016, as required by the National Environmental Management: Integrated Coastal Management Act, 2008 and the National Estuarine Management Protocol, 2013.

This estuarine bay is an exceptional estuary. It is the leading estuarine port in terms of its support of not only the nation's economy, but the southern hemisphere at large.

The complexity of estuaries requires coordinated and effective management to ensure the goods and services that these ecosystems provide do not deteriorate, but that they instead improve. It is of paramount importance that cooperatively, we ensure that the estuarine ecological health status of this ecosystem improves to create harmony between human activities, the utilisation of the estuarine resource and the ecosystem functioning of the estuary.

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Minister of Environmental Affairs

Date: 26/09/17

Project Team

The Durban Bay Estuarine Management Plan was prepared by the National Department of Environmental Affairs in collaboration with Transnet National Ports Authority, KZN Economic Development, Tourism and Environmental Affairs, eThekwini Municipality and Environmental Resources Management (ERM) and Marine & Estuarine Research (MER).

Key Stakeholders:

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

EXECUTIVE SUMMARY OF THE SITUATION ASSESSMENT

Durban Bay is situated on the east coast of South Africa and has formed the focal point for development of the city of Durban. The region has a sub-tropical climate with temperatures ranging between an average minimum of 16°C and average maximum of 27°C. The catchment area is generally wet receiving an average annual rainfall of 1 010 mm mostly in summer between November and March. The uMbilo, uMhlatuzana and aManzimnyama rivers supply freshwater to the estuary and all receive runoff from both residential and industrial areas. The combined catchments of all three rivers have an area of about 250 km2 and fall entirely within the eThekwini Municipal boundary. All three rivers are canalised in their lower reaches. Several storm-water drains originating in the Durban CBD discharge into the Bay at various localities situated around Bayhead, Maydon Wharf, Victoria Embankment and the Point.

Durban Bay is classified as an estuarine bay. Estuarine bays are large tidal systems where there is freshwater input but also a strong marine influence. They represent the rarest estuarine type in South Africa where only Knysna, Richards Bay and Durban Bay fall into this category. Significantly, this Bay is also known as the Port of Durban, the leading container port in the southern hemisphere, and it therefore functions as one of national economy's key assets (Forbes and Demetriades 2006). Moreover, it is an important resource for the citizens of Durban to access for recreational, subsistence and other social reasons.

As described in the Situation Assessment Report, the Bay's estuarine ecosystem has been compromised to the point that it has lost resilience for various reasons related to both the Port uses of the Bay and the social and economic activities undertaken within the catchments which drain into the Bay. Yet, while the environment has become significantly degraded, it nevertheless remains an estuary of local, regional and even national significance.

Estuaries fulfil important social and economic functions. For example, areas of salt marsh or mangrove habitat protect adjacent land and human settlement from storm surges caused by high intensity coastal storms. Salt marshes and other littoral vegetation also intercept contaminants in runoff and thus can buffer the effects of urbanisation. Estuarine bays also serve as places of refuge and have consequently been used as both small scale harbours and large scale ports. They provide an economic basis for coastal tourism and viable seafood industries. Such social and environmental benefits provided by the Bay are known as 'ecological goods and services'.

These ecological, social and environmental benefits have long been recognised, with settlements at river mouths and along estuaries going back for millennia. However, human activities and developments have also resulted in degradation of these habitats. Diminished and degraded habitats are less available to support healthy populations of estuarine organisms and this renders them less able to provide the environmental, social and economic goods and services on which coastal populations depend for their livelihoods and protection.

Yet, while the directly proportional relationship between healthy estuarine functioning and social and economic goods and services would seem to suggest that it is in the interest of people to protect estuarine functioning, population growth and social and economic demands continue to place increasing pressure on already fragile estuarine ecosystems. Where these pressures result in

declines in the state of the ecosystem, they also result in declines in the goods and services that can be provided. This in turn results in negative impacts on human well-being in coastal systems. In the context of anticipated increasing social and economic demands on the estuary that is Durban Bay, the best way to both avoid the negative cycle described above and to ensure that the estuary is able to continue providing its valuable goods and services, is to carefully manage the impact of human activities on the functioning of the estuary.

The seemingly competing demands of enhancing the social and economic benefit of the Bay and of preserving and restoring estuarine function, in fact together create a compelling case for the need of better management, where the objective of such management would be to improve the resilience of the ecosystem. Better management will open opportunities for the Bay to be more effective in providing the social and economic goods and services. It is in this context that the relevant authorities initiated the task of compiling an Estuarine Management Plan for the Bay.

Social Context

An analysis of the social context within which the Bay falls illustrates that both the catchments and the secondary boundary are highly populated, urbanised and transformed environments with principally residential and industrial land uses and several key open space systems and recreational facilities (including the Moses Mabhida Stadium to the north, the Bluff Nature Reserve and National Golf Clubs to the south and the University of KwaZulu Natal and surrounding open space system to the west). The 2007 Census showed that more than 95% of the catchment and secondary boundary is serviced by piped water and solid waste removal, although only 76% of these households had flush toilets. This context is important because the demographic characteristics of the area and in particular the land uses of the area have an important influence on the estuary through the rivers and storm water systems which drain into the Bay. Significantly, the population and development trends suggest that there will be greater urbanisation and population growth which will therefore exacerbate the social pressures placed on the Bay. The social analysis has also shown that social activities and users are both dependent on the Bay and its ecosystems goods and services, while also serving as an important influence on estuarine functioning.

The following social users and activities are supported by the Bay:

- Neighbouring communities who benefit from views, enhanced property values and landscape benefits;
- Recreational users including members of the yachting, canoeing and rowing clubs, fishermen who fish from the Bay and collect bait;
- Educational users including school children, conservation groups and researchers who visit the Bay and the Natural Heritage Site in particular;
- Tourists and visitors who make use of the restaurants, museums, shops and cruise/ferry facilities; and
- These social users will benefit directly from the improved functioning of the Bay. Certain of their activities, do, however, negatively impact estuarine functioning.

Economic Context

The development of the city of Durban has long been centred on the establishment and expansion of the economically highly important harbour. The Port of Durban is the busiest of all Southern African ports and handles 32% of the ships calling at South African ports.

On average, the Port handles 45 million tons of bulk cargo (including SBM crude oil imports) and 2.75 million Twenty Foot Equivalent Unit Containers TEUs (59% of the total TEUs handled in SA). During the 2014/2015 financial year, the Port of Durban handled a total of 3,960 sea-going ships with a total gross tonnage of over 138 million.

In addition to the direct benefit to the economy of the functioning Port, the Bay also supports several other port related or ancillary industries and sectors, including:

- The shipping and cargo handling industries and associated storage businesses;
- The transportation industries associated with the import and export of goods through the Port and into the city, the regional, the country and the Southern African region; and
- The ship chandelling, ship building and repairs industry.

In addition, there are a large number of tenants who run a range of associated or non-associated businesses that benefit from their proximity to the Bay. Furthermore, there are economic users such as tourism and hospitality users, e.g. museums, shopping, restaurateurs, hoteliers and passenger liners, whose services are either dependent on, or are assisted by, their proximity to the Bay. These activities all create value for the economy as well as employment for the people of Durban. Yet, while the Bay supports these economic activities, it is itself also impacted by such activities and associated developments. For example, there have been important changes to the estuary related to Port development which has resulted in habitat loss. Activities in and around the Bay can also impact on the water quality of the Bay, as illustrated in the figure below. Importantly, as with social trends, trends suggest that economic users of the Bay will be putting more pressure on the estuary in future. As economic pressures are anticipated to increase, so will the negative impact of these activities on estuarine functioning unless activities are carefully managed.

Ecological Status of the Estuary

Durban Bay, while remaining highly significant from an ecological perspective, is a degraded ecosystem. Not only are the various communities within the ecosystem in decline, but the resilience of the ecosystem itself has been compromised. Human activities within the estuarine boundaries and in the catchments have had a massive effect on physical, abiotic and biotic elements of the system:

- **Physical:** The historical extent of the estuarine area has been significantly reduced from an estimated original 35 km^2 to an area of 13.5 km^2 with a shoreline of approximately 27 km. The historically shallow mouth has been dredged and stabilised by breakwaters to allow shipping movements and the width has been increased to 350 m. Maximum dredged depth in the harbour is around 20 m with the average channel depth being about 13 m. Sediment distribution in the Bay has been modified such that the deeper channels, particularly in the

upper reaches have become settlement points for any sediment brought in from the catchments.

- **Abiotic**: Habitat loss through harbour development frequently exceeds 90% and in the case of the seagrass beds the loss has been total. Analyses of the water chemistry going back 30 years indicate disturbing levels of pollution, particularly in the upper regions of the Bay. The pollution effects are manifested in terms of reduced dissolved oxygen levels in the water, resulting in periodic major fish kills such as occurred in the summer of 2007-2008, as well as bacterial levels well beyond those considered to be hazardous to human health. Algal blooms, which are the proliferation of single celled microscopic plants in the water column to the point where the water may become visibly discoloured, are increasingly frequent and reflect the increasing levels of nutrients (nitrates and phosphates) from the catchment. These events in turn result in highly variable dissolved oxygen levels in the water and contribute to fish kills. Conversely, biological filtration processes on the sandbanks have the capacity to reduce these effects and enhance the quality of the water moving out of the Bay over tidal cycles. This has been compromised by a reduction in the size and number of sandbanks in the Bay due to Port development requirements.

- **Biotic**: The macro-vegetation in the Bay has either been lost completely, as shown by the disappearance of the seagrass beds in the 1960s and the long since loss of any fringing saltmarsh vegetation. The surviving mangroves are now protected in the Natural Heritage Site. These 12 hectares represent less than 5% of the original mangrove area.

- The invertebrate fauna has never been systematically surveyed since the original survey in the early 1950s when concern was expressed regarding the loss of natural habitats. This was at a time when the southern mangrove habitat was largely intact. The disappearance of the push net prawn fishery is indicative of the disappearance of the ginger prawn *Marsupenaeus japonicus*, while observations in the mangrove remnant suggest that the large mangrove whelk *Pyrazus palustris* has also been lost. The fish fauna in the Bay would also have been reduced by habitat loss although it can be argued that the sheltered, relatively deep and totally marine areas near the mouth would now support a marine reef fauna which would not have been a feature of the pristine environment. On the other hand the marine migrant fauna, dependent on estuaries as juveniles, would be more dependent on the highly reduced and still threatened sand and mud banks and the now vanished seagrass habitats.

