



Conservation, Partnerships & Ecotourism

# UMHLANGA NATURE RESERVE *Protected Area* MANAGEMENT PLAN



# **Umhlanga Lagoon Nature Reserve**

**KwaZulu-Natal  
South Africa**

## **Protected Area Management Plan**

Prepared by  
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Ezemvelo KwaZulu-Natal Wildlife Protected Area Management Planning Unit

### **Citation**

Umhlanga Lagoon Nature Reserve: Management Plan. Version 1.0 (June 2013), Ezemvelo KZN Wildlife, Pietermaritzburg.



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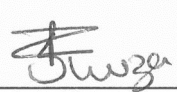


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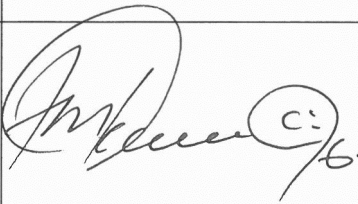
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## PREFACE

This Protected Area Management Plan for Umhlanga Lagoon Nature Reserve is the primary and overarching management document for the protected area and has been developed during 2013. It forms the framework within which the nature reserve will be managed and developed towards the achievement of its management objectives, derived in collaboration with the protected area's stakeholders during January 2013.

The protected area management planning process, and the resultant planning document (elaborated on in the next few pages), has been designed to meet the statutory requirements of the National Environmental Management: Protected Areas Act and other relevant legislation.

The protected area management planning process requires participation from the protected area's stakeholders, the general public and specialists during the various stages of plan development and implementation. Although the management plan and its sub-components are five-year planning documents, an annual review process will ensure an active adaptive management planning approach.

A long-term business approach has also been introduced that ensures that the protected area's management objectives are operationalised and reflected through an annual plan of operation. This costs and prioritises the management actions required to achieve the vision and objectives of the management plan and allows Ezemvelo to actively pursue additional and improved funding and income towards the achievement of the natural and cultural heritage conservation objectives of the nature reserve over the next five years.

Ezemvelo KwaZulu-Natal Wildlife, as the appointed Management Authority for Umhlanga Lagoon Nature Reserve, hereby commits itself to the implementation of this plan.

Dr. Bandile Mkhize  
Chief Executive Officer

Date:

## EXECUTIVE SUMMARY

### Introduction

The Umhlanga Lagoon Nature Reserve (Location: 19° 42'S; 31° 06'E) is a 26 ha protected area on the northern edge of the holiday town of Umhlanga Rocks. The nature reserve falls within the eThekweni Metropolitan Municipality.

Umhlanga Lagoon Nature Reserve includes the Mhlanga Lagoon, at the mouth of the Ohlanga River, and surrounding land. The lagoon is surrounded by 50-60 ha of climax coastal forest (i.e. the Hawaan Forest), which contains numerous rare forest plants, and to the north and south of the lagoon mouth, by impressive stands of dune forest.

The main significance of this nature reserve is that it is one of the last remaining green belts on the Durban coast and, apart from providing protection for the estuarine and unique climax coastal forests, it serves as a reminder of what the coast looked like historically. Shell middens, of archaeological importance, are also protected in this coastal nature reserve. Umhlanga Lagoon Nature Reserve is popular for bird watching and of especial education importance because of its close proximity to Durban. The peri-urban position of the nature reserve will cause it to become more valuable as the years pass by, especially for educational, recreational, aesthetic and spiritual reasons, and its contribution to the conservation of biodiversity in the province.

### Strategic management framework

The following vision has been adopted for Umhlanga Lagoon Nature Reserve:

*“The ecological integrity, function and character of Umhlanga Lagoon Nature Reserve is conserved in perpetuity through effective management and community support to maintain a representative sample of this ecosystem that will promote opportunities for environmental awareness and nature-based recreation.”*

An objective has been identified for each of Umhlanga Lagoon Nature Reserve's key performance areas, which relate to the important functions and activities necessary to achieve the vision and protect, develop and manage the nature reserve effectively. The objectives have then been translated into strategic outcomes, which form the basis for the management activities and targets set out in the operational management framework.

The following specific issues have been identified by the Nature Reserve Planning Committee:

- Catchment degradation and resultant siltation of rivers and estuaries is an issue common to all estuaries and lagoons in South Africa, to a greater or lesser degree.
- Organic loading from treated sewage discharged up-river occurs on occasion, and plans for future housing development threaten to increase sewage discharge.
- Additional water discharge between catchments may pose a threat to the water balance and alter the breaching regime of the estuary.
- Some erosion of the steeply inclined dune slopes adjacent to the lagoon has been occurring.

- Mouth breaching is necessary when the lagoon becomes polluted. In the past, artificial breaching was also undertaken to facilitate planting and harvesting of sugar cane.
- The road bridge approach restricts the floodplain to some extent.
- Housing development threatened the adjacent Hawaan Coastal Forest until it was stopped in 2003. Development pressures in the surrounding urban and sub-urban areas continue.

The following specific strategic outcomes have been identified by the Nature Reserve Planning Committee to address the abovementioned issues:

- There is adequate law enforcement within Umhlanga Lagoon Nature Reserve in order to achieve the protected area vision.
- Constructive community involvement in Umhlanga Lagoon Nature Reserve's management through effective stakeholder engagement; and provision of support to the community in developing its understanding of the management of Umhlanga Lagoon Nature Reserve.
- Capture of buffer zone considerations in IDP's and SDF's and municipal schemes.
- Ensure that all visitor activities are appropriate to the goals of the nature reserve and to its neighbours.
- Develop and implement an alien species control plan for Umhlanga Lagoon Nature Reserve (fauna and flora).
- Develop and implement an indigenous invasive species control plan for Umhlanga Lagoon Nature Reserve.
- Identify, rehabilitate and manage areas that have been significantly impacted by accelerated soil erosion.
- Monitor registered research projects to ensure that collection conforms to policies and that appropriate permits are in place.
- Key species management, including rare and endangered species, is undertaken using the best available scientific knowledge.
- Critical ecological processes and functions are maintained within Umhlanga Lagoon Nature Reserve.
- Biological monitoring programmes are developed and implemented to determine the success of management interventions in protecting the ecosystems, communities and species of Umhlanga Lagoon Nature Reserve.
- Development of a five-year Financial Plan that identifies the resource needs to achieve the objectives for Umhlanga Lagoon Nature Reserve.
- Ensure that Umhlanga Lagoon Nature Reserve is adequately staffed and conforms to legal staffing practices.
- All facilities and infrastructure in Umhlanga Lagoon Nature Reserve are adequately maintained.
- Service infrastructure and practices in Umhlanga Lagoon Nature Reserve do not cause environmental harm.

## **Monitoring and reporting**

Monitoring and reporting is a critical component of the adaptive management cycle. It enables the effective assessment of management interventions and, if necessary, can be used to direct modifications of management in an effort to achieve the outcomes required. An annual monitoring schedule for Umhlanga Lagoon Nature Reserve, which conforms to the norms and standards for surveillance and monitoring (Goodman, 2011), has been developed, based on the management targets contained in the operational management framework.

## **Annual plan of operation**

Each year, an annual plan of operation will be prepared, based on the objectives, strategic outcomes, management activities and targets contained in the management plan. The annual plan of operation should be prepared, based on the findings of the previous year's management plan implementation review. The annual plan of operation will be tied to staff performance contracts, and goals set in them will be categorised in the same key performance areas as the management plan.

**Table 1: Abbreviations**

Amafa	Amafa aKwaZulu-Natali (KwaZulu-Natal Provincial Heritage Agency)
CCA	Community Conservation Area
CDP	Concept Development Plan (Component of Ezemvelo KZN Wildlife protected area management planning process)
CEO	Chief Executive Officer
CRMP	Cultural Resource Management Plan
CMS	Co-management Structure
DAEARD	KwaZulu-Natal Provincial Department of Agriculture and Environmental Affairs
DEAET	Eastern Cape Department of Economic Affairs, Environment and Tourism
DEA	National Department of Environmental Affairs
DWA	National Department of Water Affairs
EIA	Environmental Impact Assessment
Ezemvelo	Ezemvelo KwaZulu-Natal Wildlife
EMF	Environmental Management Framework
EMP	Environmental Management Plan
FPA	Fire Protection Association in terms of the National Veld and Forest Fire Act (No.1 of 1998)
GDP	Gross Domestic Product
GIS	Geographical Information System
IDP	Municipal Integrated Development Plan
IUCN	International Union for the Conservation of Nature
MEC	Member of the Executive Council
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
NEMA	National Environmental Management Act
NPAES	National Protected Area Expansion Strategy
NRPC	Nature Reserve Planning Committee
NSBA	National Spatial Biodiversity Assessment
OIC	Officer in Charge
OPSCOM	Operations Committee
PA	Protected Area
ROC	Ezemvelo KZN Wildlife Operations Committee East
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SAPPI	South African Pulp and Paper Industry
SDF	Municipal Spatial Development Framework
SMME	Small, Micro and Medium Enterprises
SWOT	Strengths, weaknesses, opportunities and threats analysis
UNESCO	United Nations Educational, Scientific and Cultural Organisation

# 1 BACKGROUND

## 1.1 Introduction

The Umhlanga Lagoon Nature Reserve (Location: 19° 42'S; 31° 06'E) is a 26 ha protected area on the northern edge of the holiday town of Umhlanga Rocks. The nature reserve falls within the eThekweni Metropolitan Municipality. It includes the Mhlanga Lagoon, at the mouth of the Ohlanga River, and surrounding land. It is a small, hyposaline body of water that is normally separated from the sea by a sandbank for about 90 % of the year (Begg, 1984), but in recent times more frequent breaching of the sandbank has been induced by higher than average runoff (normally  $26 \times 10^6 \text{ m}^3/\text{yr}$  from the average catchment area [118 km<sup>2</sup>]).

To get to the nature reserve, from the M4 north, take the Portland Drive exit, turn right at the T-junction and then immediately right again. Continue under the highway until Lagoon Drive. Turn left along Lagoon Drive, at the end of which is the entrance to the nature reserve. There is no entry fee for the nature reserve.

Over the past 50 years, the lagoon has shown little change in its morphology (Cooper, 1987; Perry, 1988). At this stage, there is no reason to believe that anything significant has changed since the late 1980's, although this needs to be confirmed. The lagoon is surrounded by extensive reedbeds, consisting almost entirely of *Phragmites australis*, which stabilise the banks and yield important supplies of detritus to the system. The lagoon is also surrounded by 50-60 ha of climax coastal forest (i.e. the Hawaan Forest), which contains numerous rare forest plants, such as *Cavacoa aurea* and *Cola natalensis* and, to the north and south of the lagoon mouth, impressive stands of dune forest, characterised by Red Milkwood (*Mimusops caffra*).

The sandbar is partially vegetated and during large floods is totally removed. The width of this bar varies substantially, as does the position of the mouth. According to Forbes & Demetriades (2010) the former presumably reflects wave action and deposition of marine sands into the mouth area and the latter a combination of natural variability in breach positions and human interference. A substantial portion of the lower estuary below the M4 was infilled during March 2007 sea storms, which reduced much of the lower estuary to a narrow strip of water.

Estimates of the Ohlanga catchment area range from 85 to 196 km<sup>2</sup> Begg (1978), but Perry (1989) and Cooper (1989) give a figure of 118 and Perissinotto *et al.* (2004) a figure of 80 km<sup>2</sup>. Mean Annual Runoff (MAR) estimates range from 19.7 to 29.5  $\times 10^6 \text{ m}^3$ , with an intermediate of  $26 \times 10^6 \text{ m}^3$  (Cooper 1989) and a low of  $12.6 \times 10^6 \text{ m}^3$  (Perissinotto *et al.* 2004). It is thus one of the smaller rivers on the KwaZulu-Natal coast.

The Umhlanga Lagoon and surrounds is a popular birding spot as it provides habitat for many wetland and coastal forest birds, animals and plants. Birding websites mention that the birdlist comprises some 208 species, with 60 species possible on a single visit in summer, while a winter visit should produce 40 species. The Ezemvelo KZN Wildlife database lists 176 species, while a list obtained from Geoff Nichols, compiled with Bill Duthie a few years ago, includes 313 species.



Close to the nature reserve is another popular birding spot, the Umhlanga Rocks Wastewater Treatment Works (the “Ponds”). These “Ponds” lie next to the Ohlanga River, over the hill behind Umhlanga Rocks. There are four maturation ponds; two are extensively overgrown and the other two are mostly clear water. The five maturation ponds are open to *bona fide* birders at all times and no prior permission is required for entry.

From the car park at the Umhlanga Lagoon Nature Reserve, a single path leaves and crosses a short boardwalk. Here the path forks, the right hand trail crossing the reedbed and climbing along the primary dune to a viewing area overlooking the lagoon. A picnic site is situated on the left-hand path, while public toilets are situated on the seaward dune.

The nature reserve was established in 1980 to conserve and maintain the land and its natural systems surrounding the lagoon. At a later stage, the lagoon was also proclaimed as part of the nature reserve. In the context of the rapidly developing Greater Durban Metropolitan Area, the nature reserve remains as a natural remnant of what the earlier landscape portrayed.

The main significance of this nature reserve is that it is one of the last remaining green belts on the Durban coast. Combined with the Hawaan Forest, it serves as a reminder of what the coast looked like historically. The peri-urban position of the nature reserve will cause it to become more valuable as the years pass by, especially for educational, recreational, aesthetic and spiritual reasons and its contribution to the conservation of biodiversity in the province.

As a part of the Greater Durban Metropolitan Area and Durban Metropolitan Open Space System (DMOSS), the management of this nature reserve forms the core of nature conservation management activities of the North Local Council. It helps link natural areas like Hawaan Forest, Forest 31, Peace Cottage and Umdhloti Lagoon.

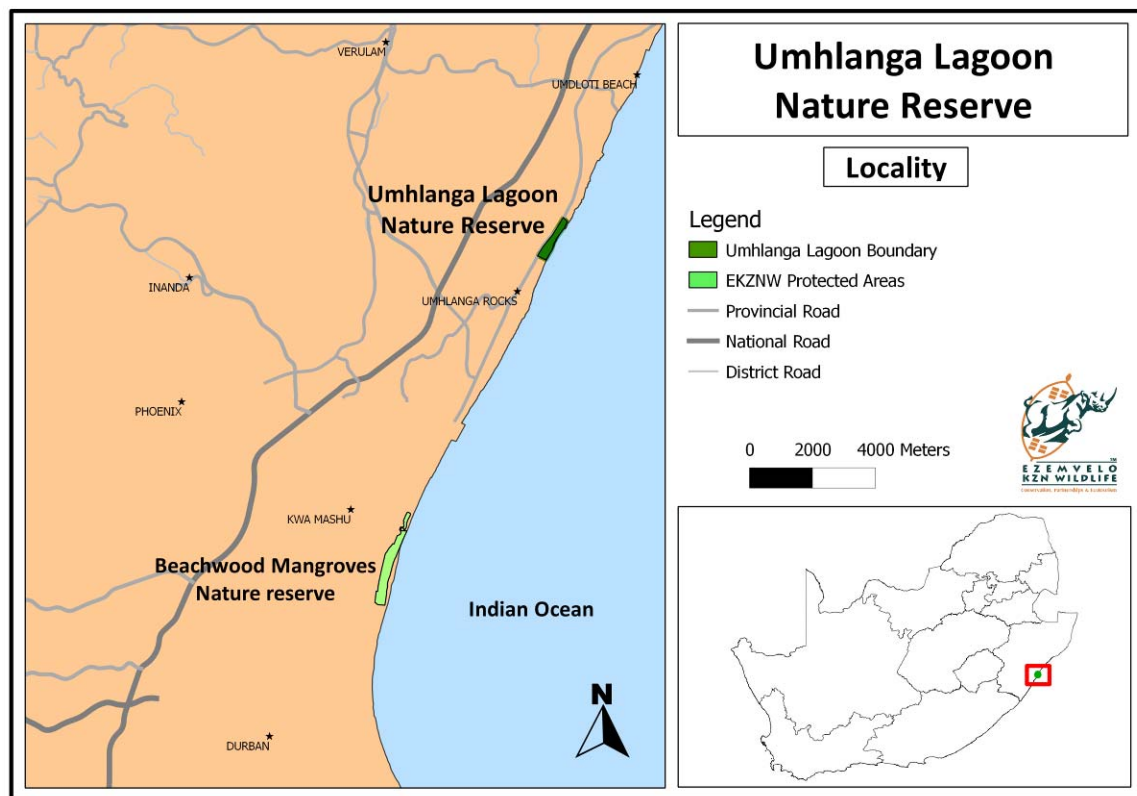
The Umhlanga Estuary itself covers approximately 11.4 ha. It lies adjacent to the Hawaan Forest, and the Umhlanga Lagoon Nature Reserve, as a coastal reserve, provides protection for the estuarine and unique climax coastal forests. Shell middens of archaeological importance are also protected in the reserve (Mann *et al.*, 1998).

Visitor facilities at Umhlanga Lagoon Nature Reserve include a boardwalk and trail. No harvesting of bait organisms is allowed and relatively little fishing takes place in the estuary. No use of power boats is allowed in the estuary.

A regional review of the current status of marine and estuarine protected areas in KwaZulu-Natal (Mann *et al.*, 1998) was commissioned by the Marine Reserves Task Group, which was established by the Sea Fisheries Research Institute (SFRI) and the South African Network for Coastal and Oceanographic Research (SANCOR), in 1996, to examine the use of Marine Protected Areas (MPA's) in Marine Resource Management in South Africa. The purpose of that review was to investigate the current status of marine and estuarine protected areas in KwaZulu-Natal. That report stressed that the estuaries of KwaZulu-Natal are important as “life support systems”, which act as fish and crustacean nurseries, and as exporters of detritus into the marine ecosystem.

There are 74 estuaries in KwaZulu-Natal, of which only 10 fall within official protected areas. This is totally inadequate in terms of the importance of estuaries as “life support systems” and more estuaries on the KwaZulu-Natal south coast need to be given full conservation

protection (Mann *et al.*, 1998). This therefore emphasises the importance of the Umhlanga Lagoon nature Reserve.



Map 1: Regional location of Umhlanga Lagoon Nature Reserve

## 1.2 The values of Umhlanga Lagoon Nature Reserve

The values of a nature reserve are those remarkable attributes that exemplify it and are largely the reason that it has been proclaimed as a protected area. The values are important in planning and management, as they are the aspects of the place that must be protected.

The values of Umhlanga Lagoon Nature Reserve include:

<b>Natural values</b>	<ul style="list-style-type: none"><li>▪ Provides habitat for a number of important animal species, including red data fish, reptile, bird and invertebrate species.</li><li>▪ Provides protection for a small portion of coastal forest and rare plant species.</li><li>▪ One of only 10, out of 74, estuaries in KwaZulu-Natal that are formally protected.</li></ul>
<b>Ecosystem service values</b>	<ul style="list-style-type: none"><li>▪ Estuaries, in general, provide a number of ecosystem services, including silt trapping, acting as a carbon sink, a fish nursery for fisheries, processing of sewage and a source of sustainable resources.</li></ul>
<b>Eco-cultural tourism values</b>	<ul style="list-style-type: none"><li>▪ Popular birding destination.</li><li>▪ Protects shell middens of archaeological importance.</li></ul>
<b>Cultural and historic values</b>	<ul style="list-style-type: none"><li>▪ Provides a glimpse into the past, when Durban was a significant and diverse wetland ecosystem and when the coast had extensive coastal forest, and is one of the last remnants of those two ecosystems.</li></ul>
<b>Social values</b>	<ul style="list-style-type: none"><li>▪ Valuable and accessible education facility, used by many educational groups, from schools to universities.</li></ul>

## 1.3 Purpose of the plan

Protected area management plans are intended to be high-level, strategic documents that provide the direction for the development and operation of protected areas. The purpose of the management plan is to:

- Facilitate compliance with the National Environmental Management: Protected Areas Act, 2003 (No. 57 of 2003) and other relevant legislation;
- inform management at all levels, from the staff on site through to the CEO, the Board and the MEC;
- provide the primary strategic tool for management of Umhlanga Lagoon Nature Reserve, informing the need for specific programmes and operational procedures;
- provide motivations for budgets and provide indicators that the budget is spent correctly;
- build accountability into the management of Umhlanga Lagoon Nature Reserve;

- provide for capacity building, future thinking and continuity of management; and
- enable Ezemvelo KZN Wildlife to develop and manage Umhlanga Lagoon Nature Reserve in such a way that its values and the purpose for which it was created are protected.

Consistent with Section 17 of the National Environmental Management: Protected Areas Act, 2003 (No. 57 of 2003), the purpose of Umhlanga Lagoon Nature Reserve is to:

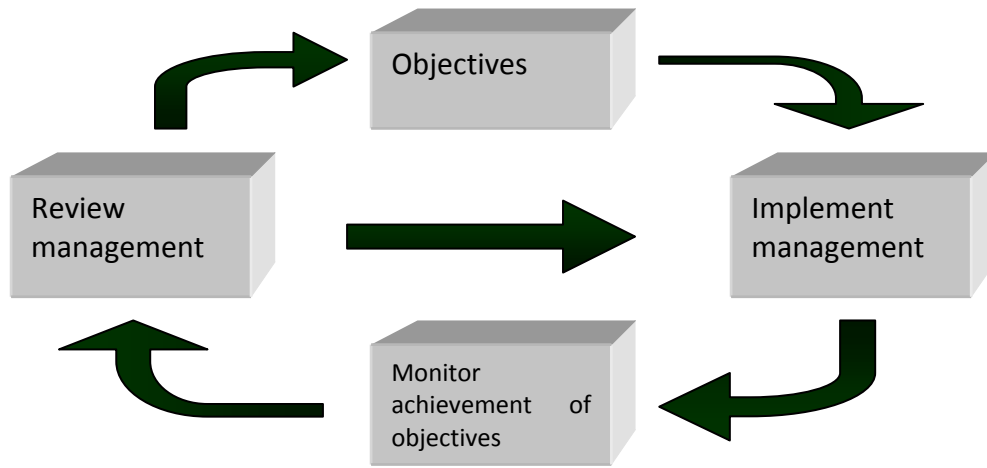
- protect an ecologically viable area representative of South Africa's estuarine biological diversity and natural landscapes and seascapes;
- preserve the ecological integrity of that area;
- conserve biodiversity in that area;
- protect an area representative of naturally occurring estuarine/ mangrove ecosystem, habitats and species in South Africa;
- protect South Africa's threatened or rare species associated with estuaries;
- protect an area which is vulnerable or ecologically sensitive; to assist in ensuring the sustained supply of environmental goods and services, particularly those associated with estuaries;
- provide for the sustainable use of natural and biological resources, with particular emphasis on the role that estuaries play in the maintenance of fisheries;
- create or augment destinations for nature-based tourism, particularly as it relates to education;
- manage the interrelationship between natural environmental biodiversity, human settlement and economic development;
- generally, contribute to human, social, cultural, spiritual and economic development; and
- rehabilitate and restore a degraded estuarine ecosystem and promote the recovery of endangered and vulnerable species.

#### **1.4 Planning approach**

The preparation of this management plan has been undertaken based on the following guiding principles.

##### **1.4.1 Adaptive management**

Adaptive management is a structured, iterative process in which decisions are made using the best available information, with the aim of obtaining better information through monitoring of performance (Figure 1). In this way, decision making is aimed at achieving the best outcome, whilst accruing the information needed to improve future management. Adaptive management can lead to the revision of a part or, if necessary, the whole management plan.



**Figure 1: The adaptive management cycle**

Adaptive management enables protected area managers to:

- i) Learn through experience.
- ii) Take account of, and respond to, changing factors that affect the protected area.
- iii) Continually develop or refine management processes.
- iv) Demonstrate that management is appropriate and effective.

#### *1.4.2 Collaboration and transparency*

Stakeholder involvement and support is an important aspect of effective protected area management. It is also a requirement in terms of Sections 39(3) and 41(2)(e) of the National Environmental Management: Protected Areas Act, 2003 (No. 57 of 2003). Accordingly, the development of this protected area management plan has been undertaken through a collaborative process, involving local communities and other key stakeholders.

Furthermore, the draft protected area management plan was made available for public review and comment, prior to its finalisation. It is intended that this process will ensure a great deal of valuable input into the development of the protected area management plan, the outcomes of which are incorporated into the plan. A detailed public participation report will be available upon request from the nature reserve manager or Ezemvelo's Planning Unit.

