INTEGRATED RESERVE MANAGEMENT PLAN

TABLE BAY NATURE RESERVE

June 2011

Photo: Bruce Sutherland

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AUTHORIZATION PAGE

This Integrated Management Plan for the Table Bay Nature Reserve was drafted by the Area Manager and recommended by the Reserve Planning Team, a multi-disciplinary team consisting of:

Reserve Planning Team:

Branch Manager, Regional Manager, Area Manager, Reserve Manager, Biophysical Specialist, Biodiversity Coordinator, Sustainable Resource Specialist and Monitoring and Evaluation Coordinator

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Koos Retief – Area Manager

Biodiversity Management Branch

Environmental Resource Management Department

City of Cape Town

Name and Title	**Signature and Date**
Mr Jacob Hugo Executive Director: Economic, Environment and Spatial Planning Directorate	

Approved by:

Name and Title	**Signature and Date**
Mr Anton Bredell Minister of Local Government, Environmental Affairs and Development Planning	

DOCUMENTED

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INTEGRATED RESERVE MANAGEMENT PLAN

Compiled by

Jacobus J. Retief

Biodiversity Management Branch

Environmental Resource Management Department

City of Cape Town

Table Bay Nature Reserve

June 2011

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TABLE OF CONTENTS

List of appendices

Appendix D7: Royal Ascot environmental management system

List of abbreviations used

APO	**annual plan of operations**
C.A.P.E	**Cape Action for People and the Environment**
CARA	**Conservation of Agricultural Resources Act**
CDF	**Conservation Development Framework**
CFR	**Cape Floristic Region**
DEA&DP	**Department of Environmental Affairs and Development Planning**
DWAF	**Department of Water Affairs and Forestry**
EIA	**environmental impact assessment**
EMP	**estuary management plan**
EMS	**environmental management system**
ERMD	**Environmental Resource Management Department**
FPA	**Fire Protection Association**
FPP	**fixed-point photography**
GIS	**geographic information system**
IBA	**important bird area**
IDP	**Integrated Development Plan**
IMEP	**Integrated Metropolitan Environmental Policy**
IRMP	**Integrated Reserve Management Plan**
LBSAP	**Local Biodiversity Strategy and Action Plan**
MAR	**mean annual runoff**
METT-SA	**Management Effectiveness Tracking Tool South Africa**
MOU	**memorandum of understanding**
MPA	**marine protected area**
NEMA	**National Environmental Management Act, Act 107 of 1998**
NGO	**non-governmental organisation**
OEMP	**operational environmental management plan**
PAR	**protected-area review**
PNE	**protected natural environment**
POS	**public open space**
ROD	**record of decision**
SAAQIS	**South African air quality information system**
SAHRA	**South African Heritage Resources Agency**
SANCCOB	**Southern African Foundation for the Conservation of Coastal Birds**
SWOT	**strengths-weaknesses-opportunities-threats analysis**
WESSA	**Wildlife and Environment Society of South Africa**
WPSP	**Workplace Skills Plan**
WWF	**Worldwide Fund for Nature**
WWTW	**wastewater treatment works**

PART 1

DESCRIPTION

1. INTRODUCTION

Table Bay Nature Reserve is a protected-area expansion concept for the Rietvlei protected natural environment (PNE), also known as Rietvlei Wetland Reserve. The reserve consists of the seven management sections indicated in table 1 below, some of which have PNE status or a record of decision (ROD) ensuring their protection, while others are public open spaces (POSs):

Table 1. Status of the seven management sections of the Table Bay Nature Reserve.

Management section	Status
Parklands fynbos corridor	ROD
Diep River	POS
Rietvlei coastal section	POS
Rietvlei wetlands	PNE and some POS additions, important bird area (IBA), and core flora conservation site
Milnerton Lagoon	PNE and core flora conservation site
Zoarvlei (Paardeneiland wetlands)	POS
Milnerton Racecourse	ROD and core flora conservation site

The strategic management planning process for Table Bay Nature Reserve began with the definition of the vision followed by the purpose for the reserve. This purpose is then supported by desired states for the reserve. The reserve objectives contribute to realising the purpose and desired states.