- The birds provide the best documented record of faunal changes in the Bay as they have been counted and recorded systematically over the last 40 years. Counts over the period 1965-1999 showed that the abundance of water birds decreased by at least 70% during this period. According to Van Niekerk et.al (2012), the status of the birds has been graded poor.

Provisional Health Assessment of the Estuary

To support and assist in the development of the EMP for Durban Bay a **Provisional Health Assessment** was carried out by the ecological specialists on the team with input from other estuarine scientists. This was done using the most recent methods developed for determining the

Ecological Water Requirements of an estuary to support the Estuarine Resource Directed Measures for the protection of water resources (DWAF, 2008). This was done to address the gap which exists given that a formal preliminary estuarine ecological reserve has not as yet been carried out on this estuary. This provides a significant base layer of information to help prioritise the interventions and management actions which could maintain or improve the health of the estuary. The summarised results of this assessment are included in the table below.

Provisional Present Ecological Health Status for Durban Bay

Estuarine Process or Biotic component	**Weight**	**Score**	**Weighted Score**
Hydrology	25	60	15
Hydrodynamics and mouth condition	25	90	23
Water quality	25	20	5
Physical habitat alteration	25	20	5
Habitat health score			**48**
Final Microalgae	20	20	4
Macrophytes	20	5	1
Final Invertebrates	20	20	4
Fish	20	10	2
Birds	20	10	2
Biotic health score			**13**
ESTUARINE HEALTH SCORE *(average of habitat & biotic scores)*			**30**
PROVISIONAL PRESENT ECOLOGICAL CATEGORY			**E**

The results of the health assessment indicate that Durban Bay is in a parlous state with an overall health score of **30** putting the system in a **Provisional Ecological Status category E**. It is important to note that while the habitat health score is low (48), the biotic health is extremely low (13). The major drivers for change in the system were unsurprisingly assessed to be predominantly caused by people. These comprised both irreversible (core port and city infrastructure) and reversible changes (water quality and habitat related). Given these constraints it was felt that the Best Attainable State for this estuary is a Largely Modified System i.e. **Category D**. Durban Bay has been rated as **HIGHLY IMPORTANT** at all scales from local to national. Therefore given the significance of Durban Bay as an estuary it should be a priority to improve its current condition.

Ecosystem Goods and Services

This estuary provides important goods and services to the people of Durban. An assessment of these goods and services clearly establishes that it is important not only from an ecological perspective but also from a social and economic perspective that estuarine functioning be preserved and improved. The development of a harbour in Durban was ultimately possible because of the existence of the Bay. Beyond this, a functioning estuarine ecosystem within the Bay has the capacity, amongst other things to provide aesthetic values, environmental education, recreational opportunities such as fishing or sailing, raw materials, significant breakdown, assimilation and degradation of waste products, act as a filter for nutrient and bacterial contaminants in runoff from the catchment and act as a nursery ground for marine fish and invertebrates such as prawns which migrate between the estuary and the sea. It also acts as an important shock absorber for urban runoff during high rainfall

events attenuating flooding in the CBD. The Bay is also considered an integral and important part of the City's adaptation plan for climate change.

Threats to Ecological Functioning and Ecosystems Goods and Services

The health assessment of the Bay clearly shows that there are activities that impact negatively on estuarine functioning. In order to improve estuarine functioning, it is important to manage threats and potential threats.

Human activities and developments posing a potential threat to estuaries and the valuable services provided by these systems can be divided into the following broad categories:

- **Infrastructure development** which has resulted in a net loss of a significant portion of the habitats in the Bay, including roads infrastructure, riparian infrastructure, infilling and in-stream infrastructure, canalisation, dredging;
- **Land use** which results in pollution of the rivers and the storm water systems which drain into the Bay, including industry, human settlements and agriculture in the catchments, as well as activities undertaken in the Bay itself, including shipping and recreational activities in the Bay itself;
- **Water quantity** increases related to alien vegetation along the banks of the three rivers draining into the Bay and hardened services in the catchments;
- Activities negatively impacting **water quality**, including run-off, spills, waste water and solid waste disposal; and
- The **exploitation of living resources**, such as bait collection, fish harvesting and mining.

Governance

Throughout the report, there is a clearly identified need to improve management of those activities that impact negatively on estuarine functioning. An overview of the governance context highlights, however, that this will need to happen within an extraordinarily complex legal framework and institutional arrangement.

Prior the Integrated Coastal Management Act (No 24 of 2008) and National Estuarine Management Protocol (2013), there were number of different laws and policies that were used to manage estuaries. The legal and institutional structures governing Durban Bay therefore provide unique challenges from a development, public use and conservation perspective. These challenges are often characterised as a dilemma where other law seeks to protect the natural environment and other lends itself to the facilitation of development. While there are lot of laws that could be applied to support role-players in navigating these challenges, the ICM Act and the Protocol became critical to promote integration and cooperative governance. There are signs that co-operation between the various role-players have improved the management of the Bay. Improved communication and co-ordination between authorities has largely taken place through a number of forums, including the Waste Management Forum, the eThekwini Coastal Working Group (known as Municipal Coastal Committee) and the Provincial Coastal Committee.

Opportunities and Constraints

The objective of the EMP is to provide a fresh approach to the management of the factors impacting on the estuary by providing a vehicle for cooperation, change where needed and the motivation to realise appropriate solutions to existing and future problems and opportunities. The duties and powers to regulate activities in and around the Bay will remain under the aegis and responsibility of statutory bodies. It is not intended that new duties be imposed on the agency or organisation; instead the EMP relies on relevant agencies and organisations working together to take steps to implement the strategies and actions outlined in the EMP. The legal requirement to preserve the functioning of the ecosystem requires that active measures be put in place to first prevent further deterioration and subsequently to restore functioning. It has been suggested that this will require not only addressing those negative influences that can be addressed, but also that active and positive interventions be considered, e.g. habitat restoration and rehabilitation.

Given the importance of the estuary and the acknowledgement that there is a need for rehabilitation and the management of impacting activities, the following management opportunities exist that would result in improved estuarine functioning:

- Managing negative impacts, for example interventions in the Bay, the city and the catchments which result in improved water quality;
- Exploring positive opportunities including the protection and restoration of key habitats in the Bay and the possible rehabilitation of habitats in the Bay as well as in the catchments.

Next Steps: The Visioning and Management Planning Processes

This Situation Assessment provides a foundation and starting point for the development of appropriate management plans. Prior to developing these plans there is also a need to define the vision that management interventions are seeking to achieve. In this case, this vision will be generated through engagement with a wide range of stakeholders. This vision will draw from the situation assessment and will serve as the foundation for the management plan.

ABBREVIATIONS AND ACRONYMS

CAPE	Cape Action Plan for People and the Environment
CBO	Community Based Organisation
CMA	Catchment Management Agency
CWG	Coastal Working Group
DAEA	KZN Department of Agriculture and Environmental Affairs
DEA	Department of Environmental Affairs
D'MOSS	Durban Metro Open Space System

DST	Department of Science and Technology
DWA	Department of Water Affairs
EESMP	eThekwini Environmental Services Management Plan
EIA	Environmental Impact Assessment
EM	eThekwini Municipality
ERM	Environmental Resources Management (Pty) Ltd
EMP	Estuarine Management Plan
EWR	Ecological Water Requirement
GIS	Geographic Information Systems
ICMA	Integrated Coastal Management Act (Act 24 of 2008)
IDP	Integrated Development Planning
KZN	KwaZulu Natal
MER	Marine and Estuarine Research
NCC	National Coastal Committee
NGO	Non-governmental Organisation
PCC	Provincial Coastal Committee
SAR	Situation Assessment Report
SDF	Spatial Development Framework
TEMPI	Transnet-eThekwini Municipality Planning Initiative
TNPA	Transnet National Ports Authority
TOR	Terms of Reference
WUA	Water User Association

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1. INTRODUCTION

1.1 BACKGROUND AND CONTEXT

South Africa has about 300 estuaries, of which 75 are located in KwaZulu-Natal (KZN). Estuaries are naturally highly productive ecosystems providing nursery areas for a variety of migratory marine fish habitats for migrant wading birds, and a range of active and passive recreational opportunities for local inhabitants. However, in the South African context, estuaries are highly vulnerable and more than 70% of those along our coast are seriously degraded. This is true of the Bay of Natal.

The Bay of Natal, hereafter referred to as Durban Bay (see *Figure 1.1*), is one of the rarest types of estuaries in South Africa and placed in the estuarine type category of estuarine bay, with the only 2 other estuarine bays in South Africa being in Knysna and Richard's Bay. This type of estuary is characterised by low freshwater inputs, relatively large size and tidal prism but sheltered conditions. These sheltered conditions produce an estuary, with a strong marine influence but minimal wave action. Durban Bay is permanently open and is thus characterized by fluctuations in the water levels driven by the tides, and by salinities measurably higher than freshwater as a result of seawater intrusion.

Durban Bay has historically constituted a significant and unique environment on the KwaZulu-Natal coast from an ecological, social and economic perspective. In terms of its ecological significance, Durban Bay has been rated as highly important at all scales from local to national. Development of the city of Durban can be attributed to the excellent natural harbour provided by the Bay and the interdependent growth of the Port and the City of Durban has resulted in the generation of one of Africa's busiest key ports. While presently heavily impacted by 150 years of harbour and surrounding development, it remains a significant component of the regional coastal ecosystem. It therefore is an obvious priority to stop any further degradation of the Bay and to support improved estuarine functioning going forward. Not only is the Bay a significant ecosystem in its own right, but it also affords resources and benefits shared by a range of stakeholders including commercial shipping and associated activities, businesses and local residents as well as clubs who have interests as diverse as sailing, nature conservation, recreation and tourism.