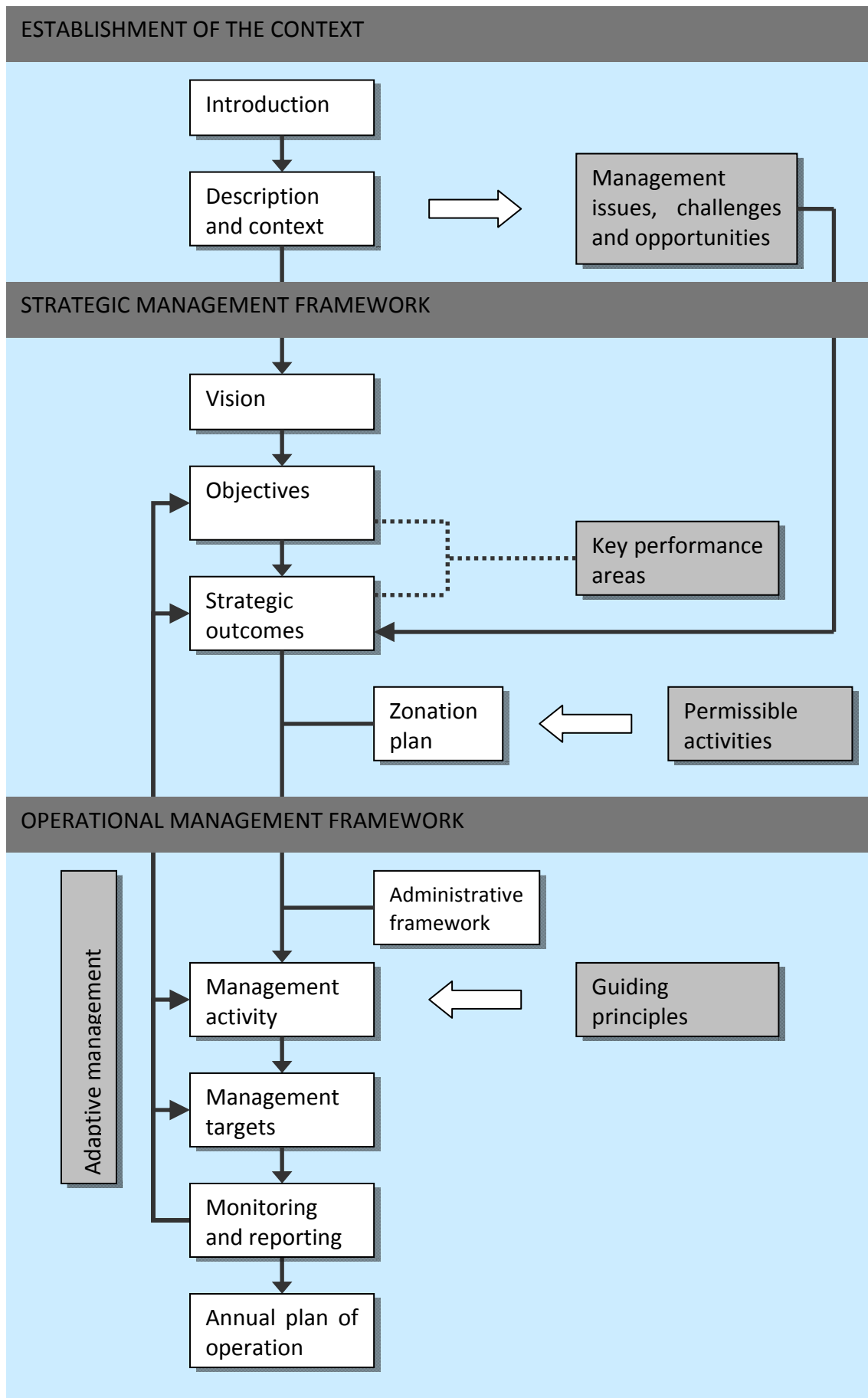
### 1.4.3 Structure of the plan

The structure of the plan is as follows:

Section1:	Provides an introduction and background to Umhlanga Lagoon Nature Reserve and the integrated management plan.
Section 2:	Establishes the context of the Umhlanga Lagoon Nature Reserve, providing the basis for the strategic and operational management frameworks that follow.
Section 3:	Sets out the vision and objectives that must be achieved in an effort to effectively conserve the nature reserve.
Section 4:	Provides a plan for zonation of the nature reserve, outlining the land uses that are permissible in particular zones and those that are not.
Section 5:	Describes the administrative structure required to effectively manage Umhlanga Lagoon Nature Reserve.
Section 6:	Sets out the detailed management targets that must be achieved in managing the nature reserve.
Section 7:	Sets out the monitoring measures required to determine if management targets are being met and the requirements for reporting on performance in implementing the plan.
Section 8:	Describes some of the components that must be included in the annual plan of operation.

The structure is presented graphically in Figure 2 below, with arrows indicating information and process flows.





**Figure 2: Structure of the Protected Area Management Plan**

## **2 DESCRIPTION OF UMHLANGA LAGOON NATURE RESERVE AND ITS CONTEXT**

### **2.1 *Institutional and administrative framework for management of Umhlanga Lagoon Nature Reserve***

The KwaZulu-Natal Nature Conservation Board, established in terms of the KwaZulu-Natal Nature Conservation Management Act No. 9 of 1997, was appointed by the KwaZulu-Natal MEC: Agriculture and Environmental Affairs as the management authority for all provincial protected areas in KwaZulu-Natal. The Board's implementing agency is Ezemvelo KZN Wildlife.

Management of Umhlanga Lagoon Nature Reserve must be undertaken in accordance with relevant legislation and the management policies of Ezemvelo KZN Wildlife. This includes a commitment to maintain the ecological integrity of the site.

The KwaZulu-Natal Nature Conservation Board will be responsible for reporting on the management of Umhlanga Lagoon Nature Reserve to the designated KwaZulu-Natal Provincial Member of the Executive Committee (MEC) and the Premier, thus ensuring coordination of those matters that may affect the nature reserve through the relevant provincial departments, district and local municipality.

### **2.2 *The legislative basis for management of Umhlanga Lagoon Nature Reserve***

There is a large body of legislation that is relevant to the management of Umhlanga Lagoon Nature Reserve, but the primary legislation guiding the management of protected areas is the National Environmental Management: Protected Areas Act, 2003 (No. 57 of 2003).

The Protected Areas Act establishes the legal basis for the creation and administration of protected areas in South Africa, as its objectives include provisions "for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes". The Act sets out the mechanisms for the declaration of protected areas and the requirements for their management. A detailed list of relevant legislation is provided in Appendix B. Managers are required to familiarise themselves with the purpose and contents of the statutes and their subsequent amendments and regulations.

#### **2.2.1 *Proclamation status of Umhlanga Lagoon Nature Reserve***

Umhlanga Lagoon Nature Reserve was proclaimed in 1980 (Proclamation No.74 of 1980), as follows:

- (i) Sub 452 (of B) of Lot 31 No. 1560, in extent 1.9516 ha.
- (ii) Remainder of Sub 435 of Lot 31 No. 1560, in extent 23.7312 ha.

Total extent: 25.6828 ha.

A second proclamation, in 1986 (Proclamation No.58 of 1986), included a portion of the Ohlanga River in Umlanga Lagoon Nature Reserve.

Copies of the proclamations and S.G. diagrams can be found in Appendix C2.

In terms of Section 12 of the Protected Areas Act, protected areas that were protected in terms of provincial legislation, prior to the commencement of the Protected Areas Act, and which would be eligible to be declared as nature reserves in terms of the Act, must be regarded to be a nature reserve for the purposes of the Protected Areas Act. The implication of this is that Umhlanga Lagoon Nature Reserve is legally considered to be a proclaimed nature reserve in terms of the Protected Areas Act.

### *2.2.2 Invasive species control in terms of the Biodiversity Act*

In terms of Section 76 of the National Environmental Management: Biodiversity Act (No. 10 of 2004), the management authority of a protected area must incorporate an invasive species control plan in the management plan. This is addressed in Section 5.6.2.

## **2.3 The policy framework guiding the management of Umhlanga Lagoon Nature Reserve**

In conserving and managing the biodiversity of KwaZulu-Natal, Ezemvelo KZN Wildlife operations are undertaken within a broad framework of policies. At a national level, overarching policy is set out in:

- i) The White Paper on the Conservation and Sustainable Use of South Africa's Biological Diversity of 1997.
- ii) The Bioregional Approach to South Africa's Protected Areas, 2001/2002.
- iii) Community Based Natural Resource Management Guidelines, 2003.
- iv) National environmental management principles set out in section 2 of the National Environmental Management Act.
- v) Relevant norms and standards set by the Minister and MEC in terms of the Protected Areas and Biodiversity Acts.

Within the province, Ezemvelo KZN Wildlife has adopted a Five Year Strategic Plan and Performance Plan for 2009-2014, which has developed the following corporate strategic profile.

## VISION

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

## MISSION STATEMENT

“To ensure effective conservation and sustainable use of KwaZulu-Natal’s biodiversity, in collaboration with stakeholders, for the benefit of present and future generations.”

## STRATEGIC GOALS

- i) To conserve indigenous biodiversity in KwaZulu-Natal, both within and outside of protected areas.
- ii) To be a sustainable, well resourced and capacitated biodiversity conservation and ecotourism organisation.
- iii) To foster the value of biodiversity conservation with stakeholders.
- iv) To be an efficient, effective and compliant organisation, with good governance.
- v) To effectively promote the mandate of the organisation to stakeholders.

## CORE VALUES

Integrity	At all times we act morally, ethically and with honesty.
Respect	We treat stakeholders with patience, politeness and acknowledge and value their right and those of the environment.
Accountability	We involve stakeholders in the organisation’s activities, with a culture of openness, and are answerable for the outcome of our actions and activities.
Team work	Working together to achieve our vision through goals.
Innovation	An adaptable organisation that embraces the culture of creativity and learning.
Excellence	We are a progressive organisation, applying best practices to achieve the highest quality and standards.
Commitment	At all times, we undertake our activities with passion, loyalty and dedication.
Productivity	We undertake to produce results timeously, efficiently and effectively.

A number of policies, specific to particular areas of operation, have also been developed by Ezemvelo KZN Wildlife (Appendix C1). These policies have been considered and applied within the management plan, where relevant. The nature reserve’s manager is required to be familiar with them and to apply them in managing Umhlanga Lagoon Nature Reserve.

The management plan has utilised this body of policies to develop a strategic and operational management framework for Umhlanga Lagoon Nature Reserve that is consistent with the broad goals and specific policy requirements of Ezemvelo KZN Wildlife.

## **2.4 The regional and local planning context of Umhlanga Lagoon Nature Reserve**

The following text was derived from the eThekweni Municipality Integrated Development Plan 2012/2013.

In terms of the natural environment, eThekweni is situated at the centre of the Maputaland-Pondoland-Albany Region, which is described by Conservation International as a “Biodiversity Hotspot”. The eThekweni Municipal area is characterised by diverse topography, from steep escarpments in the west, to a relatively flat coastal plain in the east. It incorporates 98 km of coastline, 18 major catchments and 16 estuaries, 4,000 km of river, and nearly 75,000 hectares of land identified as part of the Durban Metropolitan Open Space System (D’MOSS) (adopted December 2010). D’MOSS supports a wide variety of terrestrial and aquatic ecosystems, thereby attempting to meet biodiversity conservation objectives, while aiming to secure the supply of the ecosystem services that are provided freely by these ecosystems to the people of Durban. Ecosystem services, and their associated biodiversity, provide probably the most significant buffering effect against the negative impacts of climate change for local communities and infrastructure.

Notwithstanding their value, natural environments in eThekweni have been severely impacted by landscape change, invasive alien species, over exploitation and pollution. Climate change is a significant and increasing threat. Many people have benefited over the last century from the conversion of natural ecosystems to human-dominated ecosystems and from the exploitation of biodiversity. However, these gains have been achieved at growing cost in the form of losses in biodiversity, degradation of many ecosystem services, and the exacerbation of poverty for other groups of people (Millennium Ecosystem Assessment, 2005). The situation in Durban is no different to the global assessment and suggests that current policy, law, governance and environmental management efforts have been inadequate to prevent this degradation.

Virtually every terrestrial habitat in eThekweni has undergone significant levels of transformation and, as a result, every vegetation type requires some level of protection. KZN Sandstone Sourveld, North and South Coast Bushveld, and North and South Coast Grassland in particular, are vegetation types that are significantly transformed and classified as endangered and require particular attention.

Habitat destruction (land transformation), invasive alien species and pollution are regarded as the greatest threats to biodiversity and associated delivery of ecosystem services. At present, a mere 14 % of the D’MOSS area is protected through appropriate conservation zoning, conservation services and land acquisition, whilst only 9.3 % is managed for conservation. Therefore, increasing the total area of D’MOSS that is protected and managed for conservation is critical if the biodiversity of eThekweni and its associated ecosystem goods and services is to be protected. This is an enormous challenge, considering the rapid urbanisation and transformation that is taking place, as well as growing threats, such as alien species invasion and climate change, but some gains have been made.

The river and estuary ecosystems of Durban are in a particularly poor state. The municipality found in 2010 that 71 of 175 (40 %) of its monitoring sites on rivers were in poor condition and only six (just over 3 %) were classified as near natural. Rivers were found to be experiencing multiple impacts, including spills and illegal discharges, solid waste

dumping, wastewater treatment works not operating to specification or license conditions, sand mining, realignment of watercourses, flow reduction through dams, removal of riparian flora, and infestation by alien flora and fauna. In a survey of the 16 estuaries in eThekweni published in 2010, only three, together making up 10 % of the total municipal estuarine area, were classified as in good condition (none were classified as excellent). Because of the condition of the larger systems, such as the uMgeni and Durban Bay, a total of 50 % of the municipal estuarine area must be considered highly degraded. Expert opinion would suggest that, based on the current ecological condition of Durban's aquatic ecosystems, they are amongst the lowest ranked systems in the country.

Sand mining, both legal and illegal is having a major impact on aquatic ecosystems and, in particular, on the ability for rivers to replenish sand lost from beaches and coastal dunes through erosion process. This sand is important for both the buffering of high seas and for making beaches attractive to tourists. Sediment yields have increased through poor land practices, but overall supply to the coastline has decreased by two-thirds of "natural" yields due to sand mining and 12 large dams constructed on Durban's rivers, which act as sediment traps. This means that the reduction in sand supply could result in a mean erosion of greater than 1 m per year. The combined impacts of sea level rise and increased storms at sea are therefore likely to have severe consequences in terms of coastal erosion.

The areas particularly vulnerable to sea-level rise are coastal wetlands and dune ecosystems and therefore the Umhlanga Lagoon is likely to be under severe stress in the future.

#### *2.4.1 The National Protected Area Expansion Strategy*

In an effort to address a lack of effective protection and representation of all vegetation types within the protected areas system, a National Protected Area Expansion Strategy (NPAES, DEAT, 2008) has been developed and approved at a national ministerial level. The purpose of the NPAES is to provide a national framework for the expansion and consolidation of the protected area system, focussing on priority areas for representation and persistence of biodiversity.

The closest priority area in terms of the NPAES is well outside of Durban, towards the Tugela area.

#### *2.4.2 The Provincial Protected Area Expansion Plan*

The KwaZulu-Natal Protected Area Expansion Strategy identifies the Indian Ocean Coastal Belt as a high priority biodiversity area. Possible expansion of the Umhlanga Lagoon Nature Reserve could be into the Meadowbank/Peace Cottage dune forest area, the Hawaan Coastal Forest and the floodplain and upper reaches of the Mhlanga Lagoon.

#### *2.4.3 EIA Regulations in terms of NEMA*

In terms of the National Environmental Management Act (No. 107 of 1998) Environmental Impact Assessment (EIA) Regulations, various activities require environmental authorisation before they may commence. In addition, in terms of Regulation RN.546, Listing Notice No.3, there are a number of activities that require environmental approval *specifically* as a result of their proximity to a protected area. The implication of this is that if any of the activities listed in Appendix D are proposed in the nature reserve, or within five kilometres of it, they



will be subject to either a basic assessment or a full scoping and EIA process. A number of general activities, and those proposed for either tourism development or operational management within the nature reserve or the buffer areas, will thus require environmental authorisation.

#### *2.4.4 Local government planning mechanisms*

In terms of the principles of cooperative governance set out in the Constitution of South Africa, the different spheres of government are required to coordinate their actions with one another. In terms of the conservation objectives of a protected area, this is an important aspect in ensuring that appropriate land uses are applied in the areas around a protected area, as they may influence the operation of the protected area and the ecological functioning within it. On this basis, it is important to ensure that local government planning mechanisms, such as Integrated development plans (IDP's), Spatial development frameworks (SDF's) and municipal schemes are aligned with the conservation objectives and principles of protected areas within their jurisdiction.

It is important that Ezemvelo KZN Wildlife, in particular the managers of Umhlanga Lagoon Nature Reserve, work closely with the eThekweni Municipality in further developing these spatial plans. The focus of these efforts should be to ensure that inappropriate land uses, which may lead to impacts in the nature reserve, are discouraged in the buffer areas and in areas identified as national or provincial priorities for protected area expansion near the nature reserve.

The eThekweni Municipality developed an Integrated Development Plan that was drafted in 2012 and will be reviewed on an annual basis. This is discussed in Section 2.7.

### **2.5 The history of the Umhlanga Lagoon Nature Reserve**

#### *2.5.1 Origins of the name of the nature reserve*

The name of the lagoon is derived from the name of the Ohlanga River, as is the town of Umhlanga Rocks. Umhlanga is the Zulu word for reeds, so it can be translated as “the river of reeds”.

#### *2.5.2 History of conservation in Umhlanga Lagoon Nature Reserve*

On 10 July 1980, the lower reaches of the Umhlanga Lagoon (i.e. the area seaward of the N2 National Road bridge) were proclaimed a nature reserve, to be administered by the Natal Parks Board (Proclamation No.74 of 1980). A section of the Ohlanga River was added to that in 1986.

To facilitate management of the nature reserve, a management committee was constituted. This committee consisted of representatives from:

1. Umhlanga Town Board.
2. Natal Estates Ltd.
3. The Wildlife Society of South Africa.
4. University of Natal.
5. University of Durban-Westville.

## 6. City Engineers Department.

A ranger and three game guards were stationed permanently in the area. Close liaison was maintained between the Natal Parks Board, eight honorary officers within the Borough of Umhlanga, and the Borough's Protection Services.

At various times there have been negotiations underway for incorporation of the Meadowbank/Peace Cottage dune forest area, the Hawaan Coastal Forest and the floodplain and upper reaches of the Mhlanga Lagoon into the nature reserve.

In April 1991, the Umhlanga Town Clerk wrote to the Natal Parks Board suggesting that the Umhlanga Lagoon Nature Reserve be taken over by the Umhlanga Town Council. The land had originally been donated for conservation and had been under the control of the Natal Parks Board since about 1981. The proposal was supported by various Natal Parks Board staff members and a letter from the Regional Scientist South, dated 15 May 1991, supported the proposal on the following grounds:

1. The reserve is small, as well as fragmented, and the main portion of forest that is worth conserving (Hawaan) is privately owned.
2. The security of the reserve is threatened by servitudes, uncontrollable access (via the beach and river mouth) and human pressure.
3. The staff could be gainfully employed in other areas on the coast.

The proposed transfer from the Natal Parks Board to the Umhlanga Town Council never took place and the reason for that is not clear.

### 2.5.3 History of eco-cultural tourism in nature reserve

To encourage visitor utilisation of Umhlanga Lagoon Nature Reserve, a car park, for approximately 20 vehicles, a boardwalk, two picnic sites, ablution block, pedestrian bridge (constructed by Lions Club in 1987), viewsite/ lookout point and system of trails/bridle paths have been developed in the nature reserve. There has been talk about the possibility of establishing an interpretive centre and there have been suggestions of an additional boardwalk, but nothing has yet been developed.

The O'Connor Promenade, which hugs the shoreline, ends where the Umhlanga Lagoon Nature Trail begins. This is an hour-and-a-half trail, on a well marked path, with benches and picnic spots discreetly provided. It wanders through coastal forest on boardwalks that cross the Ohlanga River on its way to the lagoon, buttressed by dunes. The trail leads to both the beach and the lagoon, which is popular as a naturist "hideaway", as well as among parasailing enthusiasts and boardsailors. The remains of a Stone Age seashell midden can also be found near the lagoon and the area is home to vervet monkeys, small antelope and a profusion of butterflies and birds.

There are no records of the number of people visiting the nature reserve, nor the purpose for which they visit. Although Mann, *et al.* (1995) mentioned that, in 1994-95, approximately 7,212 visitors were recorded entering the nature reserve. A number of schools are known to utilise the nature reserve for educational purposes.

## 2.6 Ecological context of the nature reserve

### 2.6.1 Climate and weather

The bulk of the following information was obtained from the following website: <http://www.ceroi.net/reports/durban/index.htm>.

Durban has a humid subtropical climate, with relatively high rainfall, primarily falling in the summer months. The prevailing winds are north-east and south-west.

Daytime temperatures are typically between 18 and 26°C, with summer maximum temperatures reaching the lower thirties. Night-time temperatures seldom fall below 10°C, even in winter. Relative humidity levels are typically between 50 % and 70 %.

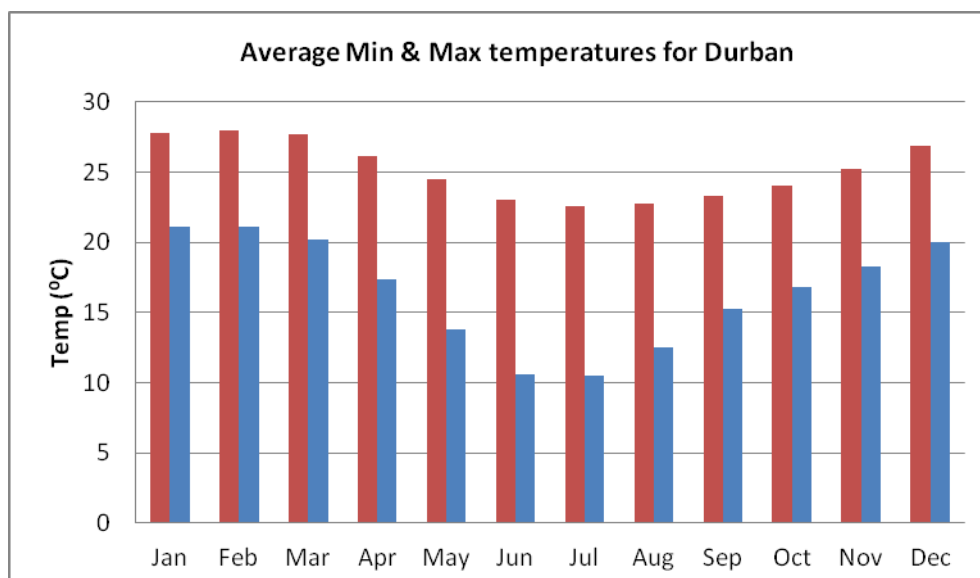
Durban lies within the southern subtropical high pressure belt, coming strongly under the influence of eastward migrating high pressure systems. Parallel winds dominate the coastline, with south-westerly and north-easterly winds roughly balanced in frequency. There is generally high wind variability.

#### 2.6.1.1 Temperature

Temperatures in Durban are mild in winter and warm-to-hot in summer. The mean annual temperature is 20.4°C and the annual range is 8.0°C. Highest mean temperatures are experienced in February and lowest mean temperatures in July. The highest maximum temperatures occur in October, in association with Berg wind conditions. Temperature is however highly variable in any particular area of Durban as a result of topography, type of surface cover, and artificial heat production due to combustion activities in industries and motor vehicles. The presence of green areas, such as Umhlanga Lagoon, assists in mitigating the extremes.

**Table 2.1: Monthly mean temperatures and temperature ranges at Durban International Airport**

Month	Mean (°C)	Average of daily max (°C)	Average of daily min (°C)	Highest Max (°C)
January	24.4	27.8	21.1	36.2
February	24.6	28.0	21.1	33.9
March	23.9	27.7	20.2	34.8
April	21.7	26.1	17.4	36.0
May	19.1	24.5	13.8	33.8
June	16.8	23.0	10.6	35.7
July	16.6	22.6	10.5	33.8
August	19.9	22.8	12.5	35.9
September	19.3	23.3	15.3	36.9
October	20.4	24.0	16.8	40.0
November	21.8	25.2	18.3	33.5
December	23.4	26.9	20.0	35.9
MEAN	20.8	25.2	16.5	40.0



**Figure 3: Average min. and max. temperatures (°C) for Durban from 1961-1990**

#### **2.6.1.2 Humidity**

The relative humidity in Durban is usually fairly high, owing to the supply of moisture from the adjacent ocean. This is higher during summer months as warmer air can hold more moisture.

**Table 2.2: Monthly mean relative humidity (%) at 14:00 at Durban International Airport (1986)**

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
RH (%)	70	70	68	65	61	54	56	60	66	69	71	69

#### **2.6.1.3 Rainfall**

The total annual rainfall in Durban is usually greater than 1,000 mm, of which the majority is received in summer. Approximately 60 % of the annual precipitation occurs between November and March and the driest month is July. The heavy summer rains can often result in flooding and landslides, causing damage to property and sometimes life. Fogs are absent and hail is rare.

**Table 2.3: Monthly mean rainfall (mm) for Durban and the maximum experienced in 24 hours (1986)**

Month	Mean	No. of rain days	Max. in 24 hrs
January	134	15	110
February	113	13	197
March	120	13	160
April	73	9	106
May	59	7	111
June	28	5	109
July	39	5	69
August	62	7	91
September	73	11	132
October	98	15	105
November	108	16	94
December	102	15	163
<b>TOTAL</b>	<b>1,009</b>	<b>130</b>	<b>197</b>

#### **2.6.1.4 Sunshine**

The amount of sunshine Umhlanga Lagoon Nature Reserve (Durban) receives is related to the amount of cloud cover. In winter, with the persistence of high pressure systems and cloud-free skies, Durban receives 60-70 % of possible sunshine. In spring and summer, this figure drops to 50 % of possible sunshine as cloud cover builds up.

#### **2.6.1.5 Radiation**

The receipt of solar radiation by Durban varies between seasons, ranging from  $1.13 \times 10^7 \text{ Jm}^{-2} \text{ day}^{-1}$  in June to  $2.14 \times 10^7 \text{ Jm}^{-2} \text{ day}^{-1}$  in January. Many people in Durban are involved in outdoor recreational activities, which increases their exposure to harmful UV-A and UV-B radiation, potentially causing cancer and eye cataracts.

#### **2.6.1.6 Wind**

The prevailing wind directions of the KwaZulu-Natal coastal belt are predominately from the north-east and south-west. Winds from these broad sectors occur with frequencies in excess of 255 days a year. South-westerly winds are generally stronger and may be accompanied by rain. Mean monthly wind speeds are lowest in May and June. Highest mean wind speeds occur in September and October, a transitional period at the end of winter. Maximum wind speeds occur in the early afternoon (14:00) and minimum wind speeds between 06:00 and 08:00.

The so called 'coastal low' is probably the best studied weather system affecting the coastline. Its formation is due to the interaction between large-scale atmospheric flow and the marked South African escarpment. These systems propagate around South Africa, moving northwards in an anticlockwise direction and are often associated with strong south-westerly gusts, termed 'busters'. Rare north-westerners in spring bring short periods of hot, dry conditions.

Due to the latitudinal position of the region, it is influenced by both tropical and temperate weather systems. Intense frontal systems, combined with the poleward flowing Agulhas Current, can cause high energy swells along the coastline. Tropical cyclones are relatively rare, but events such as Demoina and Imboa, with the accompanying floods and gale force winds, have caused severe catchment and coastal damage.