For each desired state, a number of management objectives are identified, which are then implemented through the identification of outputs. Objectives for each desired state are prioritised for the five-year time horizon of the plan. Time frames, deliverables, performance indicators and targets are then allocated to each objective, or a group of linked outputs contributing to the desired state.

1.1 Aim of the Integrated Reserve Management Plan

The aim of the Integrated Reserve Management Plan (IRMP) is to ensure that Table Bay Nature Reserve has clearly defined objectives and activities to direct the protection and sustainable use of its natural, scenic and heritage resources over a five-year period.

The IRMP thus provides the medium-term operational framework for the prioritised allocation of resources and capacity in the management, use and development of the reserve. The IRMP intends to add value and continuity by clearly stating management objectives, scheduling actions, and providing management guidelines.

The reserve planning process occurs against the backdrop of the City of Cape Town's ***Integrated Development Plan*** (IDP) (Anon 2010); the City of Cape Town's ***Integrated Metropolitan Environmental Policy*** (IMEP) (Anon 2003[1]); the City of Cape Town's ***biodiversity strategy*** (Anon 2003[2]) and ***Local Biodiversity Strategy and Action Plan*** (LBSAP) (Anon 2009[1]), and the bioregion (***Cape Action for People and the Environment, or C.A.P.E***).

The major elements of the IRMP are ***this document*** (overall strategy, vision and context); the ***detailed subsidiary plans*** (as required), and an ***annual plan of operations*** (APO). The IRMP for Table Bay Nature Reserve is supported by ***State of Biodiversity*** reports, ***operational guidelines*** and a ***monitoring and evaluation framework*** to ensure ongoing implementation and review of protected-area management activities (Figure 1).

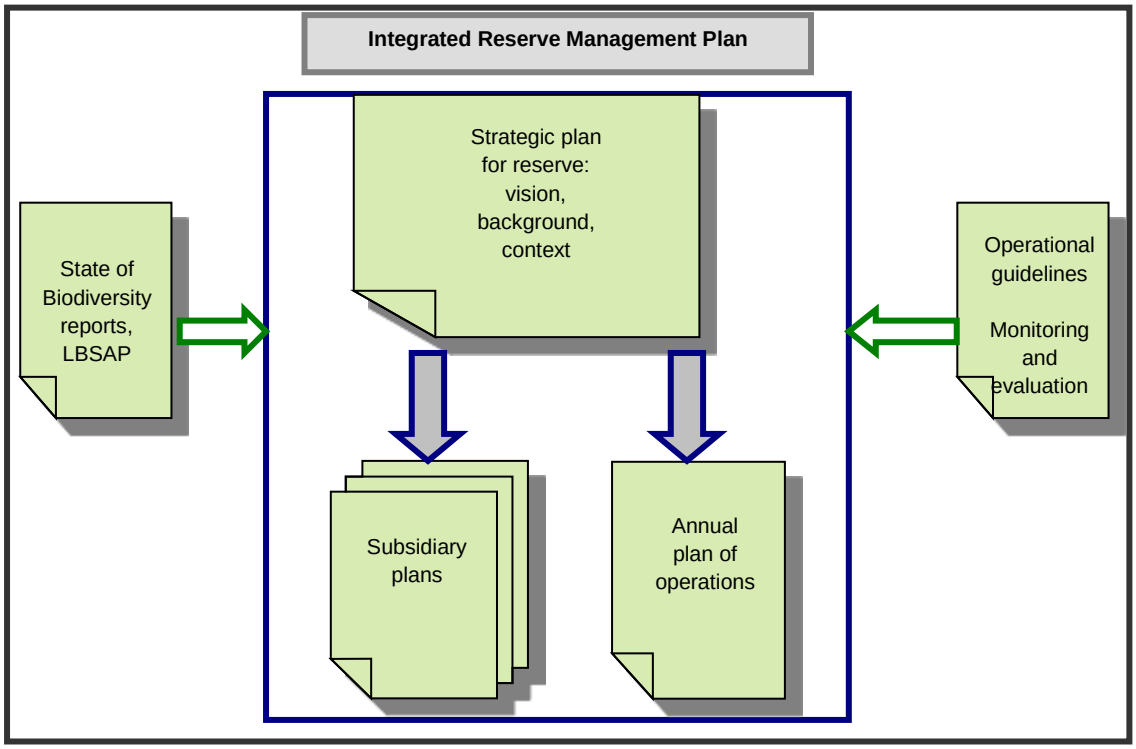


Figure 1: The elements of the IRMP

The IRMP for Table Bay Nature Reserve forms part of a tiered series of policies, legislation and related planning documents at the sector, institutional, agency and local level (see figure 2).