Figure 1.1: Generic Map of the Durban Bay Estuary

Rivers supply an estuary with fresh water and this mixes with salt water that enters from the sea. The uMbilo, uMhlatuzana and aManzimnyama rivers supply freshwater to the estuary and all receive runoff from both residential and industrial areas. About 80% of the catchments associated with these rivers comprise residential or industrial development. The combined catchments of all three rivers have an area of about 250 km^2 and fall entirely within the eThekwini Municipal boundary. All three streams are canalised in their lower reaches, before entering the Bay. Several stormwater drains originating in the Durban Central Business District (CBD) discharge into the Bay at various localities situated around Bayhead, Maydon Wharf, Victoria Embankment and the Point.

The earliest biological studies on Durban Bay were carried out in the late 1940s and early 1950s as part of a nationwide estuarine survey. Results of these surveys represent the closest available approximation of pristine conditions although by that time the Bay had already been used as a harbour for nearly 100 years. Relatively little biological research was carried out in the Bay for the next 40 years. A new surge of interest arose in the 1990s out of widespread concern for the health of South African estuaries generally and the looming prospect of major harbour extensions in the Bay.

Durban Bay's ability to provide goods and services to the City and its people that it once was able to do has been compromised. These goods and services include amongst others, a naturally sheltered area for a Port, recreational activities, an important nursery area for juvenile marine fish and the assimilation of waste from storm water runoff from the city. It is therefore critical that the impact of human activities on the functioning of the Bay is carefully managed. A critical review in the late 90s emphasized the poor environmental conditions in the Bay. This situation was graphically demonstrated by the fish kill in the summer of 2007/2008 which left the central sandbanks littered with rotting carcasses and was followed by the clean-up and removal of an estimated 17 – 25 tonnes of fish. This was a turning point in the argument for improved management of the factors, conditions or drivers affecting the health of the Bay and arguably also a major incentive for authorities to initiate the development of this Estuarine Management Plan (EMP).

While the intrinsic value of estuaries in general, and Durban Bay in particular, has long been recognised, lack of effective protection can largely be explained by the fact that they have not fitted clearly within the mandate of any one government department and are influenced by events beyond their boundaries. This has now been addressed through inclusion of relevant provisions in the National Environmental Management: Integrated Coastal Management Act, 2008 (NEM: ICMA), which introduced a specific requirement for EMPs.

To date some 30 EMPs have been developed or are currently being developed. These have focused on relatively large permanently open systems, or on temporarily open/closed categories all of which have either some degree of protection or largely rural catchments. The development of a management plan for a system where virtually all of the catchments are either urbanised or industrialised and where the estuary itself has been grossly physically modified represents, to a large degree, a step into the unknown.

This EMP for Durban Bay is furthermore unique in so far as a large proportion of the Bay is occupied by the Port of Durban and hence falls under the jurisdiction of the Transnet National Ports Authority which is governed by the National Ports Act (No.12 of 2005) and the Port Rules.

Given the complex range of stakeholders and authorities with interests in improved management of the Bay, the associated EMP must be the result of a process that offers a basis for voluntary co-operation between those authorities with management duties towards the Durban Bay environment and local user groups.

This EMP has been developed in collaboration with the Transnet National Ports Authority (TNPA), the KZN Department of Economic Development, Tourism and Environmental Affairs (EDTEA) and the eThekwini Municipality (EM).

1.2 PURPOSE AND SCOPE OF THE ESTUARINE MANAGEMENT PLAN (EMP)

The EMP aims to provide a fresh approach to the management of the factors impacting on the estuary by providing a vehicle for cooperation, change where needed and the motivation to realise appropriate solutions to existing and future problems and opportunities. The duties and powers to regulate activities in and around the Bay will remain under the aegis and responsibility of statutory bodies. It is not intended that new duties be imposed on the agency or organisation; instead the EMP relies on relevant agencies and organisations working together voluntarily to take steps to implement the strategies and actions outlined in the EMP.

The EMP for Durban Bay has been developed in two phases, namely:

- **Phase One:** Situation Assessment; and
- **Phase Two:** Objective Setting Phase.

The purpose of the SAR was to provide a foundation and starting point for the setting of a vision for the Bay and subsequently for the setting of management objectives and actions for achieving the vision. The outcome of phase two is this EMP which includes management objectives, strategies and action plans as well as a zonation plan and implementation framework. This document should be read in conjunction with the Situation Assessment Report (SAR). The key findings of the SAR are outlined in the summary box overleaf.

This EMP for the Durban Bay potentially provides a vehicle for initiating a process for collectively addressing practical management issues from a development, conservation and public use point of view. In time, the proposed EMP can also assist in clarifying many of the rights and obligations, legal uncertainties and institutional shortcomings identified in the SAR and hopefully pave the way for a coherent and dynamic legal framework for the successful management of the Bay.

The Situation Assessment and the EMP were developed through a consultative process, which included interviews, small group meetings and public meetings with authorities and stakeholders. Both the SAR and the EMP were finalised on the basis of comments provided both through the Steering Body and from stakeholders.

The detailed scope of work for the EMP was broadly based on the National Estuarine Management Protocol which has been developed in line with the requirements of the ICM Act, 2008. Management should be understood to refer to the management and control of the human influences or activities which impact on the natural functioning of the Bay and not of direct ecosystem manipulation or "management".

It should be stressed that EMPs regulate and manage human activities impacting on estuaries and in this particular case on Durban Bay. This means the EMP for Durban Bay will deal with the current configuration of the Bay and associated activities and will not consider proposals for new developments or layouts. Rather, the EMP provides opportunities to address many of the negative factors identified in the Situation Assessment as impacting on the health of the Bay. In addition, there are opportunities to explore positive interventions to improve estuarine functioning, including rehabilitation of habitat in the catchments.

Summary of Situation Assessment of the Bay

- Durban Bay is **highly modified** as a result of urban and Port development in and around the Bay.
- Virtually the entire **catchment of the Bay** is either urbanised or industrialised.
- The estuary has three **rivers** and **several stormwater drains** which discharge into it.
- Although the ecosystem is compromised to a point where it has lost much of its resilience, the Bay remains a **unique & highly productive ecosystem of local, regional and national significance; it is important to note that some of the impacts are reversible and in achieving this, the resilience of the estuary will be strengthened.**
- The Bay is an important resource for citizens of Durban and continues to **provide a range of goods and services** shared by many.
- However, the Bay is **highly sensitive and vulnerable.**
- The Bay is home to the **leading container port** in southern Africa,
- **Lack of coordination of mandates** poses a challenge for the effective management of the Bay.
- Opportunities exist for improving the functioning of the Bay through **more effective management of negative impacts within the estuary and its catchments, the main effect of** which would be improved water quality.
- Explore **opportunities** for enhancing the benefits to be arrived from the Bay. For example, through the protection and restoration of key habitats in the Bay.
- Sustainable **future port expansion could provide opportunity for enhancing estuarine functioning** (e.g. enhance circulation and create opportunities for habitat re-creation and restoration).
- For the integrity of the system to be enhanced and for estuarine functioning to be improved, there is a **need to avoid, minimize or mitigate significant negative impacts.**
- The EMP offers a basis for **collaboration** between key stakeholders, including private sector/entities and civil society in estuarine management.

There do, however, remain some influencing factors on the Bay that cannot be readily changed in the immediate future. These will constrain the extent to which the estuary can be restored. This includes the existing configuration and infrastructure associated with the Port. There may, however, in the future be opportunities to explore new and mutually beneficial configurations.

The EMP draws on the findings of the Situation Assessment Report and sets out a vision and associated principles (*Chapter Two*). It also identifies a strategy to meet these objectives (*Chapter Three*). Thereafter, the plan identifies the key actions to be undertaken during the next five years which work towards achieving the overall vision. It is anticipated that the vision and objectives as well as the associated strategy, once adopted, will remain in place beyond the review cycle of the

management plan. The management plans are required to be reviewed and updated on a five year cycle with a view to reassessing management goals and developing appropriate action plans to support progress towards realising the long term vision and implementation strategy. It is recommended that to ensure the successful implementation and monitoring of this EMP an Advisory Body comprising relevant key stakeholders and using agreed upon indicators to measure progress within a set time frame (*Chapters Six* and *Seven*) must be established.

This EMP will focus on strategic priorities as identified at the time of publishing and is not intended to provide guidance on the day to day management actions required to maintain and enhance estuarine function. As such it will serve as a framework to steer the direction of strategic management activities going forward and allow the development of detailed project plans. The advisory body will facilitate the implementation of the project plans identified in the EMP.

It is recommended that progress towards achieving the objectives set out in this EMP should be reviewed on an annual basis by the advisory body and the focal efforts adjusted to ensure that targets are met within specified time frames as per project plans. This EMP will be updated within the next five years to reflect goals that have been achieved and to accommodate changing priorities.

1.3 STRUCTURE OF THE DOCUMENT

The remainder of the document is divided into two parts. The first part is comprised of three chapters, namely:

- **Chapter Two** which sketches a vision for the Bay;
- **Chapter Three** which defines a strategy for achieving this vision, including a clear delineation of how this EMP will support strategy; and
- **Chapter Four** which identifies a set of management action plans.

The second part of the document focuses on measures to ensure that these action plans are implemented effectively, namely:

- **Chapter Five** which define a zonation plan to govern both future land use decisions as well as areas for management focus;
- **Chapter Six** which establishes and strengthens institutional structures to implement the plan and manage the process;
- **Chapter Seven** which evaluates implementation and progress by monitoring effectiveness of these actions plans; and
- **Chapter Eight** which ensures there are sufficient resources to achieve the objectives of the plan.

The box below provides a summary of this section.

In summary, the EMP:

- *Is developed through a **consultative process;***
- *Is an important vehicle to **collectively address practical management issues;***
- *Provides an opportunity to address **negative factors** that influence the Bay, as well as opportunities to **explore positive interventions***
- *Sets out a **vision** and strategic **management objectives** and **actions** for improved management of the Bay within a 5 year time horizon;*
- *Sets out **what needs to be done** and not **how it should be done;** and*
- *Focuses on **governing human activities impacting on estuaries, controlling, removing or avoiding** activities degrading the natural functioning of Bay.*

The implementation of the EMP will be monitored by the Provincial and Municipal Coastal Committee.