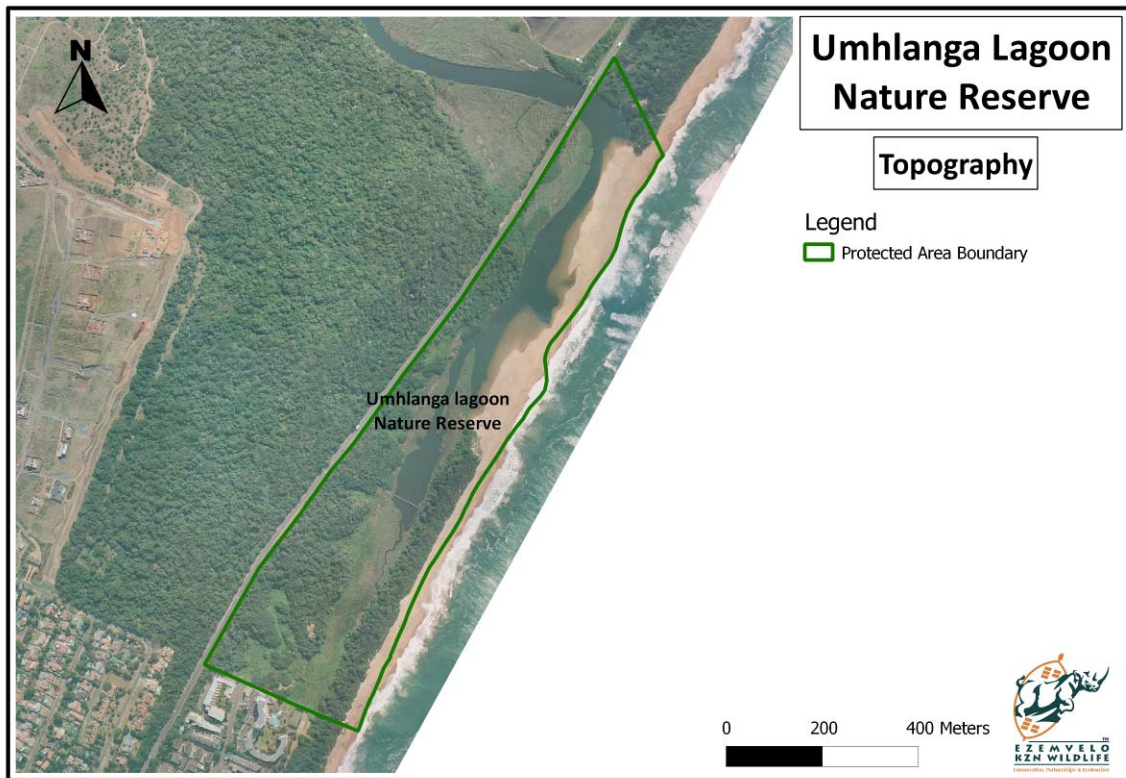
Local land/sea breezes and topographically-induced circulations are also significant wind systems, in view of their effect on human climatic comfort and the dispersion or accumulation of air pollutants. Sea breezes, which are onshore north-easterly winds, blow for most of the day along the KwaZulu-Natal coast, particularly during the summer months. They strengthen the prevailing north-easterly gradient winds, which are associated with typical anticyclonic circulation. They ventilate the coastal belt, and because they are associated with unstable atmospheric conditions, they favour the dispersion of pollutants. Sea breezes are known to extend inland as far as Cato Ridge and could thus move pollutants, generated at the coast, inland.

Land breezes develop at night and blow offshore as a north-westerly wind. They are light winds ( $1-2 \text{ ms}^{-1}$ ) and develop in a stable atmosphere. They combine with topographically induced winds to produce mountain-plain winds. At night, cooling leads to the development of mountain winds, which blow down the longitudinal axes of the valleys. Under suitable conditions, these winds deepen during the night and overflow their interfluves, so that a sheet of cold, stable air now moves across KwaZulu-Natal towards the coast. This regional wind is known as the mountain-plain wind. It combines with the land breeze near the coast and so the offshore nocturnal wind at Durban may be a very deep stable layer.

The implications for air pollution dispersion are very important. Pollutants released in the interior of KwaZulu-Natal may travel vast distances towards the coast and, because the air is stable, they are transported as thin fanning plumes, for considerable distances, without dispersion. By day, the circulation reverses and plain-mountain winds develop, which blow from the coast to the interior. They are frequently not as well developed as their nocturnal counterparts.

### *2.6.2 Topography*

Umhlanga Lagoon Nature Reserve consists of the Umhlanga Lagoon, linked to a fresh water vegetated wetland, which is both spring and storm water fed, and bordered on the southern side by a 20 to 30 m high vegetated dune cordon. Inland of the wetland to the M4 road is a piece of sloping land, vegetated by coastal forest.



**Map 2: Topographic map of Umhlanga Lagoon Nature Reserve**

### 2.6.3 *Geology and soils*

The catchment geology comprises Natal Group Sandstone, Ecca Group Sedimentary rocks, Karroo Dolerite and the Berea Red sand formation. Vryheid formation sandstone outcrops in the lagoon, while Pleistocene beach rock is periodically exposed on the beach.

### 2.6.4 *Hydrology*

The sandbar is partially vegetated and during large floods is totally removed. The Ohlangua River has a catchment of about 118 km<sup>2</sup> and is thus one of the smaller rivers on the KwaZulu-Natal coast.

A storm water drain, which drains the suburb of Umhlanga Rocks, also enters the nature reserve's wetland.

### 2.6.5 *Vegetation*

The Umhlanga Lagoon Nature Reserve is located within the Indian Ocean Coastal Belt, as defined by Mucina and Rutherford (2006). This is an almost 800 km long coastal strip, between the South African border with Mozambique, extending as far south as the mouth of the Great Kei River, near East London. It is a climatically, ecologically and biogeographically peculiar region that, they have argued, deserves to stand on its own, at the level of a Biome, within the scope of the South African vegetation. It is characterised by a regional concentration of endemic species. Whilst the northern landscapes are flat, the



southernmost landscapes are characterised by elevated plateaus, separated by deep gorges associated with major river valleys.

The landscape dominating feature for this nature reserve is the lagoon found at the mouth of the Ohlanga River, and associated brackish water wetland found behind the vegetated dune cordon. The following ecosystems are found within the Umhlanga Lagoon Nature Reserve (Mucina and Rutherford, 2006):

- 1) Lagoon/estuary/partially vegetated sandbar –
  - a. Subtropical Coastal Lagoon (W2) – KZN Vegetation Type Code 55: Conservation status is Least Threatened (Scott-Shaw & Escott, 2011);
  - b. Subtropical Seashore Vegetation (AZd4) – KZN Vegetation Type Code 68: Conservation status is Least Threatened (Scott-Shaw & Escott, 2011); and
  - c. KwaZulu-Natal Coastal Belt Grassland (CB3) – KZN Vegetation Type Code 29: Conservation status is Critically Endangered (Scott-Shaw & Escott, 2011).
- 2) Reed-dominated brackish wetland.
- 3) Forested dune cordon on the northern boundary and between the lagoon and the sea and inland of the wetland - East Coast Dune Forest (FOz7) – KZN Vegetation Type Code 63.1: Conservation status is Critically Endangered (Scott-Shaw & Escott, 2011).

The partially vegetated sandbar consists of pioneer dune species, such as *Scaevola plumieri*, an evergreen, succulent shrublet, which is one of the most important pioneers of a dune plant community. Wind-blown sand builds up against young *Scaevola* plants and a line of baby dunes is started just above the high spring tide mark. The plants continue to grow, branching and sending out roots in all directions and more and more wind-blown sand piles up around them, sometimes burying them temporarily – temporarily because burial stimulates *Scaevola* to grow more vigorously and its shoots soon emerge above the sand again, while its roots and buried stems help to stabilise the dunes, which therefore steadily increase in height (Hennessey, 1974).

In addition to mechanical building of the dunes, these plants contribute to the process of soil formation by adding organic matter (leaves, etc.) to the sand. The physical presence of the dunes creates shelter from salt-spray laden winds in their lee and the combination of more shelter and more stable and better soil allows other plant species to become established. The first line of dunes near the coast is populated by the pioneer species and successive rows of dunes carry more and different species. Initially, the first row of trees are dwarfed and have a shrubby growth form, usually not exceeding 2 m in height, and are referred to as dune scrub. The scrub zone is succeeded by forest. The forest usually contains the same tree species that are present in the scrub, but they are accompanied by many other tree species, as well as climbers or lianas (Hennessey, 1974).

The dune community, all the way from the pioneers to the climax forest species, play an enormously important role in creating and maintaining a stable environment along the shoreline. Without this community, there would be no protection from damaging on-shore, salt-laden winds, which only dune plants can tolerate, and nothing to prevent wind-blown sea sand from being blown inland and from blocking the mouths of rivers.



Coastal Dune Forest is typically species rich, with dominant species being *Mimusops caffra* (Coastal Red Milkwood) and *Sideroxylon inerme* (White Milkwood). Other characteristic species are *Acokanthera oppositifolia* (Dune Poison Bush), *Allophylus natalensis* (Dune False Current), *Aloe thraskii* (Dune Aloe), *Brachylaena discolor* (Coast Silver Oak), *Chaetachme aristata* (Thorny Elm), *Chrysanthemoides monilifera* (Tick Berry), *Cola natalensis* (Coshwood), *Cordia caffra* (Septe), *Deinbollia oblongifolia* (Dune Soap Berry), *Dracaena aleytriformis* (Large-leaved Dragon Tree), *Euclea natalensis* (Natal Guarri), *Eugenia capensis* (Dune Myrtle), *Ficus burtt-davyi* (Veld Fig), *Pavetta revoluta* (Dune Bride's Bush), *Strelitzia nicolai* (Natal Wild Banana) and *Strychnos decussata* (Cape Teak). *Cavacoa aurea* is one species that is characteristic of the Hawaan Forest on the western boundary of the nature reserve.

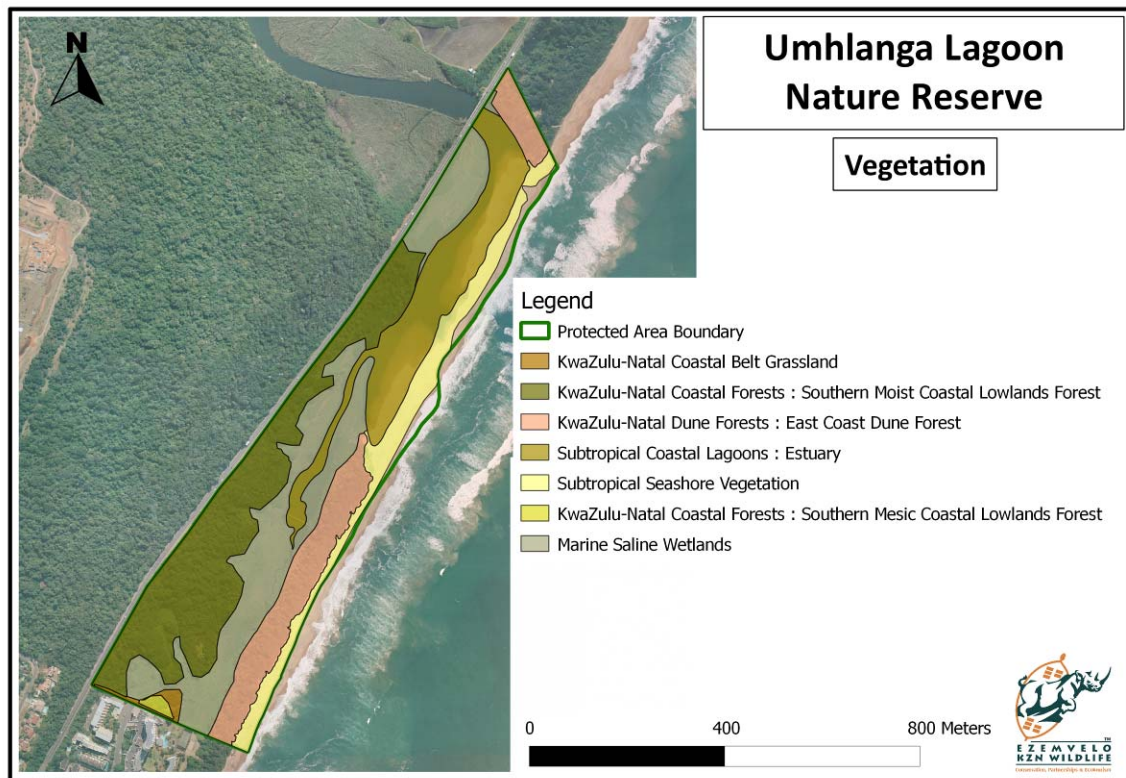
The importance of the vegetated sand dunes on the coast cannot be over-emphasised as they perform the following functions (Branch & Branch, 1981; Garland, 2003).

- Prevent excessive erosion of dune sands by wind and water. They also act as reservoirs of sand, which replenish beaches when they are eroded by high seas.
- Act as a biodiversity reservoir, having plant and animals species often no longer found beyond the protected area.
- Provide a screen against the potential impact of corrosive onshore winds on landward vegetation and property owners.
- Are an aesthetically pleasing backdrop to the beach. The presence of an intact dune plant community gives one the feeling of entering a “wild” environment, which is severely contrasted with that created by the presence of coastal dwellings and other developments right on the beach.

Stormier periods can result in beach erosion, or even total removal of the beach, in which case the base of the mobile dune system may also be attacked and eroded by waves. There is a constant cycle of destruction and accretion, which can be influenced by sea level drops or rises, storm events, rip currents and sand deposits from rivers and estuaries (Branch & Branch, 1981; Garland, 2003).

The frontal dune, or foredune, acts as a barrier protecting inland areas and retaining sand on the beach by both trapping sand blown up from the beach, and returning sand to the beach in times of erosion (Branch & Branch, 1981; Garland, 2003).

KwaZulu-Natal Coastal Belt Grassland (CB3) consists of a long and, in places, broad coastal strip along the KwaZulu-Natal Coast. This vegetation type is highly transformed (about 50 %) and is affected by a mosaic of very extensive sugar cane fields, timber plantations, urban sprawls, roads and coastal holiday resorts, with interspersed secondary *Aristida* grasslands, thickets and patches of coastal thornveld. Its conservation status is Endangered and, apart from the tiny area in the Umhlanga Lagoon Nature Reserve, only a very small part is statutorily conserved in Beachwood Mangroves, Mbumbazi and Vernon Crookes Nature Reserves and Ngoye Forest Reserve.



**Map 3: Vegetation map of Umhlanga Lagoon Nature Reserve**

### 2.6.6 Fire regime

No burning takes place at Umhlanga Lagoon Nature Reserve.

### 2.6.7 Invasive vegetation

In June 2012, an extensive Working for Water alien plant contract was undertaken at Umhlanga Lagoon, over an area of 28.3 ha. These treatments involved cut-stump treatments for Paraffin/Triffid Weed (*Chromolaena odorata*), Mauritius Thorn (*Caesalpinia decapetala*), Morning Glory (*Ipomoea purpurea*), Castor Oil (*Ricinus communis*), Syringa (*Melia azedarach*), Lantana (*Lantana camara*), Bugweed (*Solanum mauritianum*) and cutting/slashing of Giant Spanish Reed (*Arundo donax*). Details of plant age, density of infestation, chemical used for control and rate were recorded.

A more recent and serious threat is *Sagittaria latifolia* (Broad-leaf Arrowhead). This plant is found naturally across North America, and in Hawaii, the Caribbean and the northern part of South America. It has been introduced to Europe, Australia and South Africa. In Australia and South Africa, it is a serious weed and forms dense colonies on very wet soils that become more open as the species mixes with other species of deeper water levels. These colonies form long bands, following the curves of rivers, ponds and lakes, well marked by the dark green colour of the leaves. The plant has strong roots and can survive through wide variations of the water level, slow currents and waves. It displays an affinity for high levels of phosphates and hard waters. The nature reserve should be carefully monitored to ensure that this species does not establish there.

### 2.6.8 Alien Animals

Alien birds, such as Indian Mynahs (Common Mynah), are now so much part of Durban/Umhlanga that they are impossible to eradicate.

Stray domestic animals, such as cats and dogs, occasionally enter the nature reserve and present a threat to indigenous habitats and species.

### 2.6.9 Mammalian fauna

The majority of the Umhlanga Lagoon Nature Reserve is well forested, with both dune and coastal forest. These forests provide suitable habitat for blue and red duiker, bushbuck, bushpigs and vervet monkeys. The Ezemvelo database has no specific records of any mammals in the nature reserve and obviously this needs to be rectified.

There are no doubt a number of rodent and bat species, but only two have been recorded by Leigh Richards (Pers. Comm., 2013), the Curator of Mammals at the Durban Museum; namely, Greater Red Musk Shrew (*Crocidura flavescens*) and Multimammate Mouse (*Mastomys natalensis*).

### 2.6.10 Avifauna

The Umhlanga Lagoon Nature Reserve and surrounds is a popular birding spot as it provides habitat for many wetland and coastal forest birds, animals and plants. Birding websites mention that the bird list comprises some 208 species, with 60 species possible on a single visit in summer, while a winter visit should produce 40 species. The Ezemvelo KZN Wildlife database list 176 species, while a list obtained from Geoff Nichols, that he compiled with Bill Duthie a few years ago, includes 313 species.

Close to the nature reserve is another popular birding spot, the Umhlanga Rocks Wastewater Treatment Works (the “Ponds”). These “Ponds” lie next to the Ohlanga River, over the hill behind Umhlanga Rocks. There are four maturation ponds; two are extensively overgrown and the other two are mostly clear water. The maturation ponds are open to *bona fide* birders at all times and no prior permission is required for entry.

Avifauna species of conservation importance in Umhlanga Lagoon Nature Reserve: (For complete lists see Appendix E)

Scientific Name	Common Name	RDB Status
<i>Sterna caspia</i>	Caspian Tern	Near Threatened
<i>Gorsachius leuconotus</i>	White-backed Night-Heron	Vulnerable
<i>Pelecanus onocrotalus</i>	Great White Pelican	Near Threatened
<i>Phalacrocorax capensis</i>	Cape Cormorant	Near Threatened
<i>Halcyon senegaloides</i>	Mangrove Kingfisher	Vulnerable
<i>Accipiter melanoleucus</i>	Black sparrowhawk	
<i>Accipiter minullus</i>	Little Sparrowhawk	
<i>Accipiter tachiro</i>	African Goshawk	
<i>Circus ranivorus</i>	African Marsh-Harrier	Vulnerable
<i>Haliaeetus vocifer</i>	African Fish-Eagle	
<i>Milvus parasitus</i>	Yellow-billed Kite	
<i>Pandion haliaetus</i>	Osprey	
<i>Stephanoaetus coronatus</i>	African Crowned Eagle	Near Threatened
<i>Falco biarmicus</i>	Lanner Falcon	Near Threatened

Scientific Name	Common Name	RDB Status
<i>Podica senegalensis</i>	African Finfoot	Vulnerable
<i>Platysteira peltata</i>	Black-throated Wattle-eye, Wattle-eyed Flycatcher	Near Threatened
<i>Tchagra tchagra</i>	Southern Tchagra	
<i>Zoothera guttata</i>	Spotted Ground-Thrush, Spotted Thrush	Endangered
<i>Passer domesticus</i>	House Sparrow	
<i>Acridotheres tristis</i>	Common Myna, Indian Myna	
<i>Bubo africanus</i>	Spotted Eagle-Owl	
<i>Strix woodfordii</i>	African Wood-Owl, Wood Owl	
<i>Sterna caspia</i>	Caspian Tern	Near Threatened

#### 2.6.11 Herpetofauna (reptiles and amphibians)

Reptiles and amphibians form an important part of the ecosystem and certain species serve as bio-indicators due to their sensitivity to environmental factors. Much remains to be discovered about the reptile and amphibian species complement of Umhlanga Lagoon Nature Reserve, their life histories, inter-relationships and contributions to the functioning of its ecosystems. The variety and importance of these fauna are poorly studied and little understood, although the nature reserve is considered important for the conservation of this group, as it is for other faunal groups.

The Ezemvelo KZN Wildlife database has very few records of animal species for Umhlanga Lagoon and this needs to be addressed. The only reptile that is recorded in the database is the Brown House Snake (*Lamprophis capensis*). In a previous management plan, there is a reference to the Southern African Python (*Python natalensis*), but this species is not recorded in the database.

Complete lists of Herpetofauna are found in Appendix E.

#### 2.6.12 Invertebrates

Invertebrate fauna constitutes the greatest component of species diversity in natural systems, but it is usually poorly understood and, in the case of Umhlanga Lagoon, no particular species have yet been singled out as important as the invertebrate fauna there is poorly known. In terms of biodiversity and the provision of ecosystem services, however, it is important to acknowledge that invertebrates are fundamentally important.

A rare fresh water crab, *Clarius theodora*, has been found in the stream which enters the brack water, reed-fringed wetland.

#### 2.6.13 Fish species

The closed condition of the mouth and the low salinity (approximately 2ppt) are natural features of the system, which suppresses species richness by reducing utilisation of the lagoon by marine associated fauna. Thirty-two species of fish occur (Whitfield, 1980). The greatest numbers of fish are mullet (Mugilidae) and Moçambique bream (*Oreochromis mossambicus*).

## **2.7 Socio-economic context**

The following description of the socio-economic situation in the region around Umhlanga Lagoon was drawn from the 2012/2013 eThekweni Municipality IDP.

The eThekweni Municipality spans an area of approximately 2,297 km<sup>2</sup> and is home to 3.5 million people. It consists of a diverse society, which faces many social, economic, environmental and governance challenges, which include high rates of unemployment and poverty and low economic growth, which are exacerbated by low levels of skills development and literacy. From these flow the additional issues, such as exceptionally high levels of HIV/AIDS, communicable disease, such as TB, high crime rates and risky behavior. Problems of infrastructure degradation and limited access to basic household and community services are compounded by local government ineffectiveness and inefficiency.

The majority of the population are Black African (predominantly Zulu) (71 %), followed by Indians (19 %), Whites (8 %) and Coloureds (2 %). Most of the population falls within the 15-34 year age group. The greatest population concentrations occur in the central and north regions (Durban and northwards). In 2010, it was estimated that 30.5 % of eThekweni's Black African population were battling the effects of poverty, as opposed to 0.3 % of the White population, 19.5 % of the Coloured population, and 9.2 % of the Asian population.

The eThekweni economy is less diversified in terms of its economic activity spread than KwaZulu-Natal and South Africa as a whole and this can be attributed to the Municipality being highly dependent on its tertiary sector, namely finance (23 %), community services (17 %) and construction (3 %). Other activities include manufacturing (22 %), transport (16 %) and trade (16 %). Nevertheless, on the whole, economic growth in eThekweni outperformed that of the province and country as a whole.

The vision for the city is to move towards a “sustainable city that is caring and liveable”. Therefore, to address the many challenges, the city has devised an eight-point plan, of which the first component is to develop and sustain the spatial, natural and built environment to ensure sustainable and integrated growth and development of the municipality.

Major development projects planned for the eThekweni Municipality are anticipated to have positive impacts on the local economy in the next 10-15 years, though some, like the Dig-out Port at the old airport site, could result in negative environmental impacts.

## **2.8 Operational management within Umhlanga Lagoon Nature Reserve**

Effective operational management within the nature reserve is dependent on its staff, the equipment and infrastructure.

### **2.8.1 Management infrastructure**

Management infrastructure in the Umhlanga Lagoon Nature Reserve consists of:

- Entrance gate.
- Pumphouse at the entrance, which houses an electricity meter.



### 2.8.2 Conservation infrastructure

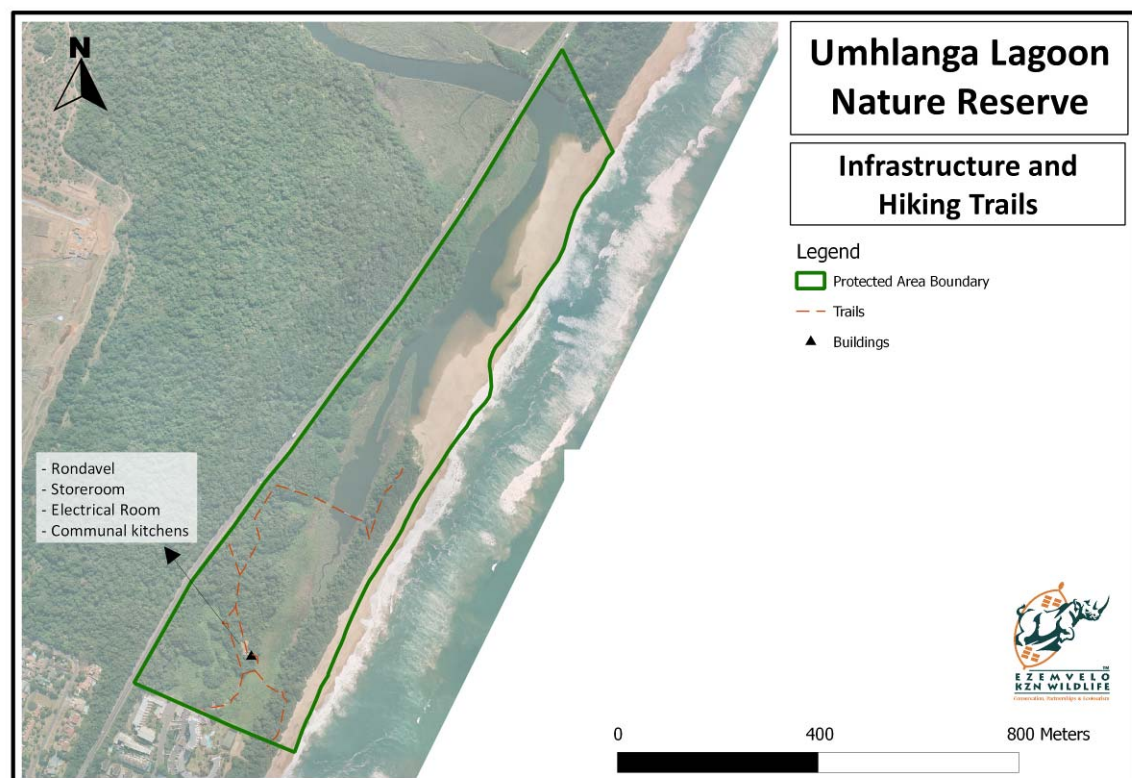
Conservation infrastructure in Umhlanga Lagoon Nature Reserve consists of:

- 3 rondavels, which serve as staff accommodation.
- 1 kitchen rondavel

### 2.8.3 Eco-tourism infrastructure

Umhlanga Lagoon Nature Reserve ecotourism infrastructure consists of:

- Car park, for approximately 20 vehicles.
- Boardwalk.
- Two picnic sites.
- Ablution block.
- Pedestrian bridge (constructed by Lions Club in 1987).
- Viewsite/ lookout point.
- System of trails/bridle paths.



**Map 4: Infrastructure and hiking trails within Umhlanga Lagoon Nature Reserve**

#### 2.8.4 *Staff establishment*

There are three permanent staff members at Umhlanga Lagoon Nature Reserve, in the following positions:

- 1 Conservation Manager (also manages Beachwood Mangroves).
- 2 Field Rangers.
- 1 General assistant

Half of the field rangers' time is involved with marine law enforcement.