Where possible, emphasis has been placed on the following:

- Assigning responsibility for management interventions
- Scheduling said management interventions
- Quantifying management costs

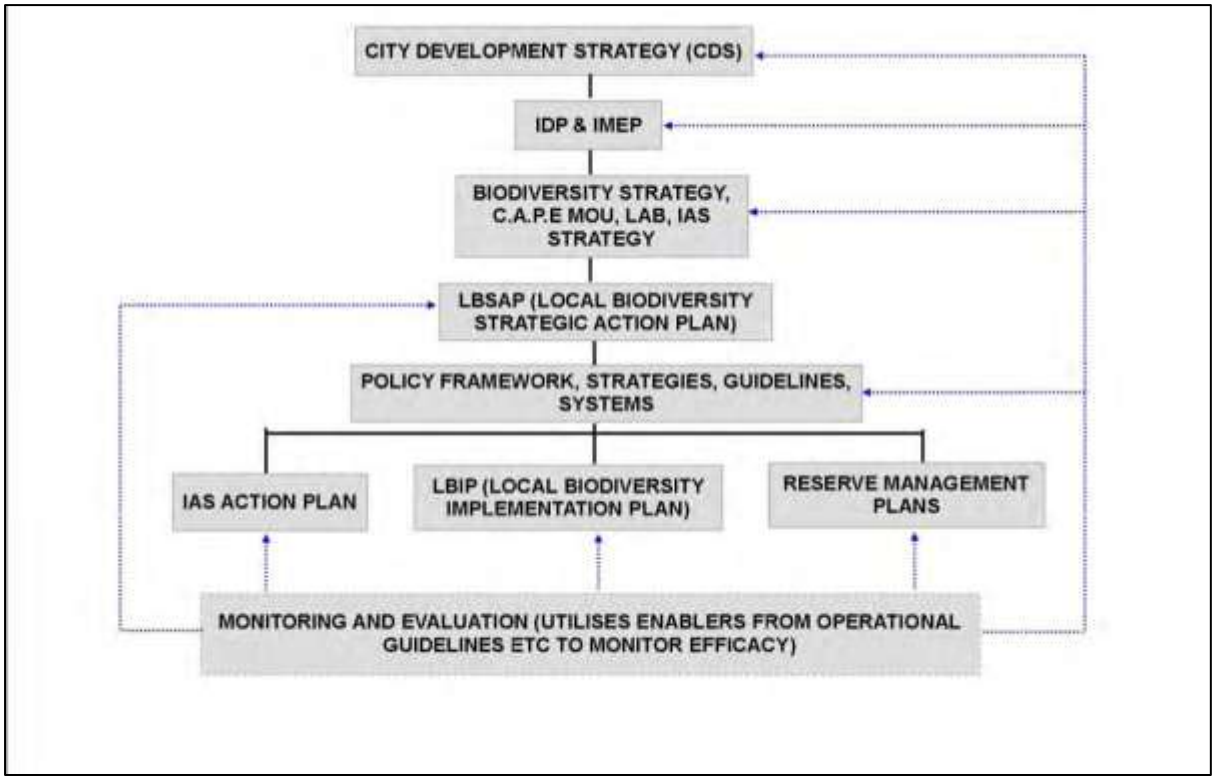


Figure 2: Legal and planning framework for the IRMP

This approach is specifically intended to create a mechanism whereby management intervention can be monitored and audited on an annual basis.

This IRMP is a dynamic document, and the detailed subsidiary plans should be updated on an annual basis or as soon as new information comes to light that may better inform decisions on responsible land management. The IRMP should be updated every five years.

The drafting of this IRMP was guided by comments received from a public participation process in the City of Cape Town during February/March 2011. The comments promoted the amalgamation of the seven management sections and their respective management plans into a single nature reserve with an overarching management plan.