2. A VISION FOR THE BAY

2.1 CONTEXT

The Situation Assessment Report consolidates existing research on the Bay, describing the declining health of the Bay. This EMP will identify actions to improve the management of the Bay so as to improve estuarine functioning. It is necessary, however, to define a vision for the Bay to inform this management plan. As such, the vision will be a high level statement which defines the strategic intent of a management intervention. The EMP will then identify actions which will help us to move toward this vision.

2.2 LOCAL VISION

The vision is intended to characterise succinctly how the estuary should function in the future. It should be an inspiring statement that people can easily relate to and remember. The vision below has been generated based on inputs during the stakeholder engagement process.

> ***"Durban Bay: the thriving estuary at the heart of our nation's prosperity."***

Achieving the above vision will require the commitment, awareness and cooperation of all participants in terms of the proposed strategies through action now and in the future.

2.3 PRINCIPLES UNDERPINNING THE VISION

A set of principles have been developed to further support and elucidate the vision:

2.3.1 Natural Principles

Supporting and maintaining the natural functioning of the Bay as a rare estuarine type with a local, regional and global significance.

2.3.2 Economic Principles

- Supporting a diversity of competitive yet sustainable economic activities in the Bay, including tourism, waterfront-dependant and shipping activities.

2.3.3 Social Principles

- Supporting the enjoyment of the Bay by all the people of Durban, whilst acknowledging that certain areas and activities may need to be restricted for operational and ecological, as well as health and safety reasons.

2.3.4 Governance Principles

- Ensuring that there is inclusive and accountable decision making and management of the human activities affecting the Bay based on compliance with applicable regulations and policies, transparency and responsiveness to the needs of the estuary and the attainment of the vision. The partnership between key stakeholders will therefore need to:

    - stimulate an appropriate balance between competing demands placed on the Bay, through shared information, cooperation and action;
    - create a culture of openness and communication; and
    - work towards a sustainable future for the Bay.

3. STRATEGY FOR ACHIEVING THE VISION

A strategy is required to define the pathway for moving from the present situation, as described in the SAR, to the desired state, as enshrined through the vision. This strategy will govern the short, medium and long term approaches to achieving the envisioned state. This EMP serves to provide a plan for the first step in the strategy. It seeks to make a significant contribution towards enabling the responsible authorities to start working together towards achieving the stated vision in a structured manner.

3.1 THE STRATEGY FOR ACHIEVING THE VISION

In order to achieve the vision, there is a need to sustain and improve the natural functioning of the Bay. A three stage strategy has been defined to achieve this goal, namely:

- **Stage One:** The focus of the first stage in achieving the vision is to focus on changing the current state of the Bay which, as described in the SAR, is declining rapidly. The objective of this first stage will be to minimise degradation and stabilise the situation. In addition, this step will focus on laying the foundation for improved management of the Bay. A five year time horizon has been given to this step.

- **Stage Two:** Once the estuary has been stabilised, there will be an opportunity to enhance its resilience and thus improve its ability to continue to provide its unique range of goods and services to the people of Durban. It is anticipated that the **5 to 10 year** cycle will therefore focus on learning from the first five-year cycle, adapting the EMP where necessary and building on successes while also actively starting to explore ways of further ***improve the functioning of the Bay***. This would require strategic interventions to be identified and further rehabilitation and strict measures implemented to not only address existing degrading influences but also to limit the potential for future environmental degradation.

- **Stage Three:** The third stage will be to look at ways to augment the estuary as an asset and redistribute benefits associated with it. This can include exploring opportunities for rehabilitation, restoration and/or re-creation of habitat some of which may only be possible using possible future port expansion opportunities. In other words, during the **10 to 15 year** cycle there would be an active focus on ***enhancing the value of the Bay*** in terms of its role in providing goods and services to the various users and beneficiaries. This would be done *inter alia* through encouraging the phasing out of high impact or non-waterfront dependent activities that

negatively impact on the Bay environment thereby compromising its value. In the event that further port development is necessary in the Bay, reconfiguration could be considered, and if sustainably planned, this could provide opportunities for improving water circulation as well as opportunities for habitat re-creation and/ or rehabilitation. The focus will also be on looking at those benefitting from the augmented asset and expanding the set of beneficiaries where possible.

This approach is illustrated graphically in *Figure 3.1* below.

An outcomes-based approach has been adopted to define the objectives for the EMP. The first step has been to define the target or goal as well as indicators to show whether or not the desired goal is achieved. The action plans are then designed specifically to achieve this desired state.

The strategy has identified that, in the first instance, actions need to focus on managing those activities that negatively impact on the natural functioning of the Bay. Therefore in the first five year cycle of the EMP, efforts to stabilise the declining health situation and the improvement of the estuary health will take precedence. Action plans to achieve this objective have been designed and are described further in *Chapter Four*. Given the objective, it is worth noting that indicators of performance will relate directly to the functioning of the estuary.

It should be noted that there will likely be some degree of overlap between each step, as indicated in *Figure 3.1*. There is also a need to remain open to exploring opportunities for enhancing resilience and augmenting the asset and redistributing benefits even in Stage One. Similarly, it is also important to realise that the value of the asset, identified as the focus of Stage Three, will be enhanced through stabilising the health of the Bay through Stage One.

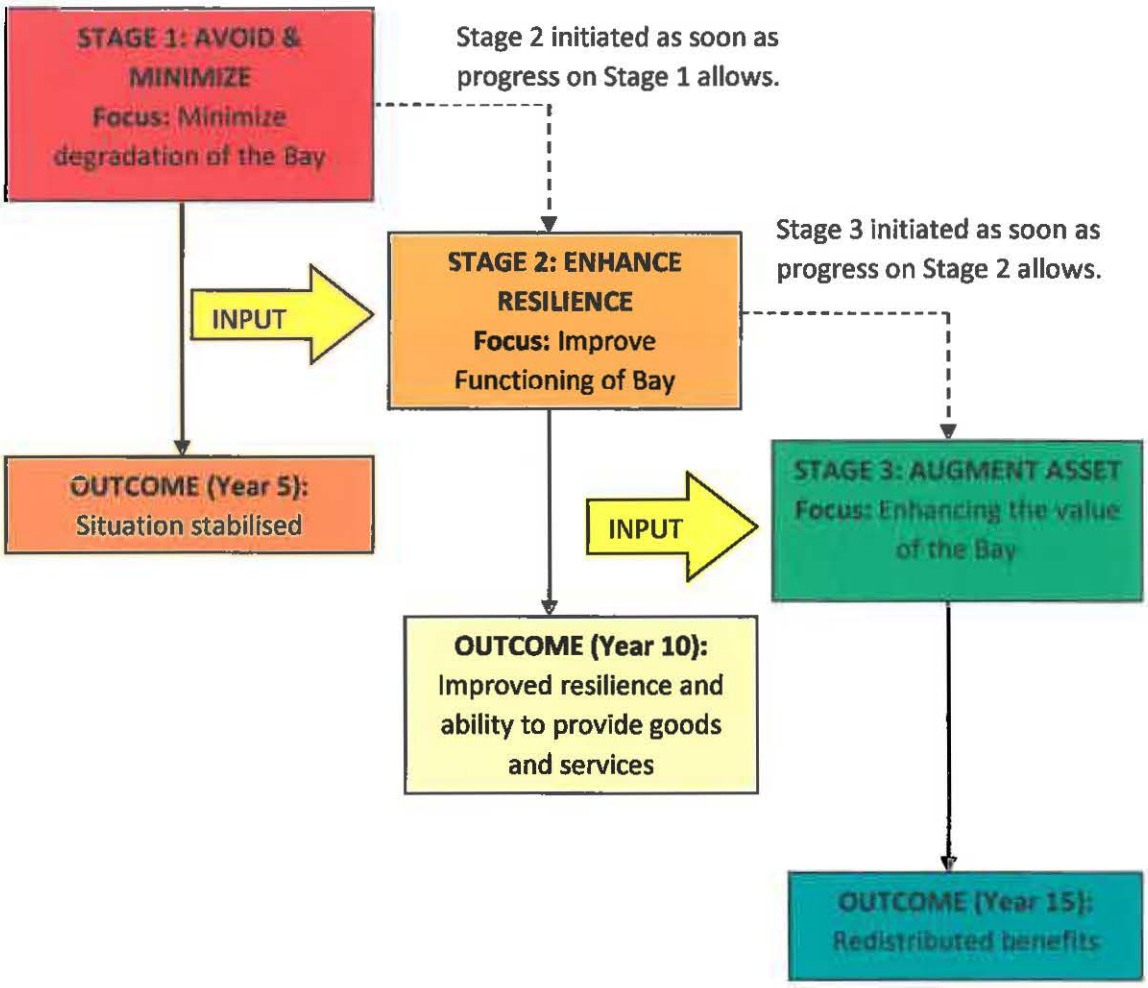

Figure 3.1: Overarching Strategy

3.2 LINKING THE APPROACH TO ANALYSIS IN THE SITUATION ASSESSMENT

The approach adopted above complements the analysis undertaken in the SAR. In the SAR, five threats to estuarine functioning were identified, namely:

- Infrastructure development in and around the Bay;
- Land uses and activities in and around the Bay as well as in the catchments;
- Water quantity, in particular related to the rivers and the catchments;
- Water quality of both the Bay and the rivers; and
- The exploitation of living resources in the Bay and its vicinity.

The strategy will seek to address these threats which drive poor estuarine health. It recommends, however, that this be done through a systematic and phased approach. The first step in the strategy

therefore focuses on achieving quick wins and making the biggest impact in terms of changing the trajectory of the estuarine health. In other words, the first phase (i.e. the implementation of the EMP) will focus on the key threats/drivers, namely:

- ❖ Water and sediment habitat quality in both the Bay and the rivers;
- ❖ Infrastructure development in and around the Bay; and
- ❖ Land use in and around the Bay.

Once progress in these three focus areas is demonstrable, the strategy will be broadened to also include a focus on the key threats and drivers, namely:

- ❖ Land uses and activities in the catchments;
- ❖ Water quantity, in particular related to the rivers and the catchments; and
- ❖ The exploitation of living resources in the Bay and its vicinity.