Umhlanga Lagoon Nature Reserve, at 32 ha in size, has 0.0938 staff per hectare, should all vacant positions be filled (Carbutt and Goodman, 2010). Other protected areas on the coast of similar size include North Park (55 ha), Bluff (45 ha) and Skyline (15 ha) and they have similar staffing per hectare. The OIC reported that staff numbers are sufficient. However, the staff are shared between Beachwood Mangroves and Umhlanga Lagoon Nature Reserves and the same OIC manages both, so this can cause problems during crises.

#### 2.8.5 *Funding levels at Umhlanga Lagoon Nature Reserve*

According to the management effectiveness assessment, Umhlanga Lagoon Nature Reserve receives an annual operational budget of R551,622.00 (2010). This budget works out to R17,809.41 per hectare (Carbutt & Goodman, 2010), which is the highest funding level of all the coastal protected areas. Staff and funding for Umhlanga Lagoon Nature Reserve are used to look after the Umhlanga Lagoon Nature Reserve and do marine law enforcement in the area.

#### 2.8.6 *Management effectiveness in Umhlanga Lagoon Nature Reserve*

In 2010, Ezemvelo KZN Wildlife conducted management effectiveness assessments for all of its protected areas (Carbutt & Goodman, 2010). Management effectiveness assessments consider protected area design, the appropriateness of management systems and processes, and delivery of protected area objectives. Such assessments are intended to enable conservation organisations to refine their conservation strategies, re-allocate budget expenditures, and develop strategic, system-wide responses to the most pervasive threats and management weaknesses (Carbutt & Goodman, 2010). They are not performance assessments of individuals, but serve to reflect an organisation's proficiency for protected area management as a whole.

The Ezemvelo KZN Wildlife minimum standard for protected areas is 67 %, which is the national minimum standard set by National Department of Environmental Affairs. Umhlanga Lagoon Nature Reserve achieved a management effectiveness score of 50 % in the 2010 assessment and scored 75 % in the 2013 assessment.

The following issues were highlighted in the assessment:

- Management of estuary and pollution.
- Inventory review and monitoring of flora and fauna.
- Control of alien plant species.
- Security risk and visitor management.

### 2.8.7 Key operational issues at Umhlanga Lagoon Nature Reserve

The following specific issues have been identified associated with the facilities, infrastructure and operations within the nature reserve.

Pressures and threats identified through the management effectiveness assessments (Carbutt & Goodman, 2010). Note that these are time-bound.

Threats (Future):	Pressures (Current)
Alien animals Alien plants Climate change Dam building Erosion (man-induced) Land-use change within the protected area PA isolation Poaching Pollution  Siltation Solid waste – from management activities Unsustainable tourism Vandalism of cultural heritage assets	Alien animals Alien plants Climate change Dam building Erosion (man-induced) Land-use change within the protected area PA Isolation Poaching Pollution Purposeful species eradication Siltation Solid waste – from management activities Unsustainable tourism Vandalism of cultural heritage assets

Issues identified by the Nature Reserve Planning Committee and nature reserve stakeholders:

- Catchment degradation and resultant siltation of rivers and estuaries is an issue common to all estuaries and lagoons in South Africa, to a greater or lesser degree.
- Organic loading from treated sewage discharged up-river occurs on occasion, and plans for future housing development threaten to increase sewage discharge.
- Additional water discharge between catchments may pose a threat to the water balance of the estuary.
- Some erosion of the steeply inclined dune slopes adjacent to the lagoon has been occurring.
- Mouth breaching is necessary when the lagoon becomes polluted. In the past, artificial breaching was also undertaken to facilitate planting and harvesting of sugar cane.
- The road bridge approach restricts the floodplain to some extent.
- Housing development threatened the adjacent Hawaan Coastal Forest until it was stopped in 2003. Development pressures in the surrounding urban and sub-urban areas continue.



### 2.8.8 Summary of management issues and challenges

The following section summarises the key management issues and challenges outlined in the descriptive sections above, which must be addressed through the management plan. The issues and challenges have been grouped under key performance areas, which flow through the strategic and operational management frameworks that follow.

**Table 2.9.1 Management challenges and issues**

Key performance area	Issue that must be addressed
Legal compliance and law enforcement	▪ General public safety. Crime rate down due to Breakers Hotel sponsored security staff.
	▪ Illegal resource utilisation (netting and fishing).
	▪ Vandalism – damaging infrastructure and theft. Damage to cultural heritage resources.
	▪ Illegal entry.
Stakeholder engagement	▪ Good support from Rotary, WESSA, Honorary Officers, Umhlanga UIP and Breakers Resort.
	▪ Capacity issues with Municipality.
Buffer zone protection and regional management	▪ Protected Area isolation.
	▪ The nature reserve is not buffered. Trying to declare Hawaan Forest a Biodiversity Stewardship Reserve.
Eco-tourism development	▪ The nature reserve is developed to capacity and there are no opportunities for developments.
	▪ Amafa important stakeholder (shell middens).
Conservation management	▪ Alien plants – terrestrial and aquatic.
	▪ Heavy urban runoff and deposition of litter and sediment from Ohlanga River.
Operational management	▪ Staffing establishment: shared between Umhlanga and Beachwood. Also do marine law enforcement. There are sufficient staff, but sharing staff between reserves can be challenging.
	▪ Lack of training and capacity building in staff in terms of Occupational Health and Safety compliance and requirements.
	▪ Consistent and sufficient funding levels.
	▪ Only threat to staffing is if project funding is lost.

### 3 STRATEGIC MANAGEMENT FRAMEWORK

In an effort to ensure that Umhlanga Lagoon Nature Reserve is effectively managed, the following strategic framework has been developed. It is aimed at providing the strategic basis for the protection, development and operation of the nature reserve over the next five years and has been prepared collaboratively through a process involving stakeholders within Ezemvelo KZN Wildlife, the communities around the nature reserve, local and provincial government departments and other stakeholders.

The vision describes the overall long-term goal for the operation, protection and development of the nature reserve. The objectives and strategic outcomes that follow are intended to provide the basis for the achievement of the vision. The objectives provide a broad description of the goals for each key performance area. The strategic outcomes, which flow from the objectives, set out what is needed to achieve the objectives, based on the management challenges and issues described in Section 2 above.

#### 3.1 Umhlanga Lagoon Nature Reserve vision

*“To effectively manage the Umhlanga Lagoon Nature Reserve, such that it maintains the representivity of its natural habitats, species and ecological processes to ensure that they contribute to national and provincial targets, maintain ecosystem services and create an environment for nature-based recreation and awareness opportunities for the local communities and general public.”*

#### 3.2 Objectives and strategic outcomes

An objective has been identified for each of Umhlanga Lagoon Nature Reserve’s key performance areas, which follow from the management challenges and issues and relate to the important functions and activities necessary to protect, develop and manage the protected area effectively. The objectives have then been translated into strategic outcomes, which form the basis for the management activities and targets set out in the operational management framework, described in Section 6 below. Table 3.1 sets out the key performance areas, the objective for each key performance area and the strategic outcomes, required to realise the objectives.

**Table 3.1 Objectives and strategic outcomes for Umhlanga Lagoon Nature Reserve**

Key performance area	Objective	Strategic outcome
Legal compliance and law enforcement	Comply with and enforce legislation pertaining to the protection, development and management of Umhlanga Lagoon Nature Reserve.	There is adequate law enforcement within Umhlanga Lagoon Nature Reserve in order to achieve the protected area vision.
Community participation	Build good neighbour relations through a local community liaison forum to improve transparency, communication and cooperation, both within Umhlanga Lagoon Nature Reserve and in the neighbouring district.	Constructive community involvement in Umhlanga Lagoon Nature Reserve's management through effective Stakeholder engagement; and provision of support to the community in developing its understanding of the management of Umhlanga Lagoon Nature Reserve.
Buffer zone protection and regional management	Negotiate the buffer zone requirements for inclusion into the local and district municipality IDP's and SDF's and municipal schemes in order to avoid inappropriate land uses in Umhlanga Lagoon Nature Reserve's buffer zones.	Capture of buffer zone considerations in IDP's and SDF's and municipal schemes.
Eco-cultural tourism development	Maintain sustainable eco-tourism in Umhlanga Lagoon Nature Reserve to provide a high quality visitor experience and promote the natural values of the nature reserve.	Ensure that all visitor activities are appropriate to the goals of the nature reserve and to its neighbours.
Environmental interpretation and awareness	Support efforts to identify and produce educational material and signage for the existing hiking trails and possible future interpretive centre.	Support organisations (Umhlanga Urban Improvement Precinct, Honorary Officers, eThekweni Biodiversity Forum, Coastwatch) conducting environmental interpretation and education programmes.

Key performance area	Objective	Strategic outcome
Conservation management	Manage the reserve to maintain its ecological integrity.	<ul style="list-style-type: none"> <li>▪ Develop and implement an alien species control plan for Umhlanga Lagoon Nature Reserve (fauna and flora).</li> <li>▪ Develop and implement an indigenous invasive species control plan for Umhlanga Lagoon Nature Reserve.</li> <li>▪ Identify, rehabilitate and manage areas that have been significantly impacted by accelerated soil erosion.</li> <li>▪ Monitor registered research projects to ensure that collection conforms to policies and that appropriate permits are in place.</li> <li>▪ Key species management, including rare and endangered species, is undertaken using the best available scientific knowledge.</li> <li>▪ Critical ecological processes and functions are maintained within Umhlanga Lagoon Nature Reserve.</li> <li>▪ Biological monitoring programmes are developed and implemented to determine the success of management interventions in protecting the ecosystems, communities and species of Umhlanga Lagoon Nature Reserve.</li> </ul>
Operational management	Provide adequate human resources, capacity, equipment and funding to enable the effective protection, development and management of Umhlanga Lagoon Nature Reserve.	<ul style="list-style-type: none"> <li>▪ Development of a five-year financial plan that identifies the resource needs to achieve the objectives for Umhlanga Lagoon Nature Reserve.</li> <li>▪ Ensure that Umhlanga Lagoon Nature Reserve is adequately staffed and conforms to legal staffing practices.</li> <li>▪ All facilities and infrastructure in Umhlanga Lagoon Nature Reserve are adequately maintained.</li> <li>▪ Service infrastructure and practices in Umhlanga Lagoon Nature Reserve do not cause environmental harm.</li> </ul>

## 4 ZONATION PLAN

The purpose of zonation within a protected area is to identify types and levels of usage that are acceptable, based on an area's sensitivity and resilience. Zonation may be used to identify areas in which appropriate uses and infrastructure may be located and developed.

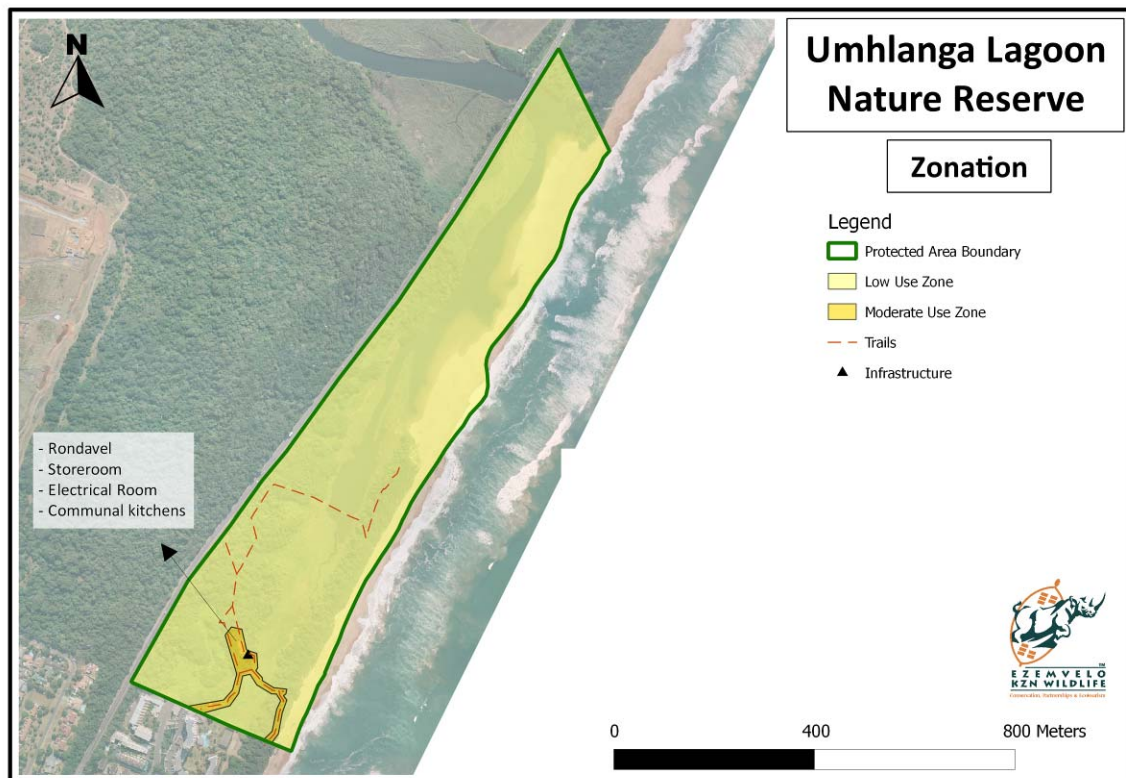
The zonation categories used for Umhlanga Lagoon Nature Reserve are the standardised zonation categories developed for all of Ezemvelo KwaZulu-Natal Wildlife's protected areas (Goosen, 2011). The zonation system recognises and reflects the:

- Sensitive features associated with a protected area (i.e. biophysical, cultural and sense of place).
- Influence of existing development and use on these features and experiences.
- Opportunities and constraints (biophysical, social or managerial constraints) for use.
- Potential threats to wilderness either within or adjacent to it.

General principles of zonation include the following:

- There is a general gradation in the zonation categories, ranging from high to low protection.
- An overlay zone provides additional protection and may be overlaid onto another zone in order to strengthen the protection, e.g. Key Feature Protection Zone.
- A node is an area where tourism, management and service infrastructure can be developed and that has a specified footprint.
- A Wilderness Zone will be buffered by the Low Use Zone.
- Where possible, both management and tourism infrastructure should be developed outside the protected area.
- Development of infrastructure should preferably be on the periphery of the zone, towards a higher impact/less sensitive adjacent zone.
- Deviations or exceptions in all zones require approval from the management authority.
- Any activities permitted in a category of higher protection are also permitted in a category of lower protection, e.g. activities permitted in the Low Use Zone can also be permitted in the Moderate Use Zone.
- All activities will take place in accordance with the local protected area rules and regulations.

#### 4.1 Zonation of Umhlanga Lagoon Nature Reserve



**Map 5: Umhlanga Lagoon Zonation Map**

## 4.2 Conceptual development guidelines

The purpose of the zonation of Umhlanga Lagoon Nature Reserve is to control the intensity and type of use within it, in efforts to ensure the overriding goals of biodiversity conservation are met whilst enabling acceptable levels of eco-cultural tourism. On this basis, the permissible intensity of use will be relatively higher within some zones, than in others.

### Zones

#### Low Use Zone:

*Description:* An area where there is little evidence of modification of natural processes and landscapes, that is more sensitive than the moderate use zone and where the ecotourism principles of low human impact will prevail

*Objective:* To designate an area for tourism experiences and management activities that are focused primarily on low impact activities and where general sensitivity requires that management and tourism impacts on the natural landscape should be mitigated.

*Permissible activities and infrastructure:* (Activities that could be allowed subject to the reserve management standard rules and regulation in terms of authorisation.)

- Facilities of a rustic nature, such as small bush camps, rustic overnight hiking huts, hides and trails.
- Motorised access is low key and 4 x 2 access is provided to points where trails start or to tourist facilities.
- 4 x 4 tracks are allowed in this zone (limit to number of tracks and frequency of use) as per site specific rules and regulations.
- Hiking and formalised trails. Management activities must focus on protecting park resources and core values.
- Limited management roads and tracks.
- Controlled extractive resource use, in line with Ezemvelo KwaZulu-Natal Wildlife policies and norms and standards.

#### *Constraints and implementation:*

- Activities are mostly low impact and low density.
- No modern facilities, such as restaurants and shops, are permissible in this zone.
- Where possible, facilities should be developed on the periphery of the zone towards the less sensitive adjacent zone.

### Moderate Use Zone:

*Description:* An area where natural processes and the landscape may be altered to support protected area operations. This zone is less sensitive than the Low Use Zone and this is where experiences, facilities, infrastructure and services are provided to visitors and where general park management activities can take place.

*Objective:* To designate a tourism area that is primarily focused on visitor experience, while still securing the values of the protected area and an area that serves the operational and support functions of the protected area.

*Permissible activities and infrastructure:* (Activities that could be allowed subject to the reserve management standard rules and regulation in terms of authorisation.)

- Hiking on formalised trails.
- The tourism road network, including access roads and game viewing roads.
- Traditional game viewing routes with associated more formalised infrastructure.
- Infrastructure is accessible by motorised access.
- Management roads and tracks.
- Management activities are directed to maintaining park infrastructure for biodiversity conservation, park operations, equipment and material storage.
- Controlled extractive resource use.

### *Constraints and implementation:*

- Within the Moderate Use Zone, a specific *Tourism Development Node* will be defined, which could include areas of commercial use.
- Where possible, this node should be outside the protected area.
- The node should preferably be on the periphery of the Moderate and Low Use Zones, to ensure a quality visitor experience in the lower use zone, but with the bulk of the impact, *e.g.* access roads and services in the higher use zone.
- This node should be developed in the less sensitive part of the Moderate Use Zone.
- The Tourism Development Node can only be developed in areas where it does not compromise the values of the protected area.
- The node must have a specified footprint.



- *Park Administrative Node* (within the Moderate Use Zone)
  - Cater for facilities such as staff accommodation, administrative offices, other operational required infrastructure, waste handling sites *etc.*
  - Wherever possible, facilities and infrastructure related to park operations should be located outside of the protected area. If not possible, they will form part of this node.
  - The node must have a specified area as a footprint.

### *Key Feature Protection Overlay*

*Description:* An area that is vulnerable and or scientifically important, where specific additional controls are imposed in order to prevent undesirable impacts on identified sensitive or threatened species, habitats, ecosystems, bio-control release sites, research sites, archaeological, living heritage and palaeontological sites.

*Objective:* This zone is for permanent, temporary or seasonal protection of important core protected area values. *It aims to provide additional protection for the integrity of key areas.*

*Permissible activities and infrastructure:*

- The zone may overlay other zones where a range of infrastructure may already exist.
- In addition to restrictions of the underlying zone site, specific rules and regulations will apply.

*Constraints and implementation:*

- This is a protection zone and would only allow for access and development under site specific constraints. (Does not cater for further developments or resource utilisation.)
- This zone provides a higher level of protection than the underlying zone.
- Could be permanent, temporary or seasonal overlay.
- Changes to this overlay can be implemented through the Nature Reserve Planning Committee and the annual management meeting, and recorded as such.

### *Protected Area Buffer Zone:*

*Description:* An area outside of the protected area where actions and agreements are taken to protect the integrity of the protected area and to enhance the livelihoods of protected area neighbours.

*Objective:* To influence land use adjacent to the protected area in order to manage external pressures and threats that may threaten its values and objectives.

*Permissible activities and infrastructure:* Each protected area must define these desirable or non-desirable activities in terms of its specific values, objectives and risks and considering factors, such as:

- Alien and invasive species.
- Pollution.
- Impact on sense of place or wilderness.
- Habitat fragmentation and isolation.
- Water resource protection.
- Damage causing animal management.
- Climate change adaptation.
- Compatible land use.
- Priority species management.

## 5 OPERATIONAL MANAGEMENT FRAMEWORK

This section translates the strategic framework, described in Section 3 above, into management activities and targets, which will be used to inform annual plans of operation and the resources required to implement them. The management targets will form the basis for monitoring of performance in implementing the plan and are thus measurable.

### 5.1 Determination of priorities for strategic outcomes

In the tables that follow in this section, a column has been included entitled “Priority”, which is intended to convey the level of priority attached to its strategic outcome. The purpose of prioritising activities is to direct funds and resources to the most important activities, in the event that there are insufficient funds or resources to undertake all of the activities outlined in a particular year. Priorities are ordered in three categories, which have been determined on the following basis:

<b>Priority 1:</b>	A management target that is central to the responsibilities and mandate of Ezemvelo KZN Wildlife or that addresses an aspect of management that is fundamental to the protection of the values and purpose of Umhlanga Lagoon Nature Reserve.
<b>Priority 2:</b>	A management target that addresses an aspect of management that contributes towards community involvement and support for the conservation of Umhlanga Lagoon Nature Reserve, which is a key principle of effective protected area management.
<b>Priority 3:</b>	A management target that indirectly contributes towards the protection of biodiversity or the development of social and/or economic benefits and opportunities for Umhlanga Lagoon Nature Reserve and/or its surrounding local communities.

The priorities are presented in the tables below, using the colour system above, which depicts the level of priority shown for the particular strategic outcome. In addition, a date is indicated in the priorities column for each strategic outcome, which is intended to convey the end date by which the management target should be achieved.

### 5.2 Legal compliance and law enforcement

Through its mandate to undertake the conservation and management of protected areas in KwaZulu-Natal, Ezemvelo KZN Wildlife must ensure that the province’s protected areas are appropriately legally protected and that the laws governing the use of protected areas and the prohibition of particular activities are enforced. In fulfilling this role, the managers of Umhlanga Lagoon Nature Reserve will adhere to the following guiding principles:

- All reasonable efforts must be made to ensure the effective conservation of biodiversity within and on the boundaries of the nature reserve. It should be noted that Ezemvelo KZN Wildlife’s mandate to protect biodiversity extends beyond the protected areas; however, this responsibility is taken up by other components of the organisation.

- Cooperative structures should be established to enable participation by key stakeholders, such as local communities and the South African Police Service in addressing offences and breaches of the law.
- Law enforcement within the nature reserve will be undertaken through surveillance, monitoring and appropriate reaction in the event of an offence.

### **5.3 Stakeholder engagement**

Constructive relationships with adjacent landowners and communities are an important aspect of the effective conservation of protected areas. Community participation should be aimed at developing a strong sense of partnership between the communities around the nature reserve and its managers. The following guiding principles should be adhered to:

- Efforts should be made to ensure that the communities living around the nature reserve are aware of the role that it fulfils in biodiversity protection and the provision of ecological services to the region.
- Community participation should be undertaken to engender a sense of ownership of the nature reserve, within the communities, and support for its biodiversity conservation goals and objectives.
- A common understanding of the issues that affect both the nature reserve and the surrounding communities should be developed and efforts to resolve them should be undertaken cooperatively.

The operational requirements for legal compliance and enforcement, and community participation, are set out in Tables 5.1 and 5.2 below.

**Table 5.1: Framework for legal compliance and law enforcement**

Strategic outcome	Management activities	Management targets	Indicators of Concern	Priority	Responsibility
<b>LAW ENFORCEMENT</b>					
There is adequate law enforcement within Umhlanga Lagoon Nature Reserve in order to achieve the protected area vision.	Set annual security targets at the annual management meeting to address security issues.	Minutes of the annual management meeting indicating security targets.	<ul style="list-style-type: none"> <li>Trespassing.</li> <li>Illegal bait collection.</li> <li>Vandalism and theft.</li> </ul>	<b>Year1</b>	OIC and regional management
	Implement the annual plan of operation and a programme of patrols of the protected area and its boundaries, as contained in the abovementioned plan, to address security issues.	<ul style="list-style-type: none"> <li>Regular patrols covering the full extent of the protected area.</li> <li>Prosecution of offenders caught committing an offence.</li> </ul>	Specific security targets, as set out in the annual security plan of operations, not achieved.	<b>Annually</b>	OIC

**Table 5.2: Framework for community participation**

Strategic outcome	Management activities	Management targets	Indicators of Concern	Priority	Responsibility
<b>Stakeholder Engagement</b>					
Constructive community involvement in Umhlanga Lagoon Nature Reserve's management through effective stakeholder engagement; and provision of support to the community in developing its understanding of the management of Umhlanga Lagoon Nature Reserve.	Attend relevant community forums in order to ensure open lines of communication between members of the local communities, stakeholders and the Umhlanga Lagoon Nature Reserve Manager.	<ul style="list-style-type: none"> <li>Maintain relationships with various stakeholder groups, such as Umhlanga Urban Improvement Precinct, Honorary Officers, eThekweni Biodiversity Forum, Coastwatch.</li> </ul>	<ul style="list-style-type: none"> <li>Scheduled meetings with forum are not held or attended by Ezemvelo staff.</li> <li>Community dissatisfaction with Umhlanga Lagoon Nature Reserve.</li> </ul>	<b>Year 1 Ongoing</b>	OIC
	Provide background to the management decisions to the Umhlanga Lagoon stakeholders.	Nature reserve plans and management information presented to the stakeholders as they are developed.	Lack of understanding of management practices at Umhlanga Lagoon Nature Reserve.	<b>Year 1 Ongoing</b>	OIC

## **5.4 Buffer zone protection and regional management**

### **5.4.1 Protected area expansion**

Ezemvelo KZN Wildlife's Protected Area Expansion Plan has not identified any areas for protected area expansion around Umhlanga Lagoon Nature Reserve. However, in order to safeguard the biodiversity within the nature reserve, and to counter any threatening processes or edge effects, suitable buffer zones and appropriate land uses in these zones should be identified. Appropriate actions may then be taken to secure these buffer zones through protected area expansion mechanisms and local planning tools, as described in Section 5.4.2 below. In ensuring the protection of its biodiversity, the following guiding principles will be adopted in terms of protected area expansion and buffer zone management:

- If under threat, efforts must be made to formally protect areas, located outside of the nature reserve.
- Threatening processes and edge effects on the nature reserve's boundary, and beyond it, must be identified.
- Appropriate actions must be taken to manage threatening processes and edge effects on the nature reserve's boundary, and beyond it.

While it is acknowledged that some land use around Umhlanga Lagoon and upstream in the catchment has a negative impact on the nature reserve, it is still important that management should influence and comment on land use change in order to ensure that the land use does not change to something that could potentially be more detrimental to the nature reserve.