The former management plan documents that are being replaced by this IRMP are listed in table 2 below:

Table 2. Schedule of management plans that are being replaced by this IRMP

Management sections	Management plans
Diep River	The Diep River corridor between Blaauwberg Road bridge and the N7 freeway management plan (Spinks & Luger 1999)
Rietvlei coastal section, Rietvlei wetlands, and Milnerton Lagoon	Caltex Rietvlei Wetland Reserve management plan report (Lochner, Barwell & Morant 1994)
Zoarvlei (Paardeneiland wetlands)	Environmental management plan – Zoarvlei (Knight Hall Hendry 1999)

Three specific management plans are presently in the implementation phases, and are therefore still valid. Two of these are implementation plans of recommendations in terms of RODs, in which provision were made for conservation areas within developments. One development is around Milnerton Racecourse (see appendix B2-1 for the ROD) and the other around the Parklands fynbos corridor (see appendix B2-2 for the ROD). A third plan was drafted for the C.A.P.E. Estuaries Programme as an estuary management plan (EMP). This EMP is also in its implementation phase, and covers the Rietvlei wetlands and the Milnerton Lagoon section.

The management plan documents that are being retained under this IRMP, and that are applicable to the various management sections, are listed in table 3 below:

Table 3: Schedule of management plans retained under this IRMP

Management sections	Management plans
Parklands fynbos corridor	Blaauwberg fynbos corridor: Operational environmental management programme (North & Mangnall 2008)
Rietvlei wetlands and Milnerton Lagoon section	Estuary management plan for the Diep River estuary (Jackson *et al*. 2011)
Milnerton Racecourse	Royal Ascot environmental management system (EMS) (Planning in Balance 2007)

1.2 Location and extent

Table Bay Nature Reserve is situated in Milnerton, Cape Town, along the Table Bay coastline at the bottom of the Diep River catchment (map 1 and 2). It is managed by the City of Cape Town's Biodiversity Management Branch. From here, two world heritage sites, Table Mountain National Park (as part of the Cape Floral Kingdom World Heritage Site) and Robben Island, are visible.

The reserve also forms the southernmost buffer area of the Cape West Coast Biosphere Reserve, linking it to the edge of the Cape Town city centre. See map 3 for a depiction of the reserve's location in terms of the Cape West Coast Biosphere Reserve.

The central feature of Table Bay Nature Reserve is the Rietvlei wetland system. The Rietvlei wetlands and Milnerton Lagoon were proclaimed as a nature area on 3 August 1984 in Proclamation No. 1632, Provincial Gazette No. 9345 (see appendix B1-1). The reserve is partly owned by the City of Cape Town and the Worldwide Fund for Nature (WWF) South Africa, who owns two of the erven on the reserve. The City of Cape Town manages these two erven on a 99-year lease for the purposes of nature conservation (see appendix B5-1).

The centre of the nature reserve is approximately 10 km north-east of Cape Town city centre (see map 1 below), at the following coordinates: 33°50′45″S; 18°30′01″E. It covers an area of approximately 880 ha (see map 2 below).