The following preliminary **guidelines and principles** are suggested for maintaining the necessary strategic focus. It is suggested that they should be considered throughout the implementation of the EMP:

- Maintain the focus on improving the health of the Bay;
- Consider how the Bay can best serve/ benefit people;
- Seek to demonstrate progress throughout the implementation of the EMP. For example, to take the necessary steps and ensure that the necessary checks and balances are in place to prevent as far as possible any further fish kills;
- Continuously seek to identify potential early successes that can help build awareness and commitment;
- Ensure that management actions are implemented; and
- Adopt a process of ongoing critical reflection and learning from experience.

4. KEY MANAGEMENT OBJECTIVES AND ACTION PLANS

As described in the previous chapter, the first 5 year cycle focuses on minimizing degradation of the estuary and thus actively strives towards changing the current trajectory. This chapter focuses on setting out the key management objectives, action plans and indicators that will give effect to this strategy and providing measures to monitor effectiveness and outcomes.

4.1 MANAGEMENT OBJECTIVES

In order to achieve the objective of stabilising the estuary, the following three key management objectives have been identified:

- To improve water and sediment habitat quality;
- To ensure sustainable development and land/water use for all new activities proposed for the Bay and its catchments; and
- To improve currently existing functional estuarine habitat.

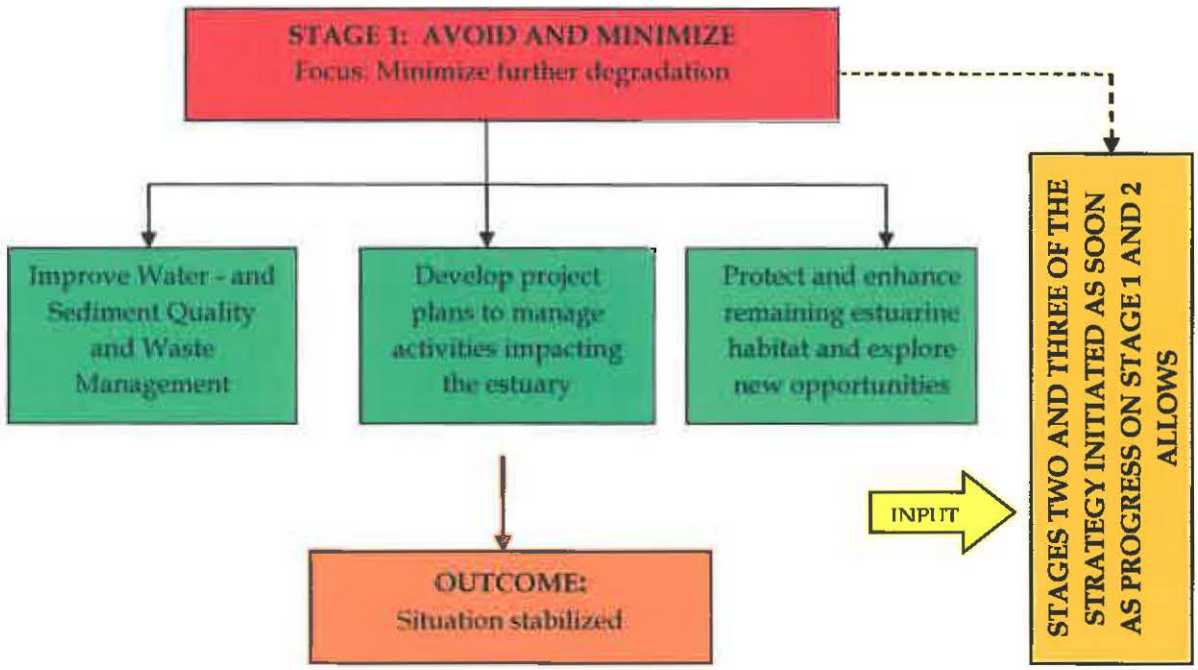

Figure 4.1: Management Objectives within Stage One of the Strategy

The following bullet points provide more detail on each of the management objectives:

- **Improve Water and Sediment Quality:** To ensure that every attempt is made to improve the water quality of the Bay and to support and promote measures to reduce pollution (including effluent from the catchments and rivers discharging into the Bay, storm-water runoff and

harbour pollution). To explore ways to increase water circulation thereby enhancing the Bay's ability to continue to function as an estuary and provide important goods and services.

- **Development of Project Plans to manage the activities impacting the estuary:** To ensure that existing land and water use activities in the Bay (including boating, angling and bait collection) and activities in the catchments are managed in such a way that impacts on the Bay are minimised and that any further development is undertaken in a sustainable manner.

- **Protect and Enhance Estuarine Habitats:** To protect and enhance the remaining estuarine habitats which are characteristic of the original Bay (including mangroves and grasses). To explore opportunities for rehabilitating/ improving and expanding existing soft habitat.

These management objectives are interdependent and equally important for achieving a successful outcome. They provide the specific focus of the EMP, essentially defining the goals which should be targeted over the next five years. If these management objectives are achieved, it is anticipated that the overarching objective for this phase will be achieved (*i.e.* to stabilise the Bay).

It should be noted that each of the objectives focuses on physical processes in order to ensure that results can be readily assessed.

4.2 PROJECT PLANS

Project Plans are set out below for each of these management objectives. These action plans will also provide for aspects related to awareness raising, governance, conservation, public access and research needs, which are cross cutting activities. Key elements contained within each action plan, include:

- Priority actions (where actions are identified as quick-wins, low, medium and high priority);
- A description of deliverables/ indicators of success;
- Timing for implementation of the actions;
- Suggested lead agency(ies) responsible for implementation. **Lead Agency** refers to the sector departments that have a mandate to implement the identified action. This is due to the cross-cutting mandates between the spheres of government.
- Suggested support agency(ies). **Supporting agency** refers to the sectors that may provide support based on their interests and needs at the time; and
- An indicative budget for implementing the proposed actions.

"Quick win" actions are those which require relatively easy interventions, without the need for significant levels of preceding research and assessment. In terms of the short, medium and long term actions identified, associated targets become increasingly onerous from year 3 to encourage officials to stretch themselves.

It is important to note that the actions identified focus on what needs to be done and, in doing so, provide guidance on how it should be done. The list is designed to be used as a guide for implementation, allowing a certain degree of flexibility in undertaking works and actions to achieve the overall intent of the strategic objectives. It should further be understood that it is neither the intention of the EMP nor within its mandate to guide day to day management activities in the Bay and catchments. Rather the intention of this document is to provide a strategic framework that can guide planning and future interventions so as to ensure that they contribute towards improving the health of the estuary. More specific operational action plans will be developed by the Department through proposed advisory body in collaboration with the various mandated implementing agents.

Throughout the development and refinement of the Action Plans consideration needs to be given to how the recommended actions link and align with existing programmes.

4.2.1 Action Plan 1: Improve Water and Sediment Quality

The National Water Act and the National Water Resources Strategy are intended to be implemented through Catchment Management Strategies and agencies. This however, has not yet been developed for Durban Bay.

National Guideline for the discharge of effluent from land-based sources into coastal waters (2014), South African Water Quality Guidelines for Coastal Marine Waters (2012); National Policy for Pollution and Waste Management are also pertinent to water quality. These policies, however, have not yet been applied to the management of water polluting activities within Durban Bay.

As indicated in the SAR, the provisional health assessment of the Bay and subsequent National Biodiversity Assessment 2012, has rated the system in an Ecological Status Category E (Highly Degraded). The reasons include:

- Poor water quality;
- Loss of habitat; and
- Loss of species.

The quality of the water entering the Bay has become significantly worse with time. Solid waste, run-off and wastewater is brought to the Bay partially through the rivers that drain into the Bay, where these run through industrial, residential and commercial catchments, and partially through the storm water drains from around the central business district that drain into it. In addition, because of its configuration, water turnover is lower resulting in water remaining in the upper reaches of the Bay for longer, further exacerbating the impact of poor quality inputs. Strict control of discharges of wastewater is required. There is also a need to reduce the frequency of overflows from blocked manholes and to reduce dumping of litter and waste into storm-water drains. No net increase in pollutant runoff loads should be allowed and this should be managed through best practice storm-water management.

There is a need to understand the quality and amount of sediment required to allow re-establishment of benthic organisms and a need to monitor trace metals in the sediments against the National Action List for the Screening of Dredged Material for Marine Disposal (2011). It is necessary to establish a monitoring programme, including biological monitoring which should include indicator species such as sand prawn, other invertebrates, fish and wading birds. This would provide a good measure of overall health of the ecosystem and help track recovery and progress towards achieving targets set. There is also a need to establish an early warning system.

It is suggested that a receiving water quality approach should be adopted, where the marine water quality targets are appropriate for the Bay and the fresh water ones are appropriate for the rivers. This is the responsibility of the Department of Water and Sanitation (DWS), Department of Environmental Affairs: Oceans and Coasts (DEA) and other authorities, but should be tracked, dialogued and co-ordinated by the advisory body

Table 4.1: Water and Sediment Quality

Objective 1: Improve Water and Sediment Quality	**To ensure that every attempt is made to improve the water quality of the Bay and to support and promote measures to reduce pollution (including effluent from the catchments and rivers discharging into the Bay, stormwater runoff and harbour pollution (e.g. ballast water)) and increasing water circulation thereby enhancing the Bay's ability to continue to function as an estuary, provide important goods and services.**			
Actions	**Deliverables**	**Timing**	**Lead Agency**	**Support Agency**
1.1 Identify the sources of pollution driving the state of the receiving environment, including the conducting of a detailed audit of inputs through : • Surveying the receiving estuarine environment (including tissue samples of fish for heavy metals and toxic, sediment etc.). • Understanding the river inputs by working with the responsible authorities and organisational bodies e.g. DWS and specific CMA. • Identifying the polluters – who is putting what into the rivers – work with others to do this. • Plan and Co-ordinate programme for the clearing of litter/oil traps at all stormwater outlets.	State of the Bay report, Survey results made public. State of the Bay report reviewed and updated at end of 5 year period.	2016-2020	DWS, DEA,TNPA and DAFF EM	EM EDTEA TNPA/EDTEA
1.2 Implement water quality standards • Use the existing Target Water Quality Guidelines (DWA) & DEA Water Guidelines to drive and implement water quality improvements in the Bay and catchments. Implement management interventions to address point source and diffuse sources of inputs to both the Bay and the catchment rivers. Include stormwater outlets, discharges from waste water treatment works and any other clearly recognizable input.	Water Quality standards being implemented. Commitments to implement throughout the Bay and catchments. Annual Reports submitted to DEA and detailed status report at end of 5 year period	2016-2020	DWS/ TNPA/DEA	EM EDTEA
1.3 Monitoring • Guide and monitor both capital and maintenance dredging to ensure protection of water and sediment habitats. • Engage in dialogue with DWS and other authorities on	Implementation and adherence to the conditions of the dredging permit Annual monitoring reports.	2016- Ongoing	DEA DEA	DWS/ EDTEAEDTEA