### **5.4.2 Local and regional planning**

It is important, in managing the buffer areas around the nature reserve, that Ezemvelo KZN Wildlife work with local government authorities to ensure that their land use planning considers the biodiversity conservation imperatives of Umhlanga Lagoon Nature Reserve. In this regard, it is necessary to ensure that buffer zone considerations are captured in planning tools, such as IDP's and SDF's. In developing relationships with the local and district municipality, Ezemvelo will adhere to the following guiding principles:

- Relationships with local government and other provincial and national departments will be developed in the spirit of cooperative governance.
- Ezemvelo KZN Wildlife will endeavour to assist the local and district municipality in determining appropriate land uses and development strategies in the areas surrounding the nature reserve.
- Ezemvelo KZN Wildlife will endeavour to align its plans and strategies with the programmes and strategies of the local and district municipality, where appropriate.

The detailed operational requirements for buffer zone protection and regional management are set out in Table 5.3 below.

**Table 5.3: Framework for buffer zone protection and regional management**

Strategic outcome	Management activities	Management targets	Indicators of Concern	Priority	Responsibility
<b>LOCAL AND REGIONAL PLANNING</b>					
Capture of buffer zone considerations in IDP's and SDF's and municipal schemes.	Negotiate the buffer zone requirements for inclusion into the local and district municipality IDP's and SDF's and municipal schemes in order to avoid inappropriate land uses in Umhlanga Lagoon Nature Reserve's buffer zones.	Report presented and negotiated with the municipalities for inclusion in their IDP's and SDF's and municipal schemes.	Approval of inappropriate land uses on the boundaries of the nature reserve.	<b>Year 3</b>	OIC



## **5.5 Eco-tourism development**

### **5.5.1 Visitor Management**

Ezemvelo KZN Wildlife has the mandate to sustainably develop Umhlanga Lagoon Nature Reserve to fully realise its potential, within the context of protecting its biodiversity and cultural values. However, there is limited scope to develop nature-based tourist opportunities within the nature reserve. In further developing tourism within the nature reserve, the following guiding principles should be adhered to:

- Tourism products developed within the nature reserve must be appropriate to the purpose for which the nature reserve has been proclaimed and must not threaten its biodiversity or ecological function.
- In developing tourism products, requirements for environmental authorisation must be considered and adhered to.
- Tourism products should be designed to capitalise on the unique beauty and biodiversity features of the nature reserve.
- Tourism products should be developed in response to tourism market demands and opportunities within the nature reserve and should be carefully assessed to determine their viability.
- The development of tourism products within the nature reserve must be integrated with tourism strategies and plans in the region.
- Tourism should be used as a tool for the generation of economic activity and employment in the communities surrounding the nature reserve.

Proposals have been put forward to develop a boardwalk within the protected area, but these need to be discussed at the appropriate forum for initial approval and buy-in from Ezemvelo KZN Wildlife and then, if accepted in principle, should go through a formal EIA process and receive environmental authorisation, prior to implementation.

### **5.5.2 Environmental interpretation and education**

Environmental interpretation and education of Umhlanga Lagoon Nature Reserve's natural and cultural resources will be aimed at creating awareness, understanding and appreciation of its biodiversity and ecological function, and their significance. In developing an environmental interpretation and education programme, the following guiding principles should be adhered to:

- There should be a strong focus on neighbouring communities, in efforts to engage, inform and benefit them.
- Wherever possible, local community members should be trained to assist and operate environmental interpretation and education tours.

The detailed operational requirements for eco-cultural tourism development and environmental interpretation and education are set out in Table 5.4 below.

**Table 5.4: Framework for eco-cultural tourism**

Strategic outcome	Management activities	Management targets	Indicators of Concern	Priority	Responsibility
<b>VISITOR MANAGEMENT</b>					
Ensure that all visitor activities are appropriate to the goals of the nature reserve and to its neighbours.	<p>Capture visitor information in order to better understand the nature reserve's visitor numbers and target group.</p> <p>This will assist in developing an understanding of the needs in the region in order to inform the types of products and activities that may be offered.</p>	<p>Annual report of visitor information.</p> <p>This will create understanding of annual tourist numbers and a tourism market profile for the protected area.</p>	<ul style="list-style-type: none"> <li>▪ Changing visitor trends.</li> <li>▪ Declining visitor numbers.</li> </ul>	<b>Annually</b>	OIC
<b>ENVIRONMENTAL INTERPRETATION AND AWARENESS</b>					
Support organisations (Umhlanga Urban Improvement Precinct, Honorary Officers, eThekweni Biodiversity Forum, Coastwatch) conducting environmental interpretation and education programmes.	Support efforts to Identify and produce educational material and signage for the existing hiking trails and possible future interpretive centre.	Adequate signage on trails.	<ul style="list-style-type: none"> <li>▪ Signs outdated</li> <li>▪ Negative publicity.</li> </ul>	<b>Year 1</b>	OIC

## **5.6 Conservation management**

### **5.6.1 Invasive species control**

A listed invasive species means any species, which is listed in terms of section 70 of the Biodiversity Act, whose establishment and spread occurs outside of its natural distribution range. Such plants are considered to be a serious threat to the ecological functioning of natural systems and to water production, and must be strictly controlled. In undertaking invasive plant control, the following guiding principles will be adhered to:

- Invasive plant control will require an ongoing programme that prioritises key infestations along water courses, drainage lines and upper catchment areas.
- Initial clearing efforts should focus on containing infestations that are most likely to spread into new areas.
- All follow-up requirements must be strictly adhered to, otherwise the problem will be exacerbated.
- Strategic partnerships and poverty relief programmes, such as the Working for Water programme, should be utilised in controlling invasive plants.
- If herbicide treatment is required, only herbicides registered for use in or near water must be used in that context and the surfactant in the herbicide, or that used in conjunction with it, must be non-detrimental to aquatic animal life.

Alien animal species can threaten the ecological, genetic or natural aesthetic integrity of Umhlanga Lagoon Nature Reserve and can be vectors for the spread of diseases. In dealing with the control of alien animals, procedures to deal with animals that stray into the nature reserve should be developed. In addressing alien animal control, the following guiding principle should be adhered to:

Feral animal species that pose a threat to indigenous species will be destroyed (as humanely as practicably possible, with due regard to the tourist experience).

### **5.6.2 Soil erosion control**

Some erosion of the steeply inclined dune slopes adjacent to the lagoon has been occurring; other than that, there are no erosion issues.

In addressing soil erosion, the following guiding principles should be adhered to:

- Areas impacted by soil erosion should be stabilised and re-vegetated with indigenous plant species to prevent the spread of listed invasive plant species.
- Areas susceptible to soil erosion, or showing early signs of soil erosion, such as loss of vegetation cover, must be managed to prevent soil erosion.

Soil erosion control and rehabilitation measures may include the need to re-vegetate disturbed areas. A detailed assessment of the nature and extent of soil erosion within the nature reserve will determine the appropriate responses required and the costs associated with them.

The detailed operational requirements for invasive species and soil erosion control are set out in the Table 5.5 below.

**Table 5.5: Framework for conservation management – invasive species control and soil erosion control**

Strategic outcome	Management activities	Management targets	Indicators of Concern	Priority	Responsibility
<b>INVASIVE SPECIES CONTROL</b>					
Implement alien species control plan for Umhlanga Lagoon Nature Reserve (fauna and flora).	Implement the alien species control plan that addresses the biological, legal and operational requirements for terrestrial and aquatic fauna and flora.	<ul style="list-style-type: none"> <li>Continue alien species control efforts.</li> <li>Compliance with the Biodiversity Act.</li> </ul>	<ul style="list-style-type: none"> <li>Non-compliance with NEMBA and CARA.</li> <li>Further spread of existing levels of infestation of listed invasive species.</li> <li>New infestations of listed invasive species.</li> <li>Input and output of control operations not at optimal level due to lack of planning.</li> </ul>	<b>Year 1</b>	OIC
	Develop an annual plan of operation for alien species control in the protected area, setting specific targets.	Minutes of annual management meeting containing the annual plan of operation and targets for alien species control.	<ul style="list-style-type: none"> <li>Non-compliance with NEMBA and CARA.</li> <li>Further spread of existing levels of infestation of listed invasive species.</li> <li>New infestations of listed invasive species.</li> <li>Input and output of control operations not at optimal level due to lack of planning.</li> </ul>	<b>Annually</b>	OIC

Strategic outcome	Management activities	Management targets	Indicators of Concern	Priority	Responsibility
<b>SOIL EROSION CONTROL</b>					
Identify, rehabilitate and manage areas that have been significantly impacted by accelerated soil erosion.	Once an area of accelerated erosion is identified, an approach will be developed and implemented to rehabilitate the area.	<ul style="list-style-type: none"> <li>Erosion problems identified.</li> <li>Implementation of accelerated soil erosion control measures in areas identified.</li> </ul>	<ul style="list-style-type: none"> <li>Erosion areas not being identified.</li> <li>Further erosion of impacted areas.</li> </ul>	<b>Ongoing</b>	OIC

### 5.6.3 Collection of biological material

There are few opportunities within Umhlanga Lagoon Nature Reserve for sustainable use of natural resources. No harvesting of bait organisms is allowed and relatively little fishing takes place in the estuary, although fishing from the beach does take place. However, activities such as the collection of biological materials/samples for legitimate scientific purposes, from *bone fide* South African research institutions, and in accordance with relevant Ezemvelo KZN Wildlife policies, will be considered.

The success of these applications will be influenced by the ability of the nature reserve's managers to effectively control and monitor such resource use.

The detailed operational requirements for collection of biological material are set out in Table 5.6 below.

**Table 5.6: Framework for conservation management – Collection of biological material**

Strategic outcome	Management activities	Management targets	Indicators of Concern	Priority	Responsibility
<b>COLLECTION OF BIOLOGICAL MATERIAL</b>					
Collection of biological material is undertaken in a legal manner and conforms to National Legislation (NEMBA, Act No.10 of 2004, Chapter 6).	Monitor registered research projects to ensure that collection conforms to policies and that appropriate permits are in place.	Ensure that all collecting is done under permit.	Illegal collection of biological material or samples.	<b>Ongoing</b>	Ezemvelo's Ecological Advice Unit and implementation by OIC



#### 5.6.4 *Wildlife management*

No active management of any wildlife species takes place within Umhlanga Lagoon Nature Reserve. Instead, the system is managed as a whole, on the basis that a healthy system supports the species dependent upon it. Nevertheless, the general principles for wildlife management within protected areas are laid out below, in the unlikely event that any interventions are needed.

Management interventions related to indigenous wildlife will be limited to those that are for the purposes of safeguarding populations of key species, including rare and endangered species, or enhancing ecological functioning to meet set conservation targets. In addition, interventions may be required for human/wildlife conflict management. In addressing wildlife management, the following guiding principles should be adhered to:

- Wildlife management must be focussed primarily on protecting the ecological functioning of the nature reserve and meeting set provincial conservation targets for species and vegetation types.
- The introduction of indigenous species into the nature reserve must be undertaken in accordance with relevant Ezemvelo KZN Wildlife policies.
- Animals that become a danger or excessive nuisance to persons and property, due to either habituation or aberrant behaviour, must be managed in accordance with relevant Ezemvelo KZN Wildlife policies.

#### 5.6.5 *Conservation targets*

The 2011 version of the KwaZulu-Natal systematic biodiversity plan identifies the provincial conservation targets referred to in Section 5.6.4, above. The conservation of Umhlanga Lagoon Nature Reserve contributes towards the achievement of a portion of some of these targets. Targets will continue to be updated as knowledge develops about the ecology of areas, connectivity between them, and other process requirements for ecosystems, communities and species. On this basis, the conservation targets should be viewed as a set of working hypotheses, around which conservation planning and evaluation can take place. An advantage of developing strategies around targets is that this process highlights critical knowledge deficits, thus guiding future research.

See Table 5.7 below for systematic biodiversity planning conservation targets to which Umhlanga Lagoon Nature Reserve contributes and the following Table 5.8 for conservation targets.

**Table 5.7: Systematic biodiversity planning conservation targets to which Umhlanga Lagoon Nature Reserve contributes**

Feature	Description	Percentage of target located within Umhlanga Lagoon	Notes
<i>Eremidium sp.</i>	Grasshopper	0.02	% of historic distribution
<i>Centrobolus anulatus</i>	Millipede	0.32	% of historic distribution
<i>Doratogonus falcatus</i>	Millipede	0.02	% of historic distribution
<i>Doratogonus natalensis</i>	Millipede	0.02	% of historic distribution
<i>Doratogonus peregrinus</i>	Millipede	0.05	% of historic distribution
<i>Cochlitoma semidecussata</i>	Mollusc	0.51	% of historic distribution
<i>Edouardia conulus</i>	Mollusc	0.00	% of historic distribution
<i>Barleria natalensis</i>	Plant	0.07	% of historic distribution
<i>Vernonia africana</i>	Plant	0.07	% of historic distribution
KwaZulu-Natal Coastal Forests	Vegetation Type	0.00	% of historic distribution
KwaZulu-Natal Dune Forests	Vegetation Type	0.04	% of historic distribution
Mangrove Forests	Vegetation Type	0.27	% of historic distribution
North Coast Grassland	Vegetation Type	0.00	% of historic distribution

Where possible, specific conservation and monitoring strategies should be established for ecological features and species for which conservation targets have been set.

**Table 5.8: Framework for conservation management – conservation targets**

Strategic outcome	Management activities	Management targets	Indicators of Concern	Priority	Responsibility
Critical ecological processes and functions are maintained within Umhlanga Lagoon Nature Reserve.	The maintenance of critical ecological processes must be included in all subsidiary plans.	All subsidiary plans must reflect critical ecological processes.	<ul style="list-style-type: none"> <li>Ecological degradation.</li> <li>Change in composition.</li> <li>Don't know what these critical processes are.</li> </ul>	<b>Ongoing</b>	Ezemvelo KZN Wildlife Ecological Advice Unit
Biological monitoring programmes are developed and implemented to determine the success of management interventions in protecting the ecosystems, communities and species of Umhlanga Lagoon Nature Reserve.	The biological monitoring and surveillance programme must be included in all subsidiary plans.	<ul style="list-style-type: none"> <li>All subsidiary plans must include a biological monitoring programme.</li> <li>Surveillance and monitoring plans for key threatened processes.</li> <li>Monitoring plans for key rare and endangered species.</li> </ul>	Lack of awareness of the status of key threatening processes including infestations of invasive plant species and severity and extent of soil erosion.	<b>Ongoing</b>	Ezemvelo KZN Wildlife Ecological Advice Unit

## 5.7 Operational management

### 5.7.1 Financial and human resources

Umhlanga Lagoon Nature Reserve cannot be effectively managed without adequate sustained funding and sufficient human resources. In addressing the financial and human resource needs of the nature reserve, the following guiding principles should be adhered to:

- Adequate funding must be provided for the management of the nature reserve to ensure the protection of its biodiversity and cultural values and the continued provision of its ecosystem services.
- A capable, experienced administrator and leader is required to fulfil the position of nature reserve manager.
- Adequate, properly trained and experienced staff must be employed at the nature reserve to undertake the operations required for its effective management.

### 5.7.2 Facilities and infrastructure

In order for Umhlanga Lagoon Nature Reserve to operate appropriately, adequate facilities and infrastructure need to be developed and maintained both for management and education purposes. In addressing facilities and infrastructure needs in the nature reserve, the following guiding principles will be adhered to:

- Facilities and infrastructure must be maintained to avoid any damage to the environment and ensure the safety of staff and visitors to the nature reserve.
- Facilities and infrastructure must be provided to ensure the effective management and operation of the nature reserve.

The detailed operational requirements for financial and human resource, and facilities and infrastructure development and management, are set out in Tables 5.9 and 5.10 below.

**Table 5.9: Framework for operational management – financial and human resources**

Strategic outcome	Management activities	Management targets	Indicators of Concern	Priority	Responsibility
<b>FINANCIAL RESOURCES</b>					
Development of a five-year Financial Plan that identifies the resource needs to achieve the objectives for the nature reserve.	<ul style="list-style-type: none"> <li>Undertake an assessment of past income and expenditure trends in the nature reserve.</li> <li>Develop a five-year projection of income and expenditure targets that will allow for the effective achievement of the nature reserves objectives.</li> </ul>	<ul style="list-style-type: none"> <li>Adequate funding to achieve the objectives of the nature reserve.</li> </ul>	<ul style="list-style-type: none"> <li>Inadequate funding to effectively protect and operate the nature reserve.</li> </ul>	<b>Year 1</b>	Ezemvelo KZN Wildlife Regional Management Unit
<b>HUMAN RESOURCES</b>					
Ensure that Umhlanga Lagoon Nature Reserve is adequately staffed and conforms to legal staffing practices.	<ul style="list-style-type: none"> <li>Motivate for all vacant staff positions to be filled.</li> <li>Comply with OH&amp;S legislation, labour legislation and internal Ezemvelo policies.</li> </ul>	<ul style="list-style-type: none"> <li>Sufficient staff to achieve nature reserve objectives.</li> <li>Clean bill of health.</li> </ul>	<ul style="list-style-type: none"> <li>Vacant post.</li> <li>Non-compliance with legislation and policies.</li> <li>Outstanding grievances.</li> </ul>	<b>Ongoing</b>	OIC

**Table 5.10: Framework for operational management – facilities and infrastructure**

Strategic outcome	Management activities	Management targets	Indicators of Concern	Priority	Responsibility
<b>FACILITIES AND INFRASTRUCTURE</b>					
All facilities and infrastructure in Umhlanga Lagoon Nature Reserve are adequately maintained.	Develop and implement an infrastructure maintenance schedule for the nature reserve that will address: <ul style="list-style-type: none"> <li>Environmental, health and safety requirements.</li> <li>Road maintenance - including rehabilitation plans, where necessary.</li> <li>Fence maintenance - maintenance and monitoring.</li> <li>Building maintenance and compliance with relevant building regulations and legislation.</li> </ul>	<ul style="list-style-type: none"> <li>Infrastructure maintenance plan developed.</li> <li>Regular scheduled maintenance of all facilities and infrastructure.</li> </ul>	Environmental, health or safety incidents associated with inadequately maintained facilities and infrastructure.	<b>Year 1</b>	OIC
	Develop an annual plan of operation for infrastructure of the protected area through the annual management meeting.	Regular scheduled maintenance of all facilities and infrastructure.	<ul style="list-style-type: none"> <li>Environmental, health or safety incidents associated with inadequately maintained facilities and infrastructure.</li> <li>Environmental damage resulting from poorly maintained, roads, tracks and trails.</li> </ul>	<b>Annually</b>	Regional Management
	Implement the annual plan of operation and infrastructure maintenance schedule.	Targets set in annual plan of operation through the management meeting.	Not achieving the targets as set in the annual plan of operation.	<b>Ongoing</b>	OIC

Strategic outcome	Management activities	Management targets	Indicators of Concern	Priority	Responsibility
Service infrastructure and practices in Umhlanga Lagoon Nature Reserve do not cause environmental harm.	<ul style="list-style-type: none"> <li>Where service infrastructure, including that for water supply, electricity and sewerage is causing environmental harm, ensure proper maintenance is being undertaken and if necessary, upgrade infrastructure or modify practices to address this.</li> <li>Determine and implement appropriate strategies for the management and recycling of waste in the nature reserve.</li> </ul>	Appropriately functioning service infrastructure and systems that do not cause harm to the environment.	Pollution events or incidents associated with service infrastructure and systems.	Ongoing	OIC

## 6 MONITORING AND REPORTING

Monitoring and reporting is a critical component of the adaptive management cycle. It enables the effective assessment of management interventions and, if necessary, can be used to direct modifications of management in an effort to achieve the outcomes required.

### 6.1 *Annual monitoring*

The annual monitoring schedule should be designed to monitor the implementation of aspects or components of the plan. It should be designed to be straightforward and relatively easy to implement by on-site staff. In accordance with the Ezemvelo KZN Wildlife norms and standards for surveillance and monitoring (Goodman, 2011), monitoring is characterised by:

- An objective, target or desired state of the attribute or resource (as described in the management targets in Section 6 above).
- Being part of a formalised adaptive management cycle.
- Establishing and repeatedly evaluating the measures of success of conservation projects or management interventions.

Records should be maintained of all key management interventions and of problem events or incidents, such as uncontrolled access, poaching, illegal plant collection or uncontrolled/arson fires. In terms of the norms and standards set for surveillance and monitoring (Goodman, 2011), these incidents would be deemed to be surveillance.

Scientific monitoring programmes may be established to monitor specific management interventions, such as measures for the protection of flagship species. Not all of the management interventions will be monitored through the monitoring schedule. Most of the outcomes of the monitoring process will be captured in an annual plan, which will be used to inform the following year's annual plan of operation.

On this basis, a monitoring schedule for Umhlanga Lagoon Nature Reserve is set out in Table 6.1.



**Table 6.1: Annual monitoring schedule for Umhlanga Lagoon Nature Reserve**

Management issue	Parameters to be monitored	Monitoring measures	Monitoring frequency	Responsibility	Reporting requirements
Law enforcement	Schedule of patrols	Written record	Weekly	Nature Reserve Manager	Annual report
	Illegal incidents	Photographs/written record	Per event		Record of event
	Access control measures	Written record	Annually		Annual report
Protected area expansion	Influx of listed invasive vegetation on the nature reserve's boundaries.	Surveillance plan	To be determined	Nature Reserve Manager	Annual report
Local and regional planning	Land uses that are approved in the areas around the nature reserve in local and regional IDP's and SDF's	Written record	Annually	District Manager	Annual report
Visitor management	Visitor statistics	Visitor entries, bookings and accommodation data	Ongoing	Nature Reserve Manager	Annual report
	Attendance of environmental interpretation and education programmes	Written records	Annually	Ezemvelo KZN Wildlife Community Conservation Unit	Annual report
Invasive plant control	Areas subject to invasive plant control	Monitoring plan	To be determined	Nature Reserve Manager	Annual report
	State of areas in which invasive plants have been eradicated				
	Records of labour hours/days	Written record	Annually		Annual report
	Herbicide usage	Written record	Annually		Annual report
Alien animal control	Control measures for alien animals found within the nature reserve	Written record	Per event	Nature Reserve Manager	Record of event

Management issue	Parameters to be monitored	Monitoring measures	Monitoring frequency	Responsibility	Reporting requirements
Soil erosion control	Areas subject to erosion control	Monitoring plan	To be determined	Nature Reserve Manager	Annual report
	State of rehabilitated areas of erosion				Annual report
Conservation targets	Incidents related to flagship species	Photographs/written record	Per event	Nature Reserve Manager	Record of event
	Status of key rare and endangered species, particularly those for which conservation targets have been set	Monitoring plan	To be determined	Nature Reserve Manager	Annual report
Biological collection	Species and amount of material collected.	Photographs/written records	Per event	Nature Reserve Manager	Annual report
Human resources	Staffing levels	Number of full-time staff	Annually	Nature Reserve Manager	Annual report
Facilities and infrastructure	State of roads, tracks and trails	Photographs/written records	Quarterly	Nature Reserve Manager	Annual report
	State of the boundary fence	Photographs/written records	Monthly		Annual report
	Rainfall	Written record	Monthly		Annual report
	State of facilities and service infrastructure	Maintenance schedule/written records	Monthly		Annual report
	Pollution events	Photographs/written records	Per event		Record of event

As set out in Table 6.1, the following issues require a surveillance plan:

- The influx of listed invasive vegetation on the nature reserve's boundaries.

In addition, the following issues require a monitoring plan:

- Measures taken to control invasive plant species (indigenous and alien).
- Measures taken to control soil erosion.
- Measures taken to manage rare and endangered species, particularly those for which conservation targets have been set.
- The ecological status of the hydrological system within the nature reserve.

These surveillance and monitoring plans must be developed and implemented in accordance with the Ezemvelo KZN Wildlife Norms and Standards: Surveillance and Monitoring Plans for Biodiversity (Goodman, 2011).

The preparation of these plans must be undertaken by the Ezemvelo KZN Wildlife Regional Ecological Advice Unit, with the support of the Surveillance and Monitoring Working Group of Ezemvelo KZN Wildlife.

## **6.2 Annual management plan implementation review**

The purpose of undertaking an annual performance review of implementation of the management plan will be to:

- Determine how effectively the management plan has been implemented.
- Assist in determining the focus for the annual plan of operation and the setting of appropriate time frames and budgets.
- Enable effective adaptive management by identifying changes and modifying management interventions.

The report produced from the annual management plan implementation review should be submitted to the Regional Operations Committee, prior to the annual management meeting for Umhlanga Lagoon Nature Reserve, for its review and comment. Records of recommendations for update/changes to the management plan should be kept so that when the plan is revised, these recommendations can be assessed and included, where necessary. This should be undertaken in the form of a running list, which is updated in each annual report so that the final annual report before the review of the management plan contains the complete list of recommendations. The review process should include:

- Any recommended minor amendments to the management plan that do not affect the substance of the vision, objectives or zonation.
- The results of an evaluation of the management effectiveness achieved for the protected area, calculated using Ezemvelo KZN Wildlife Protected Area Management Effectiveness evaluation tool, which meets the criteria of the national Department of Environmental Affairs' effectiveness evaluation guidelines, and was developed using

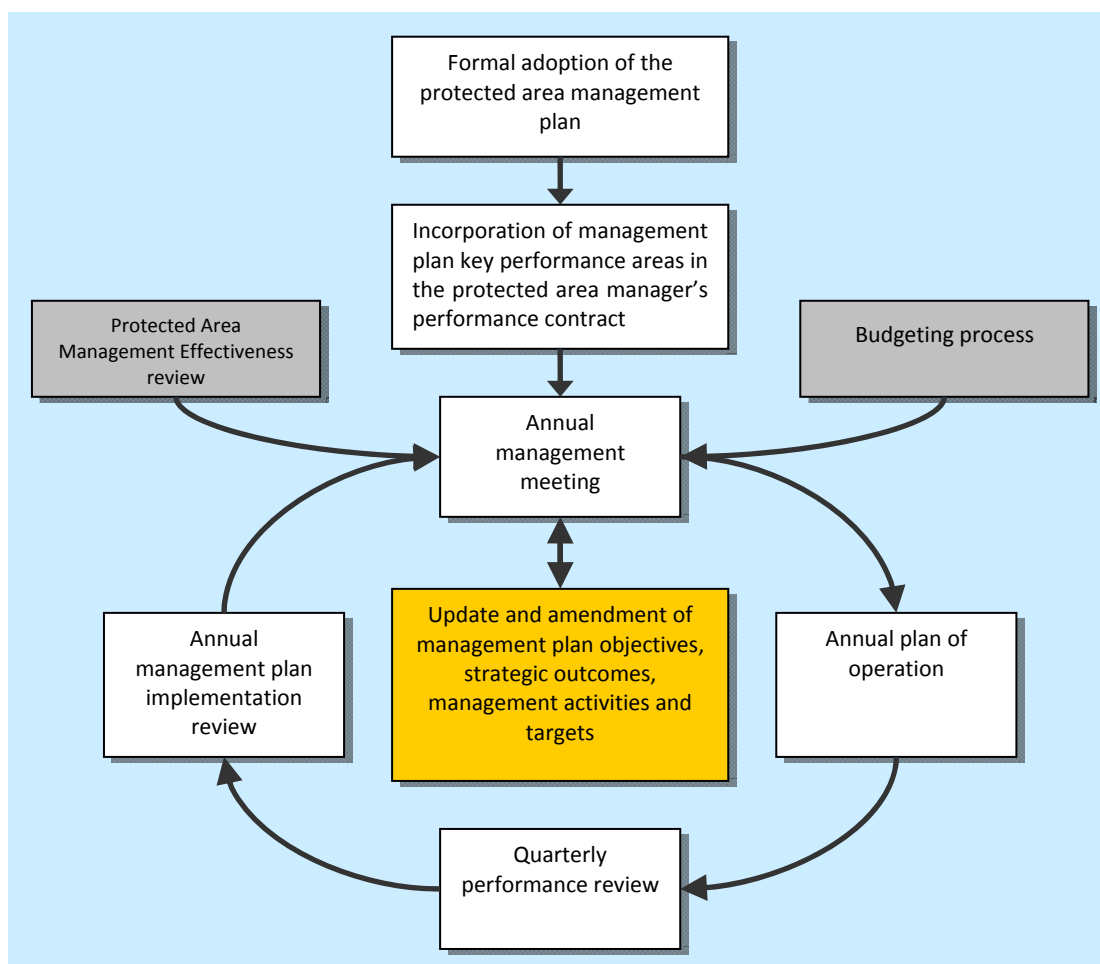
the WWF and World Bank Protected Area Management Effectiveness Tools (Stolton *et al.*, 2007).