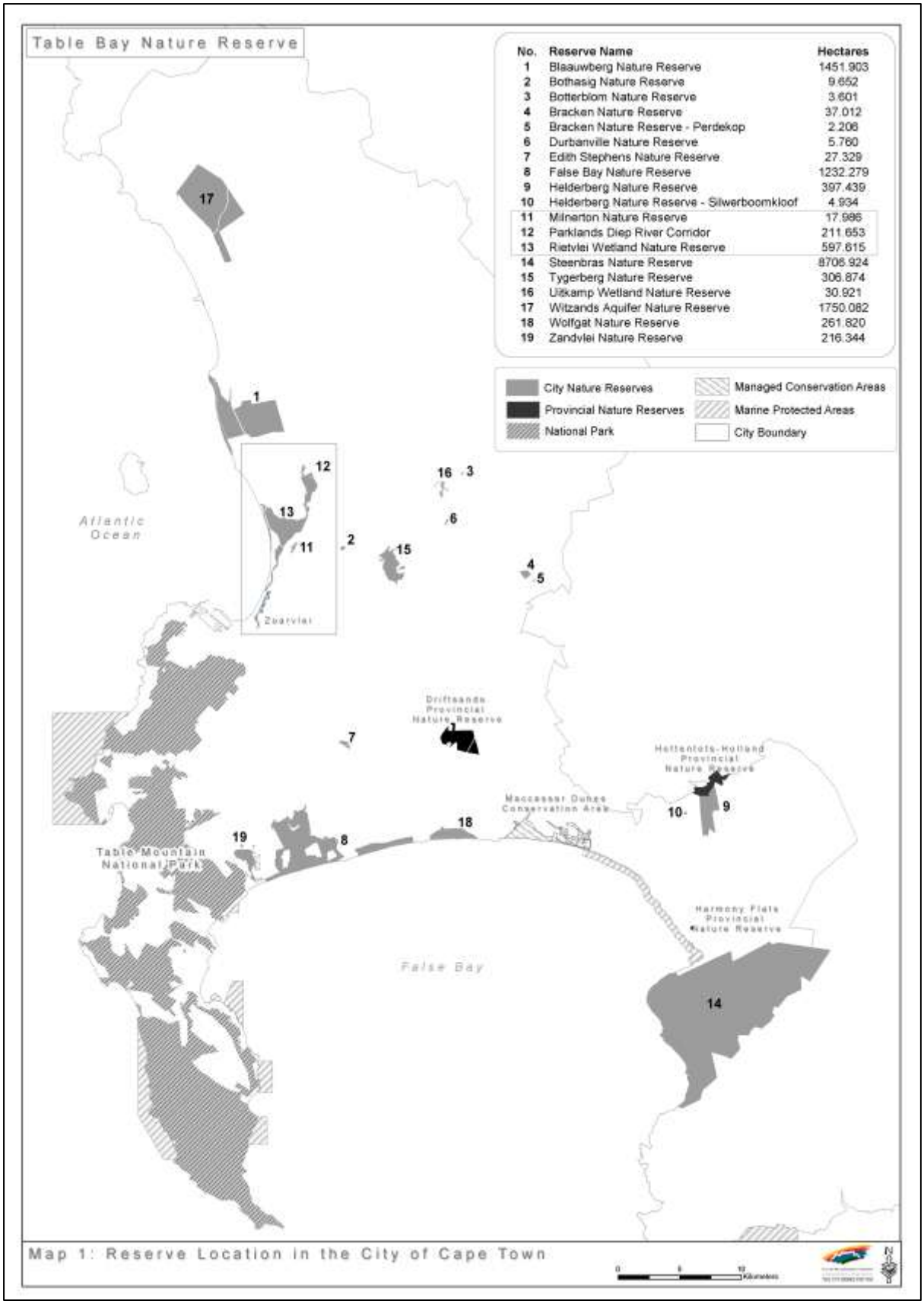
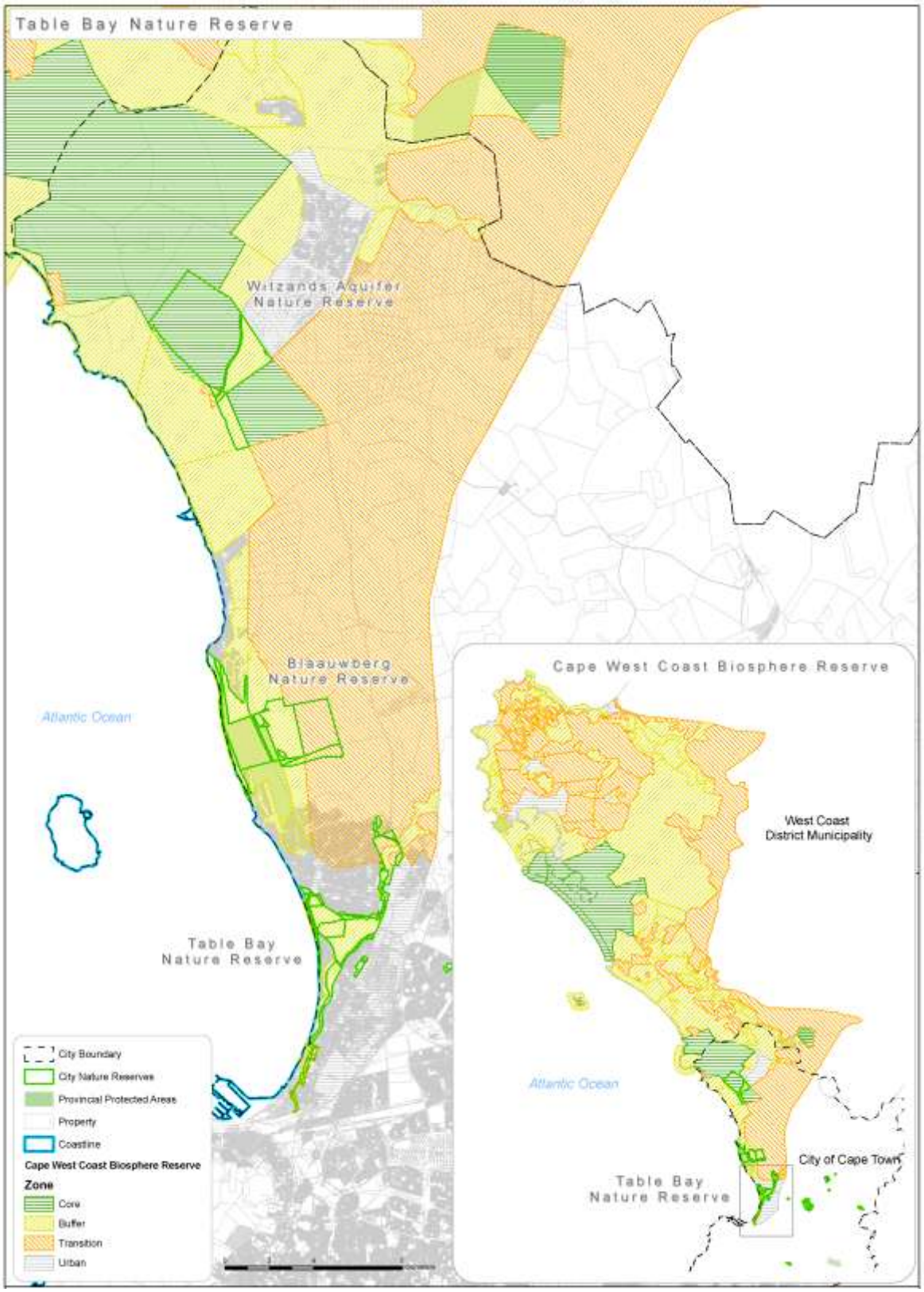