Objective 1: Improve Water and Sediment Quality	To ensure that every attempt is made to improve the water quality of the Bay and to support and promote measures to reduce pollution (including effluent from the catchments and rivers discharging into the Bay, stormwater runoff and harbour pollution (e.g. ballast water)) and increasing water circulation thereby enhancing the Bay's ability to continue to function as an estuary, provide important goods and services.			
Actions	**Deliverables**	**Timing**	**Lead Agency**	**Support Agency**
implementing receiving water quality approach for rivers. • Use existing authorisations Coastal Water Discharge Permit (CWDP)/ Water Use Licence Authorisation (WULA) to regulate point and diffuse sources to improve water quality and • Programme to track and enforce any illegal waste disposal into storm water drains			TNPA/DWS/EDEA	EM/DEA
1.4 Improve compliance at grassroots level • Conduct campaign/awareness raising about water quality; Improve policing, incentivise behaviour change (implement in the manner that the Municipality has done for the recycling initiative • Improve housekeeping practices at industrial & commercial facilities. • Education regarding disposal of garbage and improved rubbish collection in catchment areas.	Awareness raised. Various public information pamphlets. Reduction in illegal discharges to influent rivers and Bay. Annual reports and 5 year status report.	2016-Ongoing	TNPA/ EM/DEA	DWS/ EDTEA

4.2.2 Action Plan 2: Ensuring Sustainable Development and Land/Water Use

The way in which the port had developed over the years has meant that large parts of the natural environment have been lost to port infrastructure and associated industrial development. Any further loss of habitat or further constriction of water circulation could result in further degradation of the bay ecosystem. This is particularly the case in the especially sensitive and significant areas of the Bay, identified and indicated as area for conservation in the Zonation plan (see *Chapter 5*).

There are, however, proposal to extending the existing Port into the Bayhead Marshalling Yard. While this might on the one hand pose a risk to the ecosystem, it could, if properly planned, result in a positive reconfiguration of the Bay, which could open up possibilities for habitat recreation and rehabilitation.

In the event of any future development in and around the immediate vicinity of the Bay, there is a need to check that the development is not in direct conflict with the EMP more generally. This EMP should be used as a guide to evaluate future development plans. In particular, it is important that guidelines around environmental sensitivity are taken into account in order to ensure that the agreed vision and goals of the EMP are reached.

Table 4.2: Sustainable Land/Water Use and Development

Objective 2: Ensuring sustainable land/water use and development	To ensure that existing land and water use activities in the Bay (including boating, angling and bait collection) and activities in the catchments are managed in such a way that impacts on the Bay is minimised and that any further development in and around the Bay and catchments is done in a sustainable manner.			
Actions	**Deliverables**	**Timing**	**Lead Agency**	**Support Agency**
2.1 Prepare and sign a **memorandum of understanding** to ensure a consistent, transparent and sustainable approach to infrastructure development in, and around, the Bay.	MOU signed	2016-2018	TNPA, EDTEA, EM	DWS/DEA/ EKZNW
2.2 Develop (through e.g. workshops etc.,) a set of **tools** (e.g. checklist, site specific controls etc.) to assist in ensuring a unified and consistent approach to the planning of any infrastructure development in the Bay, its catchments and surrounds.	Set of Decision making tools available and being used.	2016-2018	TNPA, EDTEA, EM	DWS/EKZNW
2.3 Ensure effective Integration of the EMP into **other development planning initiatives. This would include the following:**				
2.3.1 To give effect to the Bay zonation plan, by reflecting this in future Port Master Plans and Planning within the Bay catchments and Bay surrounds	Zonation plan reflected in development plans	2016- Ongoing	TNPA, EM	EDTEA, DWS, DEA/EKZNW
2.3.2 Ensure that setback lines and other developmental needs and restrictions are integrated into IDPs and SDFs	SDFs reflect requirements of EMP	2016- Ongoing	EM, TNPA, EDTEA	DEA/EKZNW
2.3.3 Consider application for legal status of setback line(s) under the Integrated Coastal Management Act	Setback line gazetted	2016- Ongoing	EM, TNPA, EDTEA	DEA

4.2.3 Action Plan 3: Protect and Improve Functional Estuarine Habitat

The now well established richness and productivity of Durban Bay was historically produced by the mosaic of different but interlinked high value habitats which existed historically. While some of these habitats have been lost and others reduced as a result of infilling and development, the remaining complex of soft sandy beaches, mangroves, intertidal flats and subtidal shallows is the powerhouse which drives the estuarine function of the Bay today. These are highly productive areas with high biological diversity and a high biomass of micro-, infaunal and macro-organisms. These include recreationally and commercially important invertebrate (prawns and crabs) and fish species (spotted grunter, barracuda) and play an important role in water and sediment quality. These habitats are known providers of water and biological carrying capacity, protecting areas from storm surge as well as storm water runoff. Tidal flats along with intertidal salt marshes and mangrove forests constitute are a vital part of the lagoon ecosystem. Tidal flats will often form the buffer zone between deeper reaches of the lagoon thereby protecting intertidal habitats by dissipating wave energy. This, in turn, reduces the erosion of mangroves and salt marshes. Collectively these intertidal habitats are of great importance to large numbers of invertebrates and fish, supporting complex estuarine food webs and provide resting and feeding areas to large numbers of indigenous and migratory birds.

Adequate protection must be provided for estuarine biota to ensure the persistence of populations, species habitats and ecosystem processes. Where possible, habitat restoration should be undertaken. Living resources must be protected from overexploitation and excessive disturbance.

In terms of fishing in the Bay, it is argued that the ecosystem is highly compromised and is currently unable to be sustainably exploited. In addition, there are concerns about the health risks of eating fish caught in the Bay. It is therefore recommended that extractive resource utilisation not occur within the estuary until a study is undertaken to evaluate the preferred approach. This study should include an assessment of invertebrate and fish stocks as well as the risks to human health of consuming fish caught in the Bay (e.g., analysis of bioaccumulation and heavy metals and toxins in fish tissues). This should serve as an input into the process of developing a clear policy on bait collecting and fishing in the Bay. It is further argued that this policy should include cover subsistence and recreational fishing, where there should be some consistency in how these are approached. This policy would have to be in line with national and provincial policies and regulations. It is further recommended that the policy on resource exploitation is reviewed as conditions in the Bay improve or change significantly, for example, if water quality was significantly improved and/or additional habitat recreated.

It is also worth noting that there are options for future port development, such as the proposed expansion into the Bayhead Marshalling Yard area as identified in the Transnet- eThekwini Municipality Planning Initiative (TEMPI), than could contribute towards improving the health of the estuary. Such development could for example result in improved water circulation or extending the soft edges of the Bay, which could enhance the functioning of the estuary. These opportunities should be actively explored by the advisory body and provision made for this in a future revised EMP.

Table 4.3: Estuarine Habitat

Objective 3: Protect and Improve Estuarine Habitat	To identify and protect the existing functional estuarine habitat (including mangroves and grasses) in and around the Bay and to seek every opportunity for rehabilitating/ improving and expanding existing soft habitat.			
Actions	**Deliverables**	**Timing**	**Lead Agency**	**Support Agency**
3.1 Investigate **opportunities to protect key habitat including RAMSAR site** and significant existing vegetation stands through rezoning to a more appropriate conservation zone	Inventory and map. Also update zonation map.	2016-2018	EM/T NPA/DEA	EDTEA/EKZNW
3.2 Promote applied research by identifying information gaps, developing research programme(s) and soliciting research funding support, aimed at gathering/ consolidating data on parameters that affect the health of the Bay.	Research projects undertaken, Scientific reports and popular publications.	2016-2018	DEA /DWS/DST	TNPA/ EM/ EDTEA/EKZNW
3.3 Oversee Monitoring of biophysical indicators of estuary health [National Water Act 1998]	Monitoring data and reports	2016-2020	DWS	TNPA/ EM/ EDTEA/
3.4 Create effective mechanisms for ongoing **communication and awareness raising** with stakeholders about the value of the resource.	Communication strategy and popular publications	2016-2020	DEA	TNPA/ EM/ EDTEA
3.5 Develop a **clear and consistent policy** on resource extraction (i.e., fishing).	Policy Regulatory measures in place and effective compliance	2016-2018	TNPA/ DAFF	EKZNW EDTEA
3.6 Implement **management/ control measures:** • Enhance the biodiversity and the ecological status of mangrove areas. • Improved management and the removal of waste and alien species. • To remediate soft edges wherever possible.	Management/ control measures in place and being effectively implemented	2016-2020	DEA DEA (WftC)/ TNPA/ EM	TNPA/ EM/ EDTEA DAFF/EKZNW
3.7 Monitor effectiveness of management efforts	Annual Progress / audit Report	2016-2020	DEA	TNPA/ EM/ EDTEA
3.8 Ensure that the advisory body is **interfacing** with those who are developing plans for the future use of the Bay and its surroundings and cross-check the impact this may have on the Bay (i.e. become involved in planning processes related to the port and assessing it against the vision and the EMP)	Advisory Body interfacing effectively with other development initiatives that may impact on the Bay	2016-2020	DEA	TNPA/ EM/ EDTEA
3.9 Ensure effective **dialogue** with Catchment management agencies and authorities	Advisory body in effective dialogue with	2016-2020	DEA	TNPA/ EM/ EDTEA

Objective 3: Protect and Improve Estuarine Habitat	To identify and protect the existing functional estuarine habitat (including mangroves and grasses) in and around the Bay and to seek every opportunity for rehabilitating/ improving and expanding existing soft habitat.			
Actions	**Deliverables**	**Timing**	**Lead Agency**	**Support Agency**
around land use activities in the catchments (e.g., agriculture etc.)	relevant agencies and authorities			

5. ESTUARINE ZONATION PLAN

A management zonation plan provides a useful tool for satisfying the many conflicting requirements of the different user groups and stakeholders who wish to enjoy the many benefits provided by the Bay. It is important to note that zoning is not necessarily for ecological reasons but rather to manage human interactions within the area considered for zoning. Zoning therefore typically allows for:

- Partitioning of activities within the estuary and its catchments thus permitting their existence without one activity precluding or conflicting with another;
- Identifying ecologically sensitive areas and small habitat fragments for protection;
- Focussing management activities in specific areas; and
- Guiding future land/water uses and development activities in the area.