Any proposed significant changes to the management plan that are likely to result in amendment to the vision, objectives and zonation must be supported by the Regional Operations Committee and the Operations Committee (OPSCOM, or its operational successor) before being subjected to the appropriate stakeholder participation process and before OPSCOM recommends that the proposed amended management plan be submitted for authorisation to the Ezemvelo KZN Wildlife Executive Committee, Board, and onward to the MEC.

## 7 UMHLANGA LAGOON NATURE RESERVE ANNUAL PLAN OF OPERATION

Each year, an annual plan of operation will be prepared, based on the objectives, strategic outcomes, management activities and targets contained in the protected area management plan.

### 7.1 Implementation of the protected area management plan



**Figure 4: Process for the implementation of Protected Area Management Plans**

Each year, an annual management meeting is held for each protected area managed by Ezemvelo KZN Wildlife. In terms of the implementation of the management plan, the purpose of the annual management meeting for the nature reserve will be to:

- Finalise the annual report, as part of the annual management plan implementation review, described in Section 6.2 above.
- As part of the annual performance review, determine the need to modify or change any of the management plan's objectives, strategic outcomes, management activities or targets.
- Determine management activities for the coming year and set goals for each quarter, based on the key performance areas set out in the management plan, in accordance with the nature reserve manager's performance contract.

- Determine how budgets will be spent, in an effort to achieve the goals for each of the quarters of the coming year.

The minutes and notes of the annual management meeting will be compiled in an annual plan of operation, which will include all of the information, set out above, and will determine what management activities need to be completed for the coming year, based on the management plan. The annual plan of operation will be tied to staff performance contracts, and goals set in them will be categorised within the same key performance areas as the management plan. A pro forma annual plan of operation is set out in Appendix F.

## **7.2 Responsibilities in implementing the management plan**

In the tables in the operational management framework, the responsibilities for the completion of management activities are identified. In many cases, the people responsible for implementing the activities will be in attendance at the annual management meeting and the requirements for the achievement of the management activities can be discussed and agreed to at the meeting. In some cases, however, the management activities may be required to be referred to the Regional Operations Committee and the Biodiversity Conservation Operations Management Meeting (BCOMM), in order to assign responsibility for the completion of the management activity.

## **7.3 Umhlanga Lagoon Nature Reserve resource requirements**

In developing annual plans of operation for Umhlanga Lagoon Nature Reserve, the resource requirements, associated with management activities and targets set out in the operational management framework, must be considered and budgeted for. The following section broadly identifies the issues that must be considered in determining adequate human resources, funds and equipment for the nature reserve.

### **7.3.1 Staff and equipment**

Annual plans of operation must consider the staff and equipment needs to undertake the following activities:

- Administration and management of the nature reserve.
- Patrolling of the nature reserve and its boundaries.
- An ongoing invasive plant species control programme.
- An ongoing soil erosion control and rehabilitation programme.
- Ecological monitoring and data capture.
- Maintenance of roads, paths and fences within the nature reserve.
- Maintenance of facilities and infrastructure within the nature reserve.
- Capture of visitor information and statistics.
- Stakeholder engagement and cooperation.
- Environmental interpretation and education.

### **7.3.2 Projects**

In addition to the requirements for annual recurrent funding for the issues outlined above, there will be a need to identify funding requirements for the following capital projects:

1. The relocation of the electrical box from along the boardwalk to the entrance gate.
2. The replacement of the boardwalk across the estuary.

### **7.4 Annual financial plan**

The annual plan of operation must contain a financial plan, which must be approved by the Operations Committee East. The annual goals, contained in the annual plan of operation, will be prioritised with the approved budget and guided by the strategic direction of the integrated management plan.

### **7.5 Financial accounting system**

It is accepted that all fiscal management will be guided by the Public Finance Management Act (No.1 of 1999) and the Ezemvelo KZN Wildlife Financial Policy and Procedures directive. Funding sources not generated internally will be accounted for in the prescribed process as determined by the donor source.

### **7.6 Financial reporting**

Annual and quarterly fiscal reports will be submitted, as directed by the Regional Operations Committee.

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## 9 APPENDICES

Appendix A – Definition of Terms

Appendix B – List of statutes to which the Umhlanga Lagoon Nature Reserve is subject

Appendix C – List of unpublished and supporting documentation

Appendix C1 – Ezemvelo KZN Wildlife corporate policies

Appendix C2 – Copy of Umhlanga Lagoon Nature Reserve proclamation

Appendix C3 – Umhlanga Lagoon Nature Reserve Public Participation Report, June 2013

Appendix D – Listed activities requiring environmental authorisation in terms of Regulation R.546, Listing Notice No.3

Appendix E – Species lists

Appendix F – Pro forma annual plan of operation

## Appendix A: Definitions of Terms

Alien species	Species or genotypes, which are not indigenous to Umhlanga Lagoon Nature Reserve and the surrounding area including hybrids and genetically altered organisms.
Biodiversity	The variability among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part and also includes diversity within species, between species, and of ecosystems (as per the National Environmental Management: Biodiversity Act, 2004 [Act No. 10 of 2004]).
Bioprospecting	In relation to indigenous biological resources, means any research on, or development or application of, indigenous biological resources for commercial or industrial exploitation, and includes – the systematic search, collection or gathering of such resources or making extractions from such resources for purposes of such research, development or application (as per the National Environmental Management: Biodiversity Act, 2004 [Act No. 10 of 2004])
Board	The KwaZulu-Natal Nature Conservation Board as defined by the KwaZulu-Natal Nature Conservation Management Act, 1997 (Act No.9 of 1997).
Buffer zone	An area surrounding Umhlanga Lagoon Nature Reserve that has restrictions placed on its use or where collaborative projects and programmes are undertaken to afford additional protection to the nature reserve.
Co-management	The term ‘Co-management’ must be understood within the context of Section 42 of the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003).
Cultural heritage	As defined in Article 1 of the World Heritage Convention (UNESCO) 1972 , ‘cultural heritage’ is considered as “monuments, architectural works, works of monumental sculpture and painting, elements or structures of an archaeological nature, inscriptions, cave dwellings and combinations of features, which are of (...) value from the point of view of history, art or science, groups of buildings, groups of separate or connected buildings which, because of their architecture, their homogeneity or their place in the landscape, are of significance from the point of view of history, art or science, sites, works of man or the combined works of nature and man, and areas including archaeological sites which are of (...) value from the historical, aesthetic, ethnological or anthropological point of view.” For the purpose of this IMP, living heritage features such as mountains, pools, rivers, boulders, etc. as well as palaeontological features are included under this definition.
Eco-cultural Tourism (ecotourism):	The travel to natural areas to learn about the way of life and cultural history of people, the natural history of the environment, while taking care not to change the environment and contributing to the economic welfare of the local people (adapted from a definition of ecotourism by Hecto Ceballos Lascurain).
Ecological integrity	The sum of the biological, physical and chemical components of an ecosystem and its products, functions and attributes (as per the National Environmental Management: Protected Areas Act, 2003 [Act No. 57 of 2003]).
Ecosystem	A dynamic complex of animal, plant and micro-organism communities and their non-living environment interacting as a functional unit (as per the National Environmental Management: Protected Areas Act, 2003 [Act No. 57 of 2003]).

Ecosystem services	<p>As defined in Section 1 of the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) as “environmental goods and services” meaning:</p> <ol style="list-style-type: none"> <li>Benefits obtained from ecosystems such as food, fuel and fibre and genetic resources.</li> <li>Benefits from the regulation of ecosystem processes such as climate regulation, disease and flood control and detoxification.</li> <li>Cultural non-material benefits obtained from ecosystems such as benefits of a spiritual, recreational, aesthetic, inspirational, educational, community and symbolic nature;”</li> </ol> <p>For the purposes of this IMP, sustainable water production is also specifically included under this definition.</p>
Environmental degradation	The deterioration of the environment through depletion of resources such as air, water and soil; the destruction of ecosystems and the loss of species or undesirable reduction of species population numbers from a specific area from an environmental health perspective
Ezemvelo KZN Wildlife	Nature Conservation Service as established in terms of the KwaZulu-Natal Nature Conservation Management Act No. 9 of 1997.
Indigenous species	In relation to a specific protected area, means a species that occurs, or has historically occurred, naturally in a free state of nature within that specific protected area, but excludes a species introduced in that protected area as a result of human activity (as per the National Environmental Management: Protected Areas Act, 2003 [Act No. 57 of 2003]).
Invasive species	<p>Means any species whose establishment and spread outside of its natural distribution range –</p> <p>Threaten ecosystems, habitats or other species or have a demonstrable potential to threaten ecosystems, habitats or other species.</p> <p>May result in economic and environmental harm or harm to human health.</p> <p>(As per the National Environmental Management: Protected Areas Act, 2003 [Act No. 57 of 2003]).</p>
Joint management	The agreed co-ordination of management and/or management actions by landowners and/or mandated managers on their individual or combined properties in order to achieve common management objectives.
Local community	Any community of people living or having rights or interests in a distinct geographical area (as per the National Environmental Management: Protected Areas Act, 2003 [Act No. 57 of 2003]).
Management	In relation to a protected area, includes control, protection, conservation, maintenance and rehabilitation of the protected area with due regard to the use and extraction of biological resources, community-based practices and benefit sharing activities in the area in a manner consistent with the Biodiversity Act (as per the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003).

Management authority	In relation to a protected area, means the organ of state or other institution or person in which the authority to manage the protected area is vested (as per the National Environmental Management: Protected Areas Act, 2003 [Act No. 57 of 2003]).
Monitoring	The collection and analysis of repeated observations or measurements to evaluate change in status, distribution or integrity in order to track the impacts of directed management implemented to achieve a stated management objective.
Nature conservation	The conservation of naturally occurring ecological systems, the sustainable utilisation of indigenous plants and animals therein, and the promotion and maintenance of biological diversity (as per the KwaZulu-Natal Nature Conservation Management Act, 1997 [Act No.9 of 1997]).
Neighbouring community	The communities and people permanently living in the local municipal area/s bordering onto the Nature Reserve.
Natural heritage	As defined in Article 2 of the World Heritage Convention (UNESCO) 1972 ‘natural heritage’ is as: “natural features consisting of physical and biological formations or groups of such formations, which are of (...) value from the aesthetic or scientific point of view, geological and physiographical formations and precisely delineated areas which constitute the habitat of threatened species of animals and plants of (...) value from the point of view of science or conservation, natural sites or precisely delineated natural areas of (...) value from the point of view of science, conservation or natural beauty.” For the purposes of this IMP, this would include the required ecological integrity of the protected area for the production of ecosystem services.
Partnerships	A co-operative and / or collaborative arrangement between the Game Reserve management / Ezemvelo and a third party that supports the achievement of the Game Reserve management objectives.
Protected areas	Means any area declared or proclaimed as such in terms of section 3 or listed in the Second Schedule to the KwaZulu-Natal Nature Conservation Management Act, 1997 (Act No. 9 of 1997); or  Means any of the protected areas referred to in section 9 of the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003).
Protected area management committee	Is the management body that deals with the day-to-day management of the protected area and is chaired by the OIC.
Ramsar Convention	Means: “The Convention on Wetlands of International Importance, signed in Ramsar, Iran, in 1971, is an intergovernmental treaty, which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.” (There are presently 158 Contracting Parties to the Convention, the Convention has broadened its scope to cover all aspects of wetland conservation and wise use, recognising wetlands as ecosystems that are extremely important for biodiversity conservation in general and for the well-being of human communities.)

Stakeholders/ interested parties	These are interested individuals or groups concerned with or affected by an activity and its consequences. These include the authorities, local communities, investors, work force, consumers, environmental interest groups and the general public. According to the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), “stakeholder” means a person, an organ of state or a community contemplated in section 82 (1) (a), or an indigenous community contemplated in section 82(1) (b).
Surveillance	The collection and analysis of single or repeated measurements to establish status or distribution or integrity at a point in time in the absence of a specific management context or objective.
Sustainable	In relation to the use of a biological resource, means the use of such resource in a way and at a rate that would not lead to its long-term decline; would not disrupt the ecological integrity of the ecosystem in which it occurs; and would ensure its continued use to meet the needs and aspirations of present and future generations of people (as per National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).
Wilderness area	Means an area designated in terms of section 22 or 26 for the purpose of retaining an intrinsically wild appearance and character, or capable of being restored to such and which is undeveloped and roadless, without permanent improvements or human habitation (as defined by the National Environmental Management: Protected Areas Act, 2003 [Act No. 57 of 2003]).
World heritage site	Means a World Heritage Site as defined in the World Heritage Convention Act, No. 49 of 1999 under Chapter 1, section 1 subsection (xxiv).

## **Appendix B – List of statutes to which the Umhlanga Lagoon Nature Reserve is subject**

### **Biodiversity and Cultural Resource Management and Development:**

- Animals Protection Act [No. 71 of 1962]
- Atmospheric Pollution Prevention Act [No. 45 of 1965]
- Conservation of Agricultural Resources Act [No. 43 of 1983]
- Constitution of the Republic of South Africa [No. 108 of 1996]
- Criminal Procedures Act [1977]
- Environment Conservation Act [No. 73 of 1989]
- Forest Act [No. 122 of 1984]
- Hazardous Substances Act [No. 15 of 1973]
- Integrated Coastal Management Act [No. 24 of 2008]
- KwaZulu Nature Conservation Act [No. 8 of 1975]
- KwaZulu-Natal Heritage Management Act [No. 10 of 1997]
- KwaZulu-Natal Nature Conservation Management Act [No. 9 of 1997]
- Marine Living Resources Act [No. 18 of 1998]
- National Environmental Management Act [No. 107 of 1998]
- National Environmental Management: Biodiversity Act [No. 10 of 2004]
- National Environmental Management: Protected Areas Act [No. 57 of 2003]
- National Forests Act [No. 84 of 1998]
- National Heritage Resources Act [No. 25 of 1999]
- National Water Act [No. 36 of 1998]
- National Water Amendment Act [No. 45 of 1999]
- National Veld and Forest Fire Act [No 101 of 1998]
- Nature Conservation Ordinance [No. 15 of 1974]

### **General Management:**

- Development Facilitation Act [No. 67 of 1995]
- Disaster Management Act [No. 57 of 2002]
- Fire Brigade Services Act [No. 99 of 1987]
- Local Government: Municipal Systems Act [No. 32 of 2000]
- National Road Traffic Act [No. 93 of 1996]
- National Building Standards Act [No. 103 of 1977]
- Natal Town Planning Ordinance [No. 27 of 1949]
- Occupational Health and Safety Act [No. 85 of 1993]
- KwaZulu-Natal Planning and Development Act [No. 5 of 1998]
- Water Services Act [No. 108 of 1997]

### **Financial Management:**

- Public Finance Management Act [No. 1 of 1999]

### **Human Resource Management:**

- Basic Conditions of Employment Act [No. 75 of 1997]
- Broad-Based Black Economic Empowerment Act [No. 53 of 2003]
- Compensation for Occupational Injuries and Diseases Act [No. 130 of 1993]
- Employment Equity Act [No. 55 of 1998]
- Labour Relations Act [No. 66 of 1995]
- Occupational Health and Safety Act [No. 85 of 1993]
- Pension Funds Act [No. 24 of 1956]
- Skills Development Act [No. 97 of 1998]
- Skills Development Levies Act [No. 9 of 1999]
- Unemployment Insurance Act [No. 63 of 2001]



## **Appendix C – List of unpublished and supporting documentation**

Copies of documents not included in this PAMP available from:

- (a) Reserve Management and / or,
- (b) Regional Ecologist

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Item:

1. Ezemvelo KZN Wildlife Corporate Strategic Plan and Performance Plan for 2009-2014.
2. Ezemvelo Corporate Policies and Procedures (Norms & Standards), listed in the table in Appendix C1.
3. Proclamations of Beachwood Mangroves Nature Reserve – Appendix C2.
4. Beachwood Mangroves Nature Reserve Public Participation Report, June 2013 – Appendix C3.

## Appendix C1 – Ezemvelo KZN Wildlife corporate policies

The table below lists the Ezemvelo KZN Wildlife corporate policies (norms and standards), referenced from the intranet, that are most relevant to Ezemvelo KZN Wildlife protected area management. It is the responsibility of all management and other personnel associated with management of protected areas to ensure that they familiarise themselves and comply with the most recent versions of all Ezemvelo KZN Wildlife Board Approved Policies.

<b><u>Ezemvelo KZN Wildlife CORPORATE POLICIES (NORMS &amp; STANDARDS)</u></b>	
<b><u>Policy File No.</u></b>	<b>CORPORATE AFFAIRS</b>
B 2	Access to Ezemvelo KZN Wildlife Areas and Employment.
B 5	Outsourcing of Functions and Services
B 7	Monuments, Memorials and Names of Protected Areas under the control of Ezemvelo.
B 8	Restricted use of Board Theatres, Halls and Conference Facilities etc.
B 9	Code of Ethics / Conduct.
B 10	Photography in Board Protected Areas.
B 13	Mission Statement
B 14	Access to Information.
<b><u>Policy File No.</u></b>	<b>INTERNAL AUDIT</b>
C 5	Management Control
<b>BIODIVERSITY CONSERVATION OPERATIONS</b>	
<b>1. NATURAL RESOURCE SUSTAINABILITY</b>	
<b><u>Policy File No.</u></b>	<b>Threatened Species and Ecosystems</b>
D 1.1	Disposal of Black Rhino.
D 1.2	Disposal of Surplus White Rhino.
D 1.3	Strategy for the Management of Southern White Rhino in KwaZulu-Natal.
D 1.4	Strategy for the Biological Management of Black Rhino in KwaZulu-Natal.
D 1.5	Rhinoceros Products.
D 1.6	Crocodilians
D 1.7	Cycads.
D 1.8	Disposal of Threatened Species.
<b><u>EZEMVELO CORPORATE POLICIES (NORMS &amp; STANDARDS)</u></b>	
<b>BIODIVERSITY CONSERVATION OPERATIONS</b>	
<b>1. NATURAL RESOURCE SUSTAINABILITY</b>	
<b><u>Policy File No.</u></b>	<b>Exotic and Invasive Species</b>
D 1.9	Release of Alien Species.
D 1.10	Control Measures for Red-billed Quelea.
D 1.12	Grass Carp.
D 1.13	Establishment of Alien Plantations.
<b><u>Policy File No.</u></b>	<b>Migratory Species</b>
D 1.14	Black Wildebeest and Blue Wildebeest Hybridization and Conservation.
D 1.15	Permit authorising the collection of Biological Material within Board Areas.
<b>2. CONSERVATION EFFECTIVENESS</b>	

<u>Policy File No.</u>	<b>Strategic Applications</b>
D 2.1	Involvement of the KwaZulu-Natal Nature Conservation Board in Project 8 of the MAB (Man and Biosphere) Programme.
<u>Policy File No.</u>	<b>Conservation Management: Protected Area Management</b>
D 2.2	Management of Wilderness Areas.
D 2.3	Protected Area Development.
D 2.4	Prohibition of Works and Servitudes in Board Areas.
D 2.5	Zonation and Regulations for the control of off-road vehicles on beaches controlled by the Board.
D 2.6	Quarries in KZN Protected Areas.
D 2.7	Re-establishment and Management of Vegetation on Development Sites in the Ezemvelo KZN Wildlife Protected Areas.
D 2.8	Ecotourism and Protected Areas.
D 2.9	Solid Waste Management within Protected Areas.
D 2.10	State Security Service Activities within Board Areas.
D 2.11	Shark Nets in or bordering KwaZulu-Natal Nature Conservation Board Controlled Areas.
<u>Policy File No.</u>	<b>Integrated Environmental Management</b>
D 2.12	Integrated Environmental Management - incorporating the procedure for the assessment of the impact of proposed development projects on nature conservation concerns.
D 2.13	Precautionary Principle.
D 2.14	Shark Net Installations.
D 2.15	Bioprospecting in KwaZulu-Natal.
D 2.17	Use of Pesticides by the Ezemvelo KZN Wildlife: Safety to Humans and the Environment.
D 2.18	Interference with the Mouth of a Lagoon or River (Breaching).
<u>Policy File No.</u>	<b>Ex Situ Wild Animal Management</b>
D 2.21	Re-establishment of Terrestrial Mammals in Board Areas.
D 2.22	Translocation of Animals.
D 2.25	Elephant Introductions and Elephant in Enclosures.
D 2.27	Introduction and Keeping of Large Predators in Enclosures in KZN.
D 2.28	Use of Narcotic Drugs.
D 2.29	Falconry.
<b><u>EZEMVELO KZN WILDLIFE CORPORATE POLICIES (NORMS &amp; STANDARDS)</u></b>	
	<b>BIODIVERSITY CONSERVATION OPERATIONS</b>
	<b>2. CONSERVATION EFFECTIVENESS</b>
<u>Policy File No.</u>	<b>Human Animal Conflict - Inside and Outside Protected Areas</b>
D 2.30	Disposal of Leopard from Ezemvelo KZN Wildlife Protected Areas.
D 2.31	Problem Animal Control.
D 2.32	Compensation claims in respect of damage caused by Lion, Cheetah, Wild Dog and Elephant to Stock and Crops.
D 2.33	Instances of Death as a result of an Unprovoked Attack by a Wild Animal Normally contained and originating from within a Fenced Protected Area under the Control of the KwaZulu-Natal Nature Conservation Board.
<u>Policy File No.</u>	<b>Environmental Awareness</b>
D 2.34	Environmental Education Policy.

	<b>3. BIODIVERSITY PROTECTION</b>
<u>Policy File No.</u>	<b>Co-management</b>
D 3.1	Supply of Game to Conservancies, Community Conservation Areas and Biosphere Reserves in KwaZulu-Natal
D 3.2	Establishment and Management of Community Conservation Reserves (CCR)
D 3.4	Community Conservation Programmes
D 3.5	Neighbours' Access to Board Protected Areas
D 3.6	Relationship with Local Boards
D 3.7	Conservation Partnerships Between KwaZulu-Natal Nature Conservation Board and Adjacent Landowners
D 3.8	Community Trust
D 3.9	Community Levy Policy and Guidelines
D 3.10	Land Claims on Proclaimed and Unproclaimed Provincial and Assigned National Protected areas in KwaZulu-Natal
D 3.11	Amafa Policy Guidelines for the access of rock art sites in KwaZulu Natal
<u>Policy File No.</u>	<b>Resource-use benefits</b>
D 3.12	Disposal of Venison from Ezemvelo KZN Wildlife Management Operations.
D 3.13	Sustainable use of wildlife resources.
D 3.14	Freshwater Angling.
D 3.15	Freshwater species utilisation.
D 3.16	Use of plant resources from protected areas.
D 3.17	Use of doomed biological material.
D 3.19	Provision of hunting by Ezemvelo KZN Wildlife.
<u>Policy File No.</u>	<b>4. RELATIONSHIPS</b>
D 4.1	Neighbour Relations.
D 4.2	Participation - Non Government Organisations.
D 4.3	Data Access.
D 4.4	Consultation and Communication with Stakeholders: Policy and Guidelines.

**EZEMVELO CORPORATE POLICIES (NORMS & STANDARDS)**

<b><u>Policy File No.</u></b>	<b>COMMERCIAL OPERATIONS</b>
E 1	Concessions for Welfare Groups.
E 2	Hiking and Mountaineering.
E 3	Educational Concessions.
E 4	Club Facilities within Board Areas.
E 5	Hutted Camps.
E 6	Joint Venture Scheme.
E 7	Allocation of Sites in terms of the Joint Venture Scheme.
E 8	Access to Protected Areas through Unofficial Entry Points.
E 9	Visitor Facilities Management by Ezemvelo KZN Wildlife.
E 10	Lease of Lakeshore at State Dam Protected Areas.
E 11	Execution, Control and Management of Leases and Concession Contracts (excluding Biodiversity Conservation Partnerships and Leases of Wildlife).
E 12	Private Sector Reservations Policy.
E 13	Partnerships for Eco-Tourism Development within or Adjacent to Protected Areas.
E 14	Discounting of Tariffs for Walk-in Guests.
E 15	Ecotourism Discounting Strategy.
E 16	Travel Trade Commissions: Tour Operator/ Travel Agency.
E 17	Policy and Procedure for the establishment and monitoring of Commercial Operations Public Private Partnership (PPP) Agreements.
E 18	Administrative and operational policy on Professional hunting in South Africa.
E 19	Commercialisation.

## Appendix C2 – Copy of Umhlanga Lagoon Nature Reserve proclamation

\*No. 74, 1980.