As such, the vision, strategy and management plans identified for the Bay would be well supported by a zonation plan for the Bay.

In developing a zonation for the Bay, a sensitivity analysis was undertaken. This analysis was conducted on the basis of existing available information and served to identify areas within the Bay that are particularly sensitive to disturbance, including areas such as the intertidal sandbanks, the shallow sub tidal areas, the remaining mangroves in the Bay. It also identified areas of poor water quality and key pollution sources giving rise to the poor water quality. *Figure 5.2* outlines opportunities for improving the health of the Estuary, with the primary focus of this EMP and strategy being on minimizing further degradation.

Based on a sensitivity analysis as well as an analysis of existing land uses and zonations for the area a proposed zonation plan has been generated (see *Figure 5.2*). The following categories of zonation have been used:

- **Conservation:** These include existing protected areas such as the natural heritage site around the mangroves. In future, consideration should be given to extending such conservation areas and, in particular, to include consideration of conservation areas along the three rivers and their catchments draining into the Bay. It should be noted that the SA National Botanical Institute (SANBI) considers the Bay of Durban as one of the top 10 estuaries in SA. It may not be possible to establish the proposed conservation areas as National Protected areas; however the possibility may exist for the establishing of a Ramsar site in the Bay. The following control shall apply to the Conservation zone:

- ✓ No Fishing
- ✓ No bait collection
- ✓ Indigenous flora, fauna or any naturally occurring material shall not be disturbed or removed without the written authority of the Transnet National Ports Authority.

- **Recreation and boating:** Key recreation areas identified include various existing recreation areas along the Victoria Embankment, at the interface between the Port and the City. These include the area around Wilson's wharf, the Yacht Club precinct and the restaurant on the yacht mole, as well as the area around the Bat Centre. These areas could be formalised as public recreation areas and opportunities should be explored for improving the amenity value and public access to them. With the widening of the Port entrance the people of Durban have lost popular restaurants, as well as theatre and entertainment facilities that were situated at the harbour entrance. It may be appropriate in future to consider a recreational link between the Point Development and the northern side of the port entrance area.

- **Commercial/Industrial:** These areas include, the breakbulk cargo handling areas around the Point, Pier 1 and Maydon wharf, bulk cargo handling along the Bluff, Island view and Maydon Wharf, and Pier 1 and 2, which is the main areas for Container handling. The possibility exists in future, to relocate certain facilities and in so doing open new opportunities for both rehabilitation and economic growth e.g. Salisbury Island is earmarked for the expansion of container facilities at Pier 1 through the purchase of this land from the Department of Public Works and consolidation of the SA Naval base; the Bayhead Marshalling yard has been earmarked for possible port expansion. Equally, as indicated in the Port Vision Brochure 2010, the proposed long term port expansion at the old airport site will allow the development of new deepwater liquid bulk berths alongside the SAPREF refinery.

  Public Access: Special consideration should be given to enhancing public access, bearing in mind that this should not conflict with port operations and associated security and safety measures. Areas suggested for improved public access include the recreation areas along the Port/ City Interface (which may require pedestrian crossings over the rail line) and access to the natural heritage site. Opportunities may exist for controlled public access to the northern side of the harbour entrance and possibly onto the breakwater. The possibility of water taxis and/ or harbour excursion by boat could be considered. The public access arrangements suggested in this zonation plan need to be considered and finalised by TNPA.

In addition, two management zones have been identified (see *Figure 5.2*), namely:

- **The Bay: City Interface Zone:** This area possibly provides the best opportunity for linking the City to the water's edge. It could offer unique opportunities for waterfront recreation, shopping, restaurants, etc. This would require a commitment by the City and Transnet to actively explore such opportunities and especially to find creative ways of bridging the existing rail barrier along this side of the Port. This has the potential to result in a revitalisation of this part of the City.

- **The Area for Priority Water Quality Intervention:** These areas of the Bay are characterised by long-standing poor water quality and periodically life threatening conditions for marine life in the Bay. This is as a result of a combination of limited tidal exchange in the upper reaches of the Bay, the positions of the incoming streams and stormwater drains, and the frequent occurrence of highly degraded incoming water quality.

The advisory body must arrange for clear demarcation of the zoned areas at ground level, with beacons and signage indicating what restrictions are in force in each zone. It must also liaise with other stakeholders regarding sharing of information and to work out the implications of this zonation plan for port activities in the Bay.

The table below outlines some specific mapping and zoning related actions for the Department over the next five year cycle.

Figure 5.1: Figure Geographical extent of the estuarine functional zone of the Durban Bay

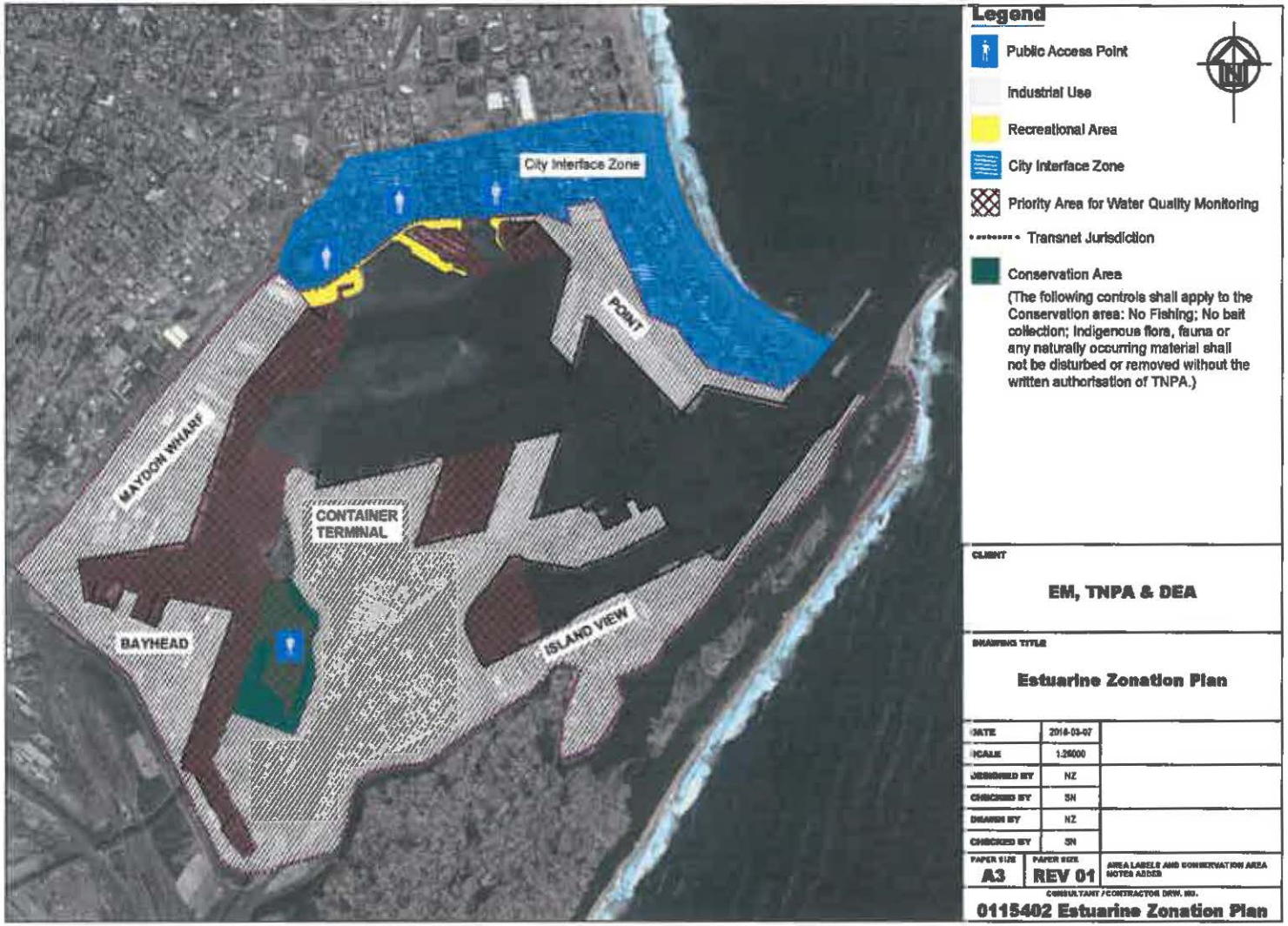

Figure 5.2: Sensitive and proposed zonation for Durban Bay estuary

Table 5.1: Zonation

Zonation	Actions to support the implementation of the action plan			
Actions	**Deliverables**	**Timing**	**Lead Agency**	**Support Agency**
5.1 Explore opportunities for improved **public access** and public enjoyment of the Bay *e.g.,* (Ferry Service across the Bay, boat chartering, guided tours, improved interpretative information around the Estuary, visitors guidebook to the footpaths, cycle route etc.)	Improved public access negotiated and implemented, zonation plan updated.	2016-2020	TNPA/ EM	DEA/ EDTEA
5.2 Develop a **plan of all existing and proposed public access** points along the Bay, relocating those which coincide with sensitive habitat or which impinges on port operations and security and formalising those with highest recreation usage/ value to provide on-going and undiminished access to the Bay	Plan developed and implemented	2016-2019	EM/TNPA	DEA/ EDTEA
5.3 Ensure ongoing **refinement of the zonation** map where necessary in order to ensure that it remains in line with other planning initiatives such as D'MOSS, Catchment management plans and the SDF.	Zoning map remains up to date.	2016-2020	EM/TNPA	DEA/ EDTEA
5.4 Explore the options for providing the necessary **protection status** for areas indicated for conservation and investigate the possibility of establishing a Ramsar site in the Bay.	Appropriate protection status obtained and efforts towards establishing a Ramsar site underway	2016-2020	TNPA/DEA	EM/ EDTEA

6. IMPLEMENTATION FRAMEWORK

6.1 LEGISLATIVE FRAMEWORK

Generally, the development and implementation of an EMP will be governed by the ICMA. The National Estuarine Management Protocol was published in terms of section 33(2) of ICMA in Government Notice 341 in *Government Gazette* 36432 of 10 May 2013. Section 5 of the Protocol identifies the Department as the authority responsible for developing the EMP for the Durban Bay estuary, but that the development is done in consultation with the National Ports Authority and other relevant stakeholders.