[Afrikaanse teks deur die  
Administrateur onderteken]

### PROKLAMASIE

van die Administrateur van die Provinsie Natal

**K**RAGTENS die bevoegdhede aan my verleen by artikel 2 (1) van die Ordonnansie op Natuurbewaring, 1974 (Ordonnansie No. 15 van 1974), proklameer, verklaar en maak ek hierby bekend dat die grond omskryf as Ond 452 (van B) van Lot 31 No. 1560, groot 1,9516 ha, en Restant van Ond 435 van Lot 31 No. 1560 met uitsondering van die provinsiale grootpad en padreserwe, groot ongeveer 23,7312 ha, albei geleë in die gebied van die Streekwaterdienskorporasie Noordkus, County Victoria, Provinsie Natal, met ingang van die afkondigingsdatum hiervan 'n natuurtuin is wat as die Natuurtuin Umhlanga-lagune bekend moet staan.

Gegee onder my handtekening te Pietermaritzburg, Natal, op hede die 18de dag van Junie eenduisend negenhonderd en tagtig.

J. C. G. BOTHA  
Administrateur

\*No. 74, 1980.

[Afrikaans text signed by  
the Administrator]

### PROCLAMATION

by the Administrator of the Province of Natal

**U**NDER the power vested in me by section 2 (1) of the Nature Conservation Ordinance, 1974 (Ordinance No. 15 of 1974), I do hereby proclaim, declare and make known that, with effect from the date of publication hereof, the land described as Sub 452 (of B) of Lot 31 No. 1560, in extent 1,9516 ha, and Remainder of Sub 435 of Lot 31 No. 1560, excluding the Provincial main road and road reserve, in extent approximately 23,7312 ha, both situate in the North Coast Regional Water Services Corporation Area, County of Victoria, Province of Natal, shall be a nature reserve and shall be known as the Umhlanga Lagoon Nature Reserve.

Given under my hand at Pietermaritzburg, Natal, this 18th day of June, one thousand nine hundred and eighty.

J. C. G. BOTHA  
Administrator

\*No. 58, 1986

[Afrikaans text signed by  
the Administrator]**PROCLAMATION**

by the Administrator of the Province of Natal

IN terms of section 2(1) of the Nature Conservation Ordinance, 1974 (Ordinance 15 of 1974), I hereby proclaim that portion of the Umhlanga River as described in the Schedule hereto, to be a nature reserve which shall form part of the Umhlanga Lagoon Nature Reserve.

Dated at Pietermaritzburg, Natal, this 9th day of September one thousand nine hundred and eighty-six.

R. M. CADMAN  
Administrator**SCHEDULE**

From the point lettered D1 on diagram S.G. No. 3254/1972 of Sub 452 (of 46) of Lot 31 No. 1560; thence along the high water mark of the left bank of the Umhlanga River to the point lettered C on the said diagram; thence along the high water mark of the Indian Ocean to the point lettered B on diagram S.G. No. 4553/1969 of the Remainder of Sub 435 of Lot 31 No. 1560; thence along the high water mark of the right bank of the Umhlanga River to the point common to the said Remainder of Sub 435 and Sub 436 both of Lot 31 No. 1560; thence northeastwards in a straight line to the point first mentioned.

\*No. 58, 1986

[Afrikaanse teks deur die  
Administrateur ongeteek]**PROKLAMASIE**

van die Administrateur van die Provinsie Natal

INGEVOLGE artikel 2(1) van die Ordonnansie op Natuurbewaring, 1974 (Ordonnansie 15 van 1974), proklameer ek hierny daardie gedeelte van die Umhlangarivier wat in die bylae hiervan omskryf word, tot 'n natuurruimte wat deel van die Natuurruimte Umhlanga-lagune uitmaak.

Geteken te Pietermaritzburg, Natal, hierdie 9de dag van September eenduisend negehoonderd ses-en-tagtig.

R. M. CADMAN  
Administrateur**BYLAE**

Van die punt geletter D1 op diagram L.G. No. 3254/1972 van Ond 452 (van 46) van Lot 31 No. 1560; daarvandaan langs die hoogwaterlyn van die linkeroewer van die Umhlangarivier tot by die punt geletter C op voormelde diagram; daarvandaan langs die hoogwaterlyn van die Indiese Oseaan tot by die punt geletter B op diagram L.G. No. 4553/1969 van die Restant van Ond 435 van Lot 31 No. 1560; daarvandaan langs die hoogwaterlyn van die regteroewer van die Umhlangarivier tot by die punt gemeenskaplik aan voormelde Restant van Ond 435 en Ond 436 albei van Lot 31 No. 1560; daarvandaan reguit noordooswaarts tot by eersgenoemde punt.

Umhlanga lagoon.



SIDES		DIRECTIONS	CO-ORDINATES		S.G. No.:
METRES			Y	Lo 31	
			Constant	+3 280 000,00	3254/1972 Approved <i>A.P. Beale</i> f. Surveyor-General 11-10-1972
			A225 -8 551,27 +	9 731,50	
			A263 -7 091,48 +	9 085,64	
AB	155,00	315.31.20	A -9 676,93 +	6 742,04	
BD	151,47	128.09.20	B -9 785,53 +	6 852,64	
DA	20,00	211.41.20	D -9 666,42 +	6 759,06	
BB1		315.31.20			
DD1		31.41.20			

**BEACON DESCRIPTION**  
20mm pipe 300mm underground East of RR marker ..... A.  
20mm pipe & cairn of stones .. B.D.

Act/Wet 10/10  
10/1970 dated 25-7-1972  
PTB PDR 3/5829

NOW SUB. 452 (of 46) OF Lot 31 NO 1560

Scale: 1:2500  
The figure represents A, B1, high water mark of Indian Ocean, C, high water mark of left bank of Umhlanga River, D1.  
1,9516 Hectares of land being  
SUB 452 (of B) of LOT 31 No. 1560  
County of Victoria,  
situate in the Sept. Oct. & Nov. 1967, March. April. Sept.  
Surveyed in Oct. & Dec. 1968, Sept. & Oct. 1969,  
by me June & July 1972.  
Province of Natal  
*Hayton*  
Land Surveyor

This diagram is annexed to D/T No. 15539/74  
Registrar of Deeds

The Original Diagram is No. Sub. Vol. 26 fol 118.  
Transfer No. 351/1864.

File No. 1560/B  
S.R. No. 338/1972  
Comp. FU-5C.  
FU-5C-17B.  
Degree Sheet 59.

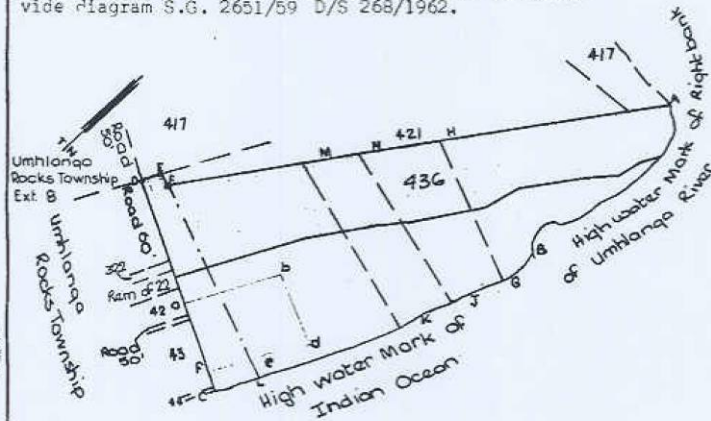




WALL, MARRIOTT, PAUL & BORGES, LAND SURVEYORS - DURBAN.

SIDES ENGLISH FEET	DIRECTIONS	CO-ORDINATES		S.G. No:
		Y SYSTEM	X	
				4553/1969
				Approved <i>[Signature]</i> Surveyor-General 5. 3. 70.

The figure a.b.d.e.f. represents a water servitude vide diagram S.G. 2651/59 D/S 268/1962.



Scale 1 in 15000

The figure A high water mark of right bank of Umhlanga River B high water mark of Indian Ocean C.D.E.F. represents 150.8567 Acres

SUB 435 OF LOT 31 NO. 1560

of land being 61.0496...ha. (m)

and comprises:

1. The figure A high water mark of right bank of Umhlanga River B high water mark of Indian Ocean G.H. representing Sub 38 of Lot 31 No 1560 vide. Dgm S.V.E35, D.T. 639/1851.
2. The figure H.G. high water mark of Indian Ocean J.N. representing Sub 37 of Lot 31 No 1560 vide. Dgm G.V. 82/10, D/G 4833.
3. The figure N.J. high water mark of Indian Ocean K.M. representing Sub 36 of Lot 31 No 1560 vide. Dgm G.V. 82/14, D/G 4829.
4. The figure M.K. high water mark of Indian Ocean L.F. representing Sub 29 of Lot 31 No 1560 vide G.V. 82/13 and D.G. 4830.
5. The figure E.L. high water mark of Indian Ocean C.D. representing Rem of 28 of Lot 31 No 1560 vide S.V. E/26 and D.T. 632/1851.

Situate in the County of Victoria, Province of Natal  
Compiled in October 1969

By me

*[Signature]*  
Land Surveyor

This diagram is annexed to CCT No. 1769/1971 Registrar of Deeds	The Original Diagrams are No. are as quoted above Transfer No.	File No. 1560 S.R. No. Comp. FU. 5C. 178 Degree Sheet 59
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J. C. S. & CO. - R

FOR ENDORSEMENTS, etc., SEE BACK

Accepted for approval  
Surveyor-General.  
24 FEB 1940

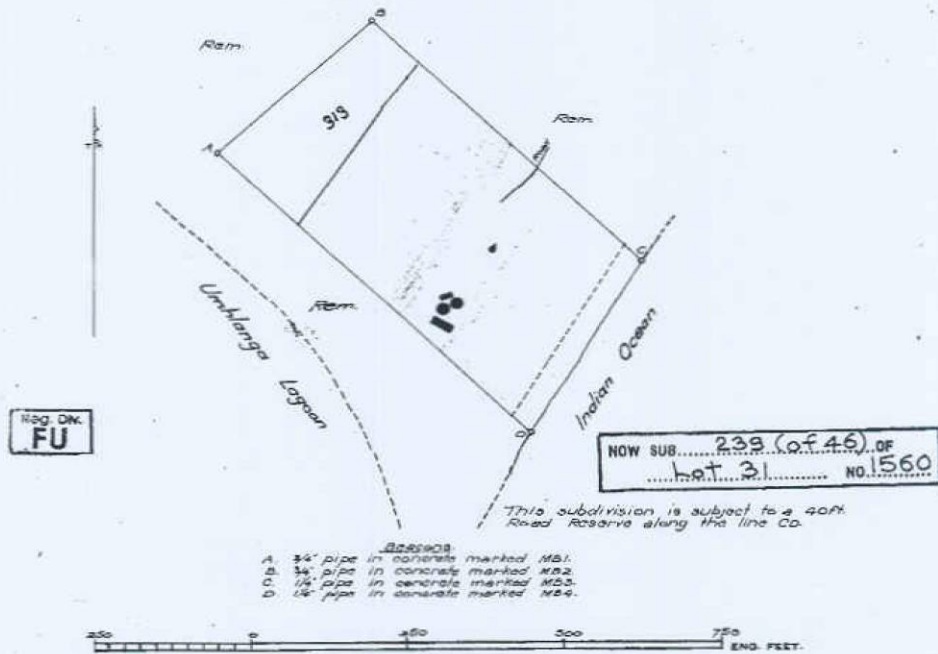
SUBDL. DIAGRAM  
Sect. 24 (b), Act No. 2 of 1927

OFFICE USE

S.G. No. 216/1940

SIDES	ENG. FEET.	ANGLES OF DIRECTION.	CO-ORDINATES	
			Y	X
AB	344.4	45° 30' 0"	A - 43.7	+ 33.4
BC	611.8	135 30 0	B + 135.3	+ 334.8
CD	360.0	208 33 0	C + 62.6	- 101.5
DA	716.6	315 30 0	D + 452.5	- 417.7

Approved  
*J.R. Brown*  
Surveyor General.  
- 6 AUG 1940



The figure A B C High Water Mark, D. of Indian Ocean.  
represents 5.2502 acres of Land being  
Sub 2 of Sub B of Lots 31-32-33-34-35-36-37-38-39-40-41-42-43-44-45  
situate in the County of Victoria. Province of Natal.  
Surveyed in January 1940 by me *Walter F. Short*  
Land Surveyor.

This diagram relates to Deed of Transfer No. 1264/1940 2/9/40. (Sd) L. Stephenson Registrar of Deeds.	Original diagram is No. Sub. Vol. 26 Fol. 118 relating to Deed of Transfer No. 35/1944	File No. 313/5 Survey Records 15 1940 Tracing Degree Sheet 52 Compilation FU-5C-10A General Plan
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## **Appendix C3 – Umhlanga Lagoon Nature Reserve Public Participation Report, June 2013**

This document is available as a separate report.

## **Appendix D – Listed activities requiring environmental authorisation in terms of Regulation R.546, Listing Notice No.3**

If any of the following activities are proposed in a protected area, proclaimed in terms of the Protected Areas Act, or within five kilometres of one, they will be subject to either a basic assessment or full scoping and environmental impact assessment process:

- The construction of billboards exceeding 18 square metres in size.
- The construction of reservoirs for bulk water supply with a capacity of more than 250m<sup>3</sup>.
- The construction of masts or towers of any material or type used for telecommunication broadcasting or radio transmission purposes where the mast:
  - Is to be placed on a site not previously used for this purpose.
  - Will exceed 15 metres in height but excluding attachments to existing buildings and masts on rooftops.
- The construction of a road wider than four metres with a reserve less than 13.5 metres.
- The construction of resorts, lodges or other tourism accommodation facilities.
- The conversion of existing structures to resorts, lodges or tourism accommodation facilities that sleep 15 people or more.
- The construction of aircraft landing strips and runways.
- The construction of above ground cableways and funiculars.
- The construction of facilities or infrastructure for the storage, or storage and handling of a dangerous good.
- The construction of tracks or routes for the testing, recreational use or outdoor racing of motor powered vehicles excluding conversion of existing tracks or routes for the testing, recreational use or outdoor racing of motor powered vehicles.
- The clearance of an area of 1ha or more of vegetation where 75% of the vegetative cover constitutes indigenous vegetation, except where such removal is required for:
  - The undertaking of a process or activity included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008), in which case the activity is regarded to be excluded from this list.
  - The undertaking of a linear activity falling below the thresholds mentioned in Listing Notice 1 in terms of GN No.544 of 2010

The construction of facilities and infrastructure or structures of any size for any form of aquaculture (this applies only inside a protected area, not within five kilometres of it).

- The construction of:
  - Jetties exceeding 10m<sup>2</sup> in size.
  - Slipways exceeding 10m<sup>2</sup> in size.
  - Buildings with a footprint exceeding 10m<sup>2</sup> in size.
  - Infrastructure covering 10m<sup>2</sup> or more.

Where such construction occurs within a watercourse or within 32 metres of watercourse, measured from the edge of the watercourse, excluding where such construction will occur behind the development setback line.
- The expansion of reservoirs for bulk water supply where the capacity will be increased by more than 250m<sup>3</sup>.
- The expansion of a resort, lodge, hotel and tourism or hospitality facilities where the development footprint will be expanded.
- The widening of a road by more than four metres or the lengthening of a road by more than one kilometre.
- The expansion of runways or aircraft landing strips where the expanded runways or aircraft landing strips will be longer than 1.4 kilometres in length.
- The expansion of above ground cableways and funiculars where the development footprint will be increased.
- The expansions of tracks or routes for the testing, recreational use or outdoor racing of motor powered vehicles excluding conversion of existing tracks or routes for the testing, recreational use or outdoor racing of motor powered vehicles, where the development footprint will be expanded.
- The expansions of facilities or infrastructure for the storage, or storage and handling of a dangerous good.
- The expansion of:
  - Jetties where the jetty will be expanded by 10m<sup>2</sup> in size or more.
  - Slipways where the slipway will be expanded by 10m<sup>2</sup> or more.
  - Buildings where the buildings will be expanded by 10m<sup>2</sup> or more in size.
  - Infrastructure where the infrastructure will be expanded by 10m<sup>2</sup> or more.

Where such construction occurs within a watercourse or within 32 metres of watercourse, measured from the edge of the watercourse, excluding where such construction will occur behind the development setback line.
- The expansion of facilities, infrastructure or structures of any size for any form of aquaculture (*this applies only inside a protected area, not within five kilometres of it*).
- Phased activities for all activities listed in the Schedule and as it applies to a specific geographical area, which commenced on or after the effective date of the Schedule, where any phase off the activity may be below a threshold but where a combination of the phases, including expansions or extensions, will exceed a specified threshold.

## Appendix E – Species lists

### Plant species of Umhlanga Lagoon Nature Reserve

A comprehensive plant species list of Umhlanga Lagoon has not been recorded, but the following short list of species is what is to be found in the Ezemvelo KZN Wildlife Database.

Class DICOTYLEDONAE(MAGNOLIOPSIDA)

Family LECYTHIDACEAE

*Barringtonia racemosa*

Family RHIZOPHORACEAE

*Bruguiera gymnorhiza*

Class MONOCOTYLEDONAE(LILIOPSIDA)

Family CYPERACEAE

*Cyperus thunbergii*

Family JUNCACEAE

*Juncus kraussii*

MONOCOTYLEDONAE(LILIOPSIDA)

Family POACEAE

*Phragmites australis*

Family STRELITZIACEAE

*Strelitzia nicolai*

Source:

Ezemvelo KZN Wildlife Database

## Mammals of Umhlanga Lagoon Nature Reserve

### Family BOVIDAE (Antelopes)

*Philantomba monticola bicolor*

Blue duiker

*Sylvicapra grimmia*

Common duiker, Grey duiker

*Tragelaphus scriptus*

Bushbuck

### Family CERCOPITHECIDAE

Vervet monkey

*Cercopithecus pygerythrus*

### Family VIVERRIDAE

Water mongoose

*Atilax paludinosus*

### Order EULIPOTYPHLA (Shrews, Moles and Hedgehogs)

#### Family SORICIDAE

Greater Red Musk Shrew

*Crocidura flavescens*

### Order RODENTIA

#### Family MURIDAE

Multimammate Mouse

*Mastomys natalensis*

### Source:

Rowe-Rowe, 1992; Rodents – Leigh Richards, Curator of Mammals Durban Museum (Pers Comm., 2013). No mammals in KZN Wildlife database.



## Birds of the Hawaan Forest area (which includes Umhlanga Lagoon Nature Reserve)

(Source Geoff Nichols & Bill Duthie (313 species); Ezemvelo KZN Wildlife Database (176 species).

Species marked with asterisk (\*) from both sources, those marked with † only in database. The old common name is included in brackets.

	Common Name	Scientific Name
3	Coqui Francolin	<i>Peliperdix coqui</i>
7	Shelley's Francolin	<i>Scleroptila shelleyi</i>
12	Natal Francolin	<i>Pternistes natalensis</i>
15	Common Quail	<i>Coturnix coturnix</i>
16	Harlequin Quail	<i>Coturnix delegorguei</i>
17	Blue Quail	<i>Coturnix adansonii</i>
19	Crested Guineafowl*	<i>Guttera pucherani</i>
20	Helmeted Guineafowl	<i>Numida meleagris</i>
21	Fulvous Duck	<i>Dendrocygna bicolor</i>
22	White-faced Duck*	<i>Dendrocygna viduata</i>
23	White-backed Duck	<i>Thalassornis leuconotus</i>
25	Egyptian Goose*	<i>Alopochen aegyptiacus</i>
27	Spur-winged Goose*	<i>Plectropterus gambensis</i>
28	Comb Duck (Knob-billed Duck)	<i>Sarkidiornis melanotos</i>
29	African Pygmy-Goose	<i>Nettapus auritus</i>
30	Cape Teal	<i>Anas capensis</i>
31	African Black Duck*	<i>Anas sparsa</i>
33	Yellow-billed Duck*	<i>Anas undulata</i>
34	Cape Shoveler	<i>Anas smithii</i>
36	Red-billed Teal (Red-billed Duck)	<i>Anas erythrorhyncha</i>
39	Hottentot Teal	<i>Anas hottentota</i>
40	Southern Pochard	<i>Netta erythrophthalma</i>
41	Small Buttonquail (Kurrichane Buttonquail)	<i>Turnix sylvatica</i>
44	Scaly-throated Honeyguide*	<i>Indicator variegatus</i>
45	Greater Honeyguide*	<i>Indicator indicator</i>
46	Lesser Honeyguide*	<i>Indicator minor</i>
49	Brown-backed Honeybird (Sharp-billed Honeyguide) *	<i>Prodotiscus regulus</i>
53	Golden-tailed Woodpecker*	<i>Campethera abingoni</i>
56	Cardinal Woodpecker*	<i>Dendropicos fuscescens</i>
58	Olive Woodpecker	<i>Dendropicos griseocephalus</i>
59	Red-throated Wryneck	<i>Jynx ruficollis</i>
60	White-eared Barbet*	<i>Stactolaema leucotis</i>
63	Yellow-rumped Tinkerbird (Golden-rumped Tinker Barbet)	<i>Pogoniulus bilineatus</i>
65	Red-fronted Tinkerbird (Red-fronted Tinker Barbet) *	<i>Pogoniulus pusillus</i>
67	Black-collared Barbet*	<i>Lybius torquatus</i>
68	Crested Barbet	<i>Trachyphonus vaillantii</i>
73	Crowned Hornbill	<i>Tockus albeterminatus</i>
76	Trumpeter Hornbill	<i>Bycanistes bucinator</i>
77	White-backed Night Heron†	<i>Gorsachius leuconotus</i>
78	Southern Ground-Hornbill	<i>Bucorvus leadbeateri</i>
79	African Hoopoe	<i>Upupa africana</i>
80	Green Wood-Hoopoe (Red-billed Wood-Hoopoe) *	<i>Phoeniculus purpureus</i>
83	Narina Trogon*	<i>Apaloderma narina</i>
84	European Roller	<i>Coracias garrulus</i>
88	Broad-billed Roller	<i>Eurystomus glaucurus</i>
89	Half-collared Kingfisher	<i>Alcedo semitorquata</i>



	Common Name	Scientific Name
90	Malachite Kingfisher*	<i>Alcedo cristata</i>
91	African Pygmy-Kingfisher (Pygmy Kingfisher) *	<i>Ispidina picta</i>
94	Mangrove Kingfisher*	<i>Halcyon senegaloides</i>
95	Brown-hooded Kingfisher*	<i>Halcyon albiventris</i>
97	Giant Kingfisher*	<i>Megaceryle maxima</i>
98	Pied Kingfisher*	<i>Ceryle rudis</i>
99	White-fronted Bee-eater	<i>Merops bullockoides</i>
100	Little Bee-eater*	<i>Merops pusillus</i>
109	Speckled Mousebird*	<i>Colius striatus</i>
110	Red-faced Mousebird*	<i>Urocolius indicus</i>
111	Jacobin Cuckoo	<i>Oxylophus jacobinus</i>
115	Red-chested Cuckoo	<i>Cuculus solitarius</i>
116	Common Cuckoo (Eurasian Cuckoo)	<i>Cuculus canorus</i>
117	African Cuckoo	<i>Cuculus gularis</i>
121	Klaas's Cuckoo*	<i>Chrysococcyx klaas</i>
122	African Emerald Cuckoo	<i>Chrysococcyx cupreus</i>
123	Diederick Cuckoo (Diederik Cuckoo)*	<i>Chrysococcyx caprius</i>
124	Green Malkoha (Green Coucal) *	<i>Ceuthmochares aereus</i>
125	Black Cuckoo	<i>Cuculus clamosus</i>
130	Burchell's Coucal*	<i>Centropus burchelli</i>
139	Rose-ringed Parakeet	<i>Psittacula krameri</i>
143	African Palm-Swift (Palm Swift) *	<i>Cypsiurus parvus</i>
145	Alpine Swift	<i>Apus melba</i>
146	Common Swift	<i>Apus apus</i>
148	African Black Swift	<i>Apus barbatus</i>
150	Little Swift*	<i>Apus affinis</i>
150	Steppe Buzzard†	<i>Buteo vulpinus</i>
152	White-rumped Swift*	<i>Apus caffer</i>
156	Purple-crested Turaco (Purple-crested Loerie)*	<i>Musophaga porphyreolopha</i>
159	Barn Owl	<i>Tyto alba</i>
160	African Grass-Owl	<i>Tyto capensis</i>
164	Spotted Eagle-Owl*	<i>Bubo africanus</i>
167	African Wood-Owl (Wood Owl) *	<i>Strix woodfordii</i>
170	Marsh Owl	<i>Asio capensis</i>
171	European Nightjar	<i>Caprimulgus europaeus</i>
173	Fiery-necked Nightjar	<i>Caprimulgus pectoralis</i>
174	Swamp Nightjar (Natal Nightjar)	<i>Caprimulgus natalensis</i>
175	Freckled Nightjar	<i>Caprimulgus tristigma</i>
182	Lemon Dove (Cinnamon Dove)	<i>Aplopelia larvata</i>
184	Laughing Dove*	<i>Streptopelia senegalensis</i>
187	Red-eyed Dove*	<i>Streptopelia semitorquata</i>
188	Emerald-spotted Wood-Dove (Greenspotted Dove)*	<i>Turtur chalcospilos</i>
190	Tambourine Dove*	<i>Turtur tympanistria</i>
191	Namaqua Dove	<i>Oena capensis</i>
192	African Green-Pigeon	<i>Treron calva</i>
203	Black-bellied Bustard	<i>Eupodotis melanogaster</i>
207	African Finfoot*	<i>Podica senegalensis</i>
208	Buff-spotted Flufftail*	<i>Sarothrura elegans</i>
209	Red-chested Flufftail*	<i>Sarothrura rufa</i>
213	African Rail	<i>Rallus caerulescens</i>
214	African Crane	<i>Crecopsis egregia</i>
215	Corn Crane	<i>Crex crex</i>
216	Black Crane	<i>Amaurornis flavirostra</i>
217	Baillon's Crane	<i>Porzana pusilla</i>