Section 34(1) of ICMA in turn requires that an EMP must be consistent with the National Coastal Management Programme as well as the national coastal management programme and any applicable provincial coastal management programme and municipal coastal management programme. In addition, section 34(1) (a) requires that the development of the EMP must follow the public participation process described in Part 5 of Chapter 6 of ICMA. This EMP has been developed in this manner.

There is an opportunity for establishing a social cohesion through which agreed upon decisions are made and identified measures enforced. It is proposed that this can be achieved through agreement on this EMP and in particular on the proposed governance framework, which is laid out as a responsibility matrix in *Table 6.1*, illustrated graphically in *Figure 6.1* and described in the various sections *6.2 – 6.5* below.

6.2 INSTITUTIONAL STRUCTURE TO IMPLEMENT THE PLAN

In order to recognize and effectively manage the unique environmental, economic and social aspect of this estuary, it is important to develop relationships and build trust amongst stakeholders with an interest in the Bay. To ensure the objectives of this management plan are achieved, the advisory body will be established to increase transparency and greater responsiveness amongst the stakeholders. In addition, the National Estuarine Management Protocol recommends the establishment of informal additional advisory bodies. This structure will be responsible to facilitate the implementation of the project plans in the EMP and to foster continuous stakeholder engagement. However, the responsible management authority as the overseer/ coordinator of the implementation of the plan will facilitate the process.

Table 6.1: Action Plan for the Advisory Body

IMPLEMENTATION FRAMEWORK	To support implementation of management action plans			
Actions	**Deliverables**	**Timing**	**Lead Agency**	**Support Agency**
6.1 Establish advisory body	Advisory body established	2016-2017	DEA	Responsible Government Departments
6.2 Generate mandate and TOR	TOR and mandate confirmed	2016-2017	DEA	Responsible Government Departments
6.3 Finalise structure including mechanisms for accountability and responsiveness	Structure agreed	2016-2017	DEA	Responsible Government Departments
6.4 Develop detailed standard operational plans	Plans generated	2016 - 2017	DEA	Responsible Government Departments
6.5 Establish linkages between the advisory body and responsible government departments	Signed MOU/ SOPs	2016 - 2017	DEA	Responsible Government Departments
6.6 Establish mechanisms for improved communication (e.g., public engagement, communication procedure)	Engagement plan procedures	2017 - 2018	DEA	Responsible Government Departments
6.7 Develop and roll out education & awareness programmes for communities	Capacity building plan Report on outcomes of needs assessment	2017 – Ongoing	Responsible Government Departments	Responsible Government Departments

7. MONITORING AND REPORTING

Estuaries are dynamic systems and conditions are continually changing as a result of natural processes and human activities. Consequently, an effective management plan for an estuary must retain certain flexibility so that modifications can be made in relation to environmental change and changes in human activities. The EMP therefore needs to be considered as a rolling programme of liaison and action, rather than a one-off, all embracing management plan.

The management actions outlined in this EMP are not exhaustive and should be added to as the plan progresses and goals are achieved. Also when new issues are highlighted and as issues currently highlighted are resolved, the necessary adjustments to the EMP will be made.
This EMP is regarded as the first of a series of rolling five year plans, with the EMP being subject to on-going review to ensure continuing validity and relevance.

The Protocol outlines that the project plans must have a monitoring plan including key indicators to measure the effectiveness of the management actions. It is suggested that a set of parameters for reviewing and measuring performance be prepared so that there is a clear accountability on who and how the monitoring plan should be implemented. There is also a need to make sure the indicators are useful indicators.

There are two ways of monitoring the effectiveness of the EMP, namely:

- Resource Monitoring (Performance measures); and
- Compliance Monitoring.

7.1 RESOURCE MONITORING

Resource monitoring refers to measure the general health of the estuary, however, this section specifically focuses on the ongoing monitoring of the state of the Bay. It is therefore specifically aimed at establishing the effectiveness of the actions identified in the first 5 year cycle of the EMP in terms of achieving the first goal of changing the negative impacts of the estuary. It is suggested that a programme of coordinating resource monitoring should be implemented to compliment the EMP. Although some monitoring of certain aspects is undertaken on an *ad hoc* basis by various agencies or departments, it is suggested that a more coordinated approach to future monitoring be adopted. This will allow monitoring to be used as a platform for gauging the future success of the EMP and for drawing attention to particular issues or areas of concern. This would also avoid duplication of sampling effort and cost.

Resource Monitoring may include:

- **Water Quality:** Full range of physical, chemical and biological parameters in the receiving environment of the estuary;
- **Sediment Quality:** Pesticides and industrial pollutants;
- **Environment and Biota:** Vegetation, aquatic fauna (fish and invertebrates), birds, etc.;
- **River and catchment conditions:** For example to specifically conduct water quality measurements immediately after flood events;
- **Water and foreshore usage:** For example to consider frequency of use, ease of access and facility demand;
- **Bathymetry:** To be undertaken periodically;
- **Flow:** Tidal levels within the estuary and freshwater inflows to the estuary; and
- **Health:** For example, to determine any health risks in/around the Bay.

Table 7.1: Proposed monitoring programme for Durban Bay

Monitoring	To assess progress: improvement in estuarine health (reversal of current negative impacts)			
Actions	**Deliverables**	**Timing**	**Lead Agency**	**Support Agency**
7.1 Consolidate existing data on the physico-chemical and biological conditions	Baseline report card produced, Annual report cards and Five year status report produced, Database established and detailed habitats and features mapped. Also update zonation map.	2017-Ongoing	EM/ TNPA/DEA	EDTEA
7.2 Develop monitoring programme using information from 7.1 above to select relevant sites, frequency and parameters to measure progress towards Objective 1 and 3.	Integrated focussed monitoring programme developed for implementation	2018- Ongoing	DEA/TNPA	EDTEA/EM
7.2.1 Survey and monitor water column and sediment quality (water column profiles of physico-chemical measures *e.g.*, dissolved oxygen, toxins *e.g.*, heavy metals and pollutants *e.g.*, nutrients) to assess progress towards objective 1	Existing information collated under action 3.1; if no information then forum should commission a survey ; report on levels of relevant physico-chemical indicators, toxins and pollutants in the water column and sediments- 6 samples per year (every 2nd month)	2018- Ongoing	DWS/ DEA	TNPA/EM/EDTEA
7.2.2 Monitoring of bacteriological indicators (these assist with pinpointing sources of other pollutants as well as providing an assessment of human health risk	Monitoring data and consolidated report with 3.2.1 above	2017-Ongoing	DWS/DEA	TNPA/EM/EDTEA
7.2.3 Survey of macrobenthic fauna in intertidal, shallow subtidal and mangrove estuarine habitats	Quarterly / Bi-annual Monitoring data and consolidated report	2017-Ongoing	DEA	TNPA/EM/EDTEA
7.2.4 Survey of fish fauna utilising intertidal, shallow subtidal and mangrove estuarine habitats to generate an index of estuarine community composition/health	Bi-annual fish survey (seine netting only)	2018-Ongoing	EKZNW/DAFF	TNPA/EM/EDTEA
7.2.5 Survey of birds utilising **intertidal, shallow subtidal and mangrove estuarine habitats**	Monthly bird counts to continue existing long term dataset and reporting of annual and five yearly trends	Monthly 2018 - Ongoing	DEA/EM	TNPA/EDTEA
7.2.6 Inventory of flora and fauna of natural heritage site including dryland and mangroves habitats,	Species inventory report	2018-Ongoing	DEA	TNPA/EM/EDTEA
7.2.7 Monitor natural heritage site using suitable indicator species *e.g., Terebralia palustris* which are sensitive to water and habitat quality; grassland orchid species to indicate vegetation status **to assess changes in response to objective 1 & 3 action plans**	Monitor and report on indicator species status	2018 - Ongoing	DEA/TNPA	EM/EDTEA

7.2 COMPLIANCE MONITORING

Compliance monitoring refers to record impacts of human activities and whether they comply with legislations or monitoring of the impacts of natural events. This kind of monitoring also include measures the performance in terms of implementing the EMP within the agreed time frames. The EMP has been developed in the form of an adaptive management framework with the provision for evaluating its performance and where performance is sub-optimal, contingencies should be implemented to remedy the situation. The following are the suggested performance measures.

7.3 MEASURE OF PROJECT PLAN INITIATION

The questions to be asked here are:

- What actions have been implemented (regardless of outcome)? and
- Which actions are outstanding?

If actions are found to not have been implemented within the agreed timeframe then the following contingencies should apply:

- Determine the cause of the delay in implementation.; and
- Modify and update the EMP to reflect a timeframe for implementation that is more achievable.

7.4 MEASURING SPECIFIC OUTPUTS

The questions to be asked are:

- Has the measureable degree of change as established through the implementation of the action plan been achieved?

If not, then the following contingencies should be adopted:

- Determine the reason for not achieving the specific output; and
- Review the appropriateness of the specific output of the EMP, and if necessary, modify the output described in the Plan to define a more achievable product.

7.5 REPORTING OF THE EMP

The Provincial and Municipal coastal committees established in terms of Chapter 5 of the Integrated Coastal Management Act shall serve as forums for monitoring the implementation of this EMP and reporting of the progress and achievements related to this estuarine management plan. The

monitoring, progress report and achievements will ultimately be submitted as an annual report to the Minister in terms of the implementation of the estuarine management plan and then tabled in Parliament as outlined in the ICM Act.

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