	Common Name	Scientific Name
220	African Purple Swamphen (Purple Gallinule) *	<i>Porphyrio [p.] madagascariensis</i>
221	Allen's Gallinule (Lesser Gallinule)	<i>Porphyryla alleni</i>
223	Common Moorhen*	<i>Gallinula chloropus</i>
224	Lesser Moorhen	<i>Gallinula angulata</i>
225	Red-knobbed Coot	<i>Fulica cristata</i>
235	Common Whimbrel (Whimbrel) *	<i>Numenius phaeopus</i>
239	Marsh Sandpiper	<i>Tringa stagnatilis</i>
240	Common Greenshank	<i>Tringa nebularia</i>
243	Green Sandpiper	<i>Tringa ochropus</i>
244	Wood Sandpiper*	<i>Tringa glareola</i>
245	Terek Sandpiper	<i>Xenus cinereus</i>
246	Common Sandpiper*	<i>Actitis hypoleucos</i>
248	Ruddy Turnstone (Turnstone) *	<i>Arenaria interpres</i>
250	Sanderling*	<i>Calidris alba</i>
251	Little Stint*	<i>Calidris minuta</i>
259	Curlew Sandpiper	<i>Calidris ferruginea</i>
261	Ruff	<i>Philomachus pugnax</i>
265	Greater Painted-snipe	<i>Rostratula benghalensis</i>
266	African Jacana	<i>Actophilornis africanus</i>
267	Lesser Jacana	<i>Microparra capensis</i>
269	Water Thick-knee (Water Dikkop) *	<i>Burhinus vermiculatus</i>
270	Spotted Thick-knee (Cape Dikkop)	<i>Burhinus capensis</i>
273	Black-winged Stilt	<i>Himantopus himantopus</i>
274	Pied Avocet	<i>Recurvirostra avosetta</i>
277	Grey Plover (Black-bellied Plover)	<i>Pluvialis squatarola</i>
278	Common Ringed Plover	<i>Charadrius hiaticula</i>
279	Kittlitz's Plover	<i>Charadrius pecuarius</i>
280	Three-banded Plover	<i>Charadrius tricoloris</i>
283	White-fronted Plover*	<i>Charadrius marginatus</i>
288	Blacksmith Lapwing	<i>Vanellus armatus</i>
291	African Wattled Lapwing	<i>Vanellus senegallus</i>
297	Bronze-winged Courser (Violet-tipped Courser)	<i>Rhinoptilus chalcopertus</i>
310	Kelp Gull*	<i>Larus dominicanus</i>
314	Grey-headed Gull*	<i>Larus cirrocephalus</i>
322	Caspian Tern*	<i>Sterna caspia</i>
325	Swift Tern (Crested Tern) *	<i>Sterna bergii</i>
326	Sandwich Tern*	<i>Sterna sandvicensis</i>
329	Common Tern*	<i>Sterna hirundo</i>
330	Arctic Tern*	<i>Sterna paradisaea</i>
331	Antarctic Tern	<i>Sterna vittata</i>
332	Little Tern	<i>Sterna albifrons</i>
338	White-winged Tern	<i>Chlidonias leucopterus</i>
339	Black Tern	<i>Chlidonias niger</i>
342	Osprey*	<i>Pandion haliaetus</i>
343	African Cuckoo Hawk (African Baza)	<i>Aviceda cuculoides</i>
346	Black-shouldered Kite (Black-winged Kite)	<i>Elanus caeruleus</i>
347	Black Kite (Yellowbilled Kite) *	<i>Milvus migrans</i>
348	Yellow-billed Kite	<i>Milvus [m.] aegyptius</i>
349	African Fish-Eagle*	<i>Haliaeetus vocifer</i>
350	Palm-nut Vulture	<i>Gypohierax angolensis</i>
359	Black-chested Snake-Eagle	<i>Circaetus pectoralis</i>
365	African Marsh-Harrier*	<i>Circus ranivorus</i>
369	African Harrier-Hawk (Gymnogene)	<i>Polyboroides typus</i>
374	African Goshawk*	<i>Accipiter tachiro</i>

	Common Name	Scientific Name
376	Little Sparrowhawk*	<i>Accipiter minullus</i>
379	Black Sparrowhawk (Black Goshawk) *	<i>Accipiter melanoleucus</i>
380	Common Buzzard (Steppe Buzzard)	<i>Buteo buteo</i>
394	Long-crested Eagle	<i>Lophaelus occipitalis</i>
395	African Crowned Eagle*	<i>Stephanoaetus coronatus</i>
407	Sooty Falcon	<i>Falco concolor</i>
408	Eurasian Hobby	<i>Falco subbuteo</i>
409	Square-tailed nightjar (Mozambique Nightjar)†	<i>Caprimulgus fossii</i>
410	Lanner Falcon*	<i>Falco biarmicus</i>
413	Little Grebe (Dabchick)	<i>Tachybaptus ruficollis</i>
423	African Darter (Darter)*	<i>Anhinga rufa</i>
424	Reed Cormorant (Long-tailed Cormorant) *	<i>Phalacrocorax africanus</i>
427	White-breasted Cormorant*	<i>Phalacrocorax [c.] lucidus</i>
428	Cape Cormorant*	<i>Phalacrocorax capensis</i>
430	Black Heron	<i>Egretta ardesiaca</i>
431	Little Egret*	<i>Egretta garzetta</i>
433	Yellow-billed Egret (Intermediate Egret)	<i>Egretta intermedia</i>
434	Great Egret (Great White Egret) *	<i>Egretta alba</i>
435	Grey Heron*	<i>Ardea cinerea</i>
436	Black-headed Heron	<i>Ardea melanocephala</i>
437	Goliath Heron*	<i>Ardea goliath</i>
438	Purple Heron*	<i>Ardea purpurea</i>
439	Cattle Egret*	<i>Bubulcus ibis</i>
440	Squacco Heron*	<i>Ardeola ralloides</i>
442	Rufous-bellied Heron	<i>Ardeola rufiventris</i>
443	Green-backed Heron*	<i>Butorides striatus</i>
444	Black-crowned Night-Heron*	<i>Nycticorax nycticorax</i>
446	Little Bittern*	<i>Ixobrychus minutus</i>
449	Hamerkop*	<i>Scopus umbretta</i>
453	Hadedda Ibis*	<i>Bostrychia hagedash</i>
454	Southern Bald Ibis	<i>Geronticus calvus</i>
455	African Sacred Ibis	<i>Threskiornis aethiopicus</i>
456	African Spoonbill	<i>Platalea alba</i>
457	Great White Pelican*	<i>Pelecanus onocrotalus</i>
458	Pink-backed Pelican	<i>Pelecanus rufescens</i>
459	Yellow-billed Stork	<i>Mycteria ibis</i>
463	Woolly-necked Stork	<i>Ciconia episcopus</i>
530	Red-backed Shrike*	<i>Lanius collurio</i>
533	Common Fiscal (Fiscal Shrike) *	<i>Lanius collaris</i>
536	House Crow	<i>Corvus splendens</i>
538	Pied Crow*	<i>Corvus albus</i>
539	White-necked Raven	<i>Corvus albicollis</i>
543	Black-headed Oriole (Eastern Black-headed Oriole)	<i>Oriolus larvatus</i>
545	Grey Cuckooshrike	<i>Coracina caesia</i>
546	Black Cuckooshrike*	<i>Campephaga flava</i>
547	Square-tailed Drongo*	<i>Dicrurus ludwigii</i>
548	Fork-tailed Drongo*	<i>Dicrurus adsimilis</i>
552	Blue-mantled Crested Flycatcher (Blue-mantled Flycatcher) *	<i>Trochocercus cyanomelas</i>
553	African Paradise-Flycatcher (Paradise Flycatcher) *	<i>Terpsiphone viridis</i>
556	Black-backed Puffback (Puffback) *	<i>Dryoscopus cubla</i>
558	Black-crowned Tchagra	<i>Tchagra senegala</i>
560	Southern Tchagra*	<i>Tchagra tchagra</i>
563	Southern Boubou*	<i>Laniarius ferrugineus</i>
566	Orange-breasted Bush-Shrike	<i>Telophorus sulfureopectus</i>

	Common Name	Scientific Name
567	Olive Bush-Shrike*	<i>Telophorus olivaceus</i>
569	Gorgeous Bush-Shrike*	<i>Telophorus quadricolor</i>
570	Grey-headed Bush-Shrike	<i>Malaconotus blanchoti</i>
575	Cape Batis*	<i>Batis capensis</i>
577	Chinspot Batis*	<i>Batis molitor</i>
580	Black-throated Wattle-eye (Wattle-eyed Flycatcher) *	<i>Platysteira peltata</i>
588	Spotted Ground-Thrush (Spotted Thrush) *	<i>Zoothera guttata</i>
590	Kurrichane Thrush*	<i>Turdus libonyanus</i>
596	Southern Black Flycatcher (Black Flycatcher) *	<i>Melaenornis pammelaina</i>
597	Fiscal Flycatcher	<i>Sigelus silens</i>
598	Spotted Flycatcher*	<i>Muscicapa striata</i>
599	African Dusky Flycatcher (Dusky Flycatcher) *	<i>Muscicapa adusta</i>
600	Ashy Flycatcher (Blue-grey Flycatcher) *	<i>Muscicapa caerulescens</i>
607	Cape Robin-Chat (Cape Robin)*	<i>Cossypha caffra</i>
610	Red-capped Robin-Chat (Natal Robin) *	<i>Cossypha natalensis</i>
611	Chorister Robin-Chat	<i>Cossypha dichroa</i>
615	Brown Scrub-Robin (Brown Robin) *	<i>Cercotrichas signata</i>
616	White-browed Scrub-Robin (White-browed Robin)*	<i>Cercotrichas leucophrys</i>
622	African Stonechat (Stonechat) *	<i>Saxicola torquata</i>
632	Familiar Chat	<i>Cercomela familiaris</i>
635	Mocking Cliff-Chat	<i>Thamnolaea cinnamomeiventris</i>
638	Red-winged Starling*	<i>Onychognathus morio</i>
639	Black-bellied Starling*	<i>Lamprotornis corruscus</i>
640	Cape Glossy Starling	<i>Lamprotornis nitens</i>
646	Violet-backed Starling (Plum-coloured, Amethyst Starling)	<i>Cinnyricinclus leucogaster</i>
648	Wattled Starling	<i>Creatophora cinerea</i>
649	Common Starling	<i>Sturnus vulgaris</i>
650	Common Myna (Indian Mynah) *	<i>Acridotheres tristis</i>
656	Southern Black Tit*	<i>Parus niger</i>
664	Brown-throated Martin (Plain Martin) *	<i>Riparia paludicola</i>
667	Grey-rumped Swallow	<i>Pseudhirundo griseopyga</i>
668	Barn Swallow (European Swallow) *	<i>Hirundo rustica</i>
670	White-throated Swallow*	<i>Hirundo albigularis</i>
671	Wire-tailed Swallow	<i>Hirundo smithii</i>
675	Lesser Striped Swallow*	<i>Hirundo abyssinica</i>
680	Rock Martin	<i>Hirundo fuligula</i>
681	Common House-Martin (House Martin)*	<i>Delichon urbica</i>
683	Black Saw-wing (Black Saw-wing Swallow) *	<i>Psalidoprocne holomelaena</i>
685	Dark-capped Bulbul (Black-eyed Bulbul) *	<i>Pycnonotus tricolor</i>
688	Sombre Greenbul (Sombre Bulbul) *	<i>Andropadus importunus</i>
690	Yellow-bellied Greenbul (Yellow-bellied Bulbul) *	<i>Chlorocichla flaviventris</i>
691	Terrestrial Brownbul (Terrestrial Bulbul)*	<i>Phyllastrephus terrestris</i>
695	Red-faced Cisticola*	<i>Cisticola erythrops</i>
697	Lazy Cisticola	<i>Cisticola aberrans</i>
698	Rattling Cisticola	<i>Cisticola chinianus</i>
702	Rufous-winged Cisticola (Black-backed Cisticola) *	<i>Cisticola [g.] galactotes</i>
705	Levaillant's Cisticola	<i>Cisticola tinniens</i>
706	Croaking Cisticola	<i>Cisticola natalensis</i>
707	Neddicky (Piping Cisticola)	<i>Cisticola fulvicapillus</i>
709	Zitting Cisticola (Fan-tailed Cisticola)	<i>Cisticola juncidis</i>
712	Pale-crowned Cisticola	<i>Cisticola cinnamomeus</i>
714	Tawny-flanked Prinia*	<i>Prinia subflava</i>
722	Bar-throated Apalis*	<i>Apalis thoracica</i>
723	Yellow-breasted Apalis*	<i>Apalis flava</i>

	Common Name	Scientific Name
727	Green-backed Camaroptera (Bleating Warbler) *	<i>Camaroptera brachyura</i>
733	Cape White-eye*	<i>Zosterops pallidus</i>
734	Little Rush-Warbler (African Sedge Warbler) *	<i>Bradypterus baboecala</i>
736	Barratt's Warbler	<i>Bradypterus barratti</i>
740	Cape Grassbird	<i>Sphenoeacus afer</i>
742	Sedge Warbler (European Sedge Warbler) *	<i>Acrocephalus schoenobaenus</i>
743	Eurasian Reed-Warbler	<i>Acrocephalus scirpaceus</i>
744	African Reed-Warbler (African Marsh-Warbler) *	<i>Acrocephalus baeticatus</i>
745	Marsh Warbler (African Sedge Warbler) *	<i>Acrocephalus palustris</i>
746	Great Reed-Warbler	<i>Acrocephalus arundinaceus</i>
749	Lesser Swamp-Warbler (Cape Reed Warbler) *	<i>Acrocephalus gracilirostris</i>
759	Long-billed Crombec	<i>Sylvietta rufescens</i>
761	Willow Warbler	<i>Phylloscopus trochilus</i>
778	Rufous-naped Lark	<i>Mirafraga africana</i>
790	Olive Sunbird†	<i>Cyanomitra olivacea</i>
802	Red-capped Lark	<i>Calandrella cinerea</i>
814	Eastern Olive Sunbird	<i>Cyanomitra olivacea</i>
815	Grey Sunbird (Mouse-coloured Sunbird) *	<i>Cyanomitra veroxii</i>
816	Amethyst Sunbird (Black Sunbird) *	<i>Chalcomitra amethystina</i>
817	Yellow Weaver†	<i>Ploceus subaureus</i>
820	Collared Sunbird*	<i>Hedydipna collaris</i>
826	White-bellied Sunbird*	<i>Cinnyris talatala</i>
831	Purple-banded Sunbird*	<i>Cinnyris bifasciata</i>
832	House Sparrow*	<i>Passer domesticus</i>
835	Southern Grey-headed Sparrow	<i>Passer diffusus</i>
838	African Pied Wagtail*	<i>Motacilla aguimp</i>
839	Cape Wagtail*	<i>Motacilla capensis</i>
840	Yellow Wagtail	<i>Motacilla flava</i>
843	Mountain Wagtail (Long-tailed Wagtail)	<i>Motacilla clara</i>
845	Yellow-throated Longclaw	<i>Macronyx croceus</i>
849	Striped Pipit	<i>Anthus lineiventris</i>
851	African Pipit (Grassveld Pipit)	<i>Anthus cinnamomeus</i>
867	Spectacled Weaver*	<i>Ploceus ocularis</i>
871	Southern Brown-throated Weaver (Brown-throated Weaver)*	<i>Ploceus xanthopterus</i>
873	Village Weaver (Spotted-backed Weaver) *	<i>Ploceus cucullatus</i>
875	Dark-backed Weaver (Forest Weaver) *	<i>Ploceus bicolor</i>
879	Red-headed Quelea	<i>Quelea erythrops</i>
883	Southern Red Bishop (Red Bishop) *	<i>Euplectes orix</i>
885	Fan-tailed Widowbird (Red-shouldered Widow) *	<i>Euplectes axillaris</i>
888	Red-collared Widowbird (Red-collared Widow) *	<i>Euplectes ardens</i>
891	Thick-billed Weaver (Grosbeak Weaver) *	<i>Amblyospiza albifrons</i>
894	Green Twinspot*	<i>Mandingoa nitidula</i>
900	Red-billed Firefinch	<i>Lagonosticta senegalensis</i>
901	African Firefinch (Blue-billed Firefinch) *	<i>Lagonosticta rubricata</i>
903	Blue Waxbill (Blue-breasted Cordonbleu)	<i>Uraeginthus angolensis</i>
905	Grey Waxbill (Black-tailed Waxbill) *	<i>Estrilda perreini</i>
909	Common Waxbill*	<i>Estrilda astrild</i>
911	Orange-breasted Waxbill (Zebra Waxbill)	<i>Amandava subflava</i>
914	Bronze Mannikin*	<i>Lonchura cucullata</i>
915	Red-backed Mannikin*	<i>Lonchura [b.] nigriceps</i>
920	Dusky Indigobird (Black Widow-finch) *	<i>Vidua funerea</i>
924	Pin-tailed Whydah*	<i>Vidua macroura</i>
932	Yellow-fronted Canary (Yellow-eyed Canary) *	<i>Serinus mozambicus</i>
934	Brimstone Canary (Bully Canary) *	<i>Serinus sulphuratus</i>



	Common Name	Scientific Name
936	Streaky-headed Seedeater	<i>Serinus gularis</i>
946	Golden-breasted Bunting	<i>Emberiza flaviventris</i>

## Reptiles

Some work is required to compile a reptile list for Umhlanga Lagoon Nature Reserve.

*Lamprophis capensis*

Brown House Snake

Source: Ezemvelo KZN Wildlife database.

## Fish recorded in Umhlanga Lagoon Nature Reserve

Order CLUPEIFORMES (Herrings)

Family CLUPEIDAE (Herrings, Shads, Sardines, Menhadens)

*Gilchristella aestuaria* Estuarine round-herring

Order CYPRINIDONTIFORMES

Family POECILIIDAE (Alien live-bearing Aquarium fish released for mosquito control)

*Poecilia reticulata* Guppy

Order PERCIFORMES (Perch-like)

Family AMBASSIDAE (Asiatic Glassfishes)

*Ambassis ambassis*\* Longspine Glassy

*Ambassis gymnocephalus* Bald Glassy

Family CARANGIDAE (Kingfish, Leervis, Queenfish, etc)

*Caranx sexfasciatus* Bigeye kingfish

Family CICHILIDAE (Cichlids)

*Oreochromis mossambicus* Mozambique tilapia (freshwater fish)

Family GERREIDAE (Pursemouths)

*Gerres methueni* Evenfin pursemouth/Striped silver biddy

*Gerres rappa* Evenfin pursemouth

Family GOBIIDAE (Gobies)

*Glossogobius giuris* Tank goby

Family HAEMULIDAE (Grunts)

*Pomadasys commersonii* Smallspotted grunter

Family LEIOGNATHIDAE (Slimys, Slipmouths, Ponyfishes)

*Leiognathus equulus* Slimy

Family MONODACTYLIDAE (Moonies)

*Monodactylus falciformis* Oval Moony

Family MUGILIDAE (Mullet)

*Crenimugil crenilabis* Fringelip mullet

*Liza alata* Diamond mullet

*Liza dumerilii* Groovy mullet

*Liza macrolepis* Large-scale mullet

*Mugil cephalus* Flathead mullet

*Myxus capensis* Freshwater mullet

*Valamugil buehneri* Bluetail mullet

*Valamugil cunnesius* Longarm mullet

Family SPARIDAE (Porgies)

*Rhabdosargus holubi* Cape stumpnose

*Rhabdosargus sarba* Natal stumpnose





Family Terapontidae (Thornfish)

*Terapon jarbua* Thornfish

Order POECILIDAE

Family POECILIIDAE (Live bearing aquarium fish - aliens)

*Poecilia reticulata* Guppy

Order PLEURONECTIFORMES

Family SOLEIDAE (Soles)

*Solea bleekeri* Blackhand sole

Order SILURIFORMES (Freshwater Catfish)

Family CLARIIDAE (Airbreathing Catfish)

*Clarias gariepinus*\* Sharptooth catfish

Order: SCORPAENIFORMES

Family: PLATYCEPALIDAE

*Platycephalus indicus*\* Bartail Flathead

Source:

Ezemvelo KZN Wildlife Database. \* Additional species obtained from Forbes & Demetriades (2010)

## Invertebrates of Umhlanga Lagoon Nature Reserve

### Millipedes

Class DIPLOPODA (Millipedes)

Order SPIROBOLIDA (Red Millipedes)

Family PACHYBOLIDAE

*Centrobolus angulatus*

Ringed millipede

### Insects

Class INSECTA

Order COLEOPTERA (Beetles)

Family SCARABAEIDAE (CETONIINAE)

(Fruit Chafers)

*Anisorrhina flavomaculata*

*Pachnoda sinuata sinuata*

Brown-and-yellow forest fruit chafer

*Plaesiorrhinella plana*

Yellow-belted fruit chafer

*Plaesiorrhinella trivittata*

Order LEPIDOPTERA (RHOPALOCERA) (Butterflies)

Family NYMPHALIDAE (CHARAXINAE) (Charaxes)

*Charaxes varanes varanes*

Pearl Charaxes

Order ODONATA (ANISOPTERA) (Dragonflies)

Family LIBELLULIDAE (Skimmers)

*Pantala flavescens*

Globe skimmer

### Crustaceans

Order DECAPODA (Crayfish, Crabs, Lobsters, Prawns)

Family GRAPSIDAE (Marsh Crabs)

*Varuna litterata*

Varuna Crab

Family PENAEIDAE (Penaeid Shrimps & Prawns)

*Metapenaeus monoceros*

Speckled shrimp

*Penaeus indicus*

Indian white prawn

*Penaeus japonicus*

Kuruma prawn

*Penaeus monoddon*

Giant Tiger Prawn

Family PORTUNIDAE (Swimming Crabs)

*Scylla serrata*

Mud crab/ mangrove crab

*Thalamita admete*

### Molluscs

Order STYLOMMATOPHORA (Terrestrial Snails)

Family ACHATINIDAE (Agate Snails)

*Cochlitoma semidecussata*

Durban Agate Snail

*Cochlitoma semigranosa*

Half-Grained Agate Snail

*Cochlitoma ?pentheri*

*Metachatina kraussi*

Brown-lipped Agate Snail

Family CERASTIDAE (Bark & Porcelain Snails)

*Gittenedouardia arenicola*

*Gittenedouardia natalensis*

*Gittenedouardia spadicea*

Family CHAROPIDAE (Pinwheels & Afrodontas)

*Trachycystis aenea*

Bronze Pinwheel



Family MAIZANIIDAE (Maizan Snails)

*Maizania wahlbergi*

Wahlberg's Round-mouthed Snail

Family POMATIASIIDAE (Shuffler Snails)

*Tropidophora insularis*

Few-ridged Shuffler

Family RHYTIDIDAE (Cannibal Snails)

*Nata vernicosa*

Dwarf Cannibal Snail

Family SUBULINIDAE (Awl Snails)

*Euonyma natalensis*

Ribbed Awl Snail

*Euonyma tugelensis*

Short Awl Snail

Family UROCYCLIDAE (Tailed Snails & Slugs)

*Elisolimax flavescens*

African Banana Slug

*Sheldonia (Kerkophorus) ampliata*

Durban Tail Waggoner

### Freshwater Snails

Family LYMNAEIDAE (Freshwater Snails)

*Lymnaea columella*\*

American Ribbed Fluke Snail

Family SUCCINEIDAE (Amber Snails)

*Oxyloma patentissima*

Twisted Amber Snail

Source:

KZN Wildlife Database; D Herbert – Curator of Molluscs, KZN Museum (Pers. Comm., 2013)

\* Introduced species.

## Appendix F – Pro forma annual plan of operation

Notes of a management meeting for Umhlanga Lagoon Nature Reserve held at office on

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Present:

Apologies:

CC:

Management Target	2011/12 Progress	2012/13 Goals	Completion Date	Responsibility	Action
<b>LEGAL COMPLIANCE AND ENFORCEMENT</b>					
<ul style="list-style-type: none"> <li>Minutes of the annual management meeting indicating security targets.</li> </ul>					
<ul style="list-style-type: none"> <li>Regular patrols covering the full extent of the protected area.</li> <li>Prosecution of offender caught committing an offence.</li> </ul>					
<b>STAKEHOLDER ENGAGEMENT</b>					
<ul style="list-style-type: none"> <li>Maintain relationships with various stakeholder groups, such as Umhlanga Urban Improvement Precinct, Honorary Officers, eThekweni Biodiversity Forum, Coastwatch.</li> <li>Nature reserve plans and management information presented to the stakeholders as they are developed.</li> </ul>					
<b>LOCAL AND REGIONAL PLANNING</b>					
Report presented and negotiated with the municipalities for inclusion in their IDP's and SDF's and municipal schemes.					

Management Target	2011/12 Progress	2012/13 Goals	Completion Date	Responsibility	Action
<b>VISITOR MANAGEMENT</b>					
Annual report of visitor information.					
<b>ENVIRONMENTAL INTERPRETATION AND AWARENESS</b>					
Adequate signage on trails.					
<b>INVASIVE SPECIES CONTROL</b>					
<ul style="list-style-type: none"> <li>Continue alien species control efforts.</li> <li>Compliance with the Biodiversity Act.</li> <li>Minutes of the annual management meeting containing the annual plan of operation and targets for alien species control.</li> </ul>					
<b>SOIL EROSION AND SEDIMENTATION CONTROL</b>					
<ul style="list-style-type: none"> <li>Erosion problems identified.</li> <li>Implementation of accelerated soil erosion control measures in areas identified.</li> </ul>					
<b>COLLECTION OF BIOLOGICAL MATERIAL</b>					
Ensure that all collecting is done under permit.					

Management Target	2011/12 Progress	2012/13 Goals	Completion Date	Responsibility	Action
<b>CONSERVATION TARGETS</b>					
<ul style="list-style-type: none"> <li>All subsidiary plans must reflect critical ecological processes.</li> <li>All subsidiary plans must include a biological monitoring programme.</li> <li>Surveillance and monitoring plans for key threatened processes are required</li> <li>Monitoring plans for key rare and endangered species to be developed.</li> </ul>					
<b>FINANCIAL RESOURCES</b>					
Adequate funding to achieve the objectives of the nature reserve.					
<b>HUMAN RESOURCES</b>					
<ul style="list-style-type: none"> <li>Sufficient staff to achieve nature reserve objectives</li> <li>Clean bill of health.</li> </ul>					
<b>FACILITIES AND INFRASTRUCTURE</b>					
<ul style="list-style-type: none"> <li>Infrastructure maintenance plan developed.</li> <li>Regular scheduled maintenance of all facilities and infrastructure.</li> </ul>					

Management Target	2011/12 Progress	2012/13 Goals	Completion Date	Responsibility	Action
<ul style="list-style-type: none"> <li>▪ Regular scheduled maintenance of all facilities and infrastructure.</li> <li>▪ Targets set in annual plan of operation through the management meeting</li> <li>▪ Appropriately functioning service infrastructure and systems that do not cause harm to the environment.</li> </ul>					