Table Bay Nature Reserve
No. Reserve Name Hectares
1 Blaauwberg Nature Reserve 1451.903
2 Bothasig Nature Reserve 9.652
3 Botterblom Nature Reserve 3.601
4 Bracken Nature Reserve 37.012
5 Bracken Nature Reserve - Perdekop 2.206
6 Durbanville Nature Reserve 5.760
7 Edith Stephens Nature Reserve 27.329
8 False Bay Nature Reserve 1232.279
9 Helderberg Nature Reserve 397.439
10 Helderberg Nature Reserve - Silwerboomkloof 4.934
11 Milnerton Nature Reserve 17.986
12 Parklands Diep River Corridor 211.653
13 Rietvlei Wetland Nature Reserve 597.615
14 Steenbras Nature Reserve 8708.924
15 Tygerberg Nature Reserve 306.874
16 Uitkamp Wetland Nature Reserve 30.921
17 Witzands Aquifer Nature Reserve 1750.082
18 Wolfgat Nature Reserve 261.820
19 Zandvlei Nature Reserve 216.344
City Nature Reserves
Provincial Nature Reserves
National Park
Managed Conservation Areas
Marine Protected Areas
City Boundary
Atlantic Ocean
Zoarvlei
Driftsands Provincial Nature Reserve
Hottentots-Holland Provincial Nature Reserve
Macassar Dunes Conservation Area
Table Mountain National Park
Harmony Flats Provincial Nature Reserve
False Bay
Map 1: Reserve Location in the City of Cape Town


Table Bay Nature Reserve
Parklands Fynbos Corridor section
Diep River Section
Rietvlei Coastal Section
Rietvlei Wetlands Section
Atlantic Ocean
Milnerton Racecourse Section
Milnerton Lagoon Section
Zoarvlei Section
Reserve Boundary
Date of Aerial Image: March 2009
Map 2: Reserve Boundary



Map 3: Reserve location in terms of Cape West Coast Biosphere Reserve

2. DESCRIPTION OF LANDHOLDINGS AND OWNERSHIP

2.1 Property details and title deed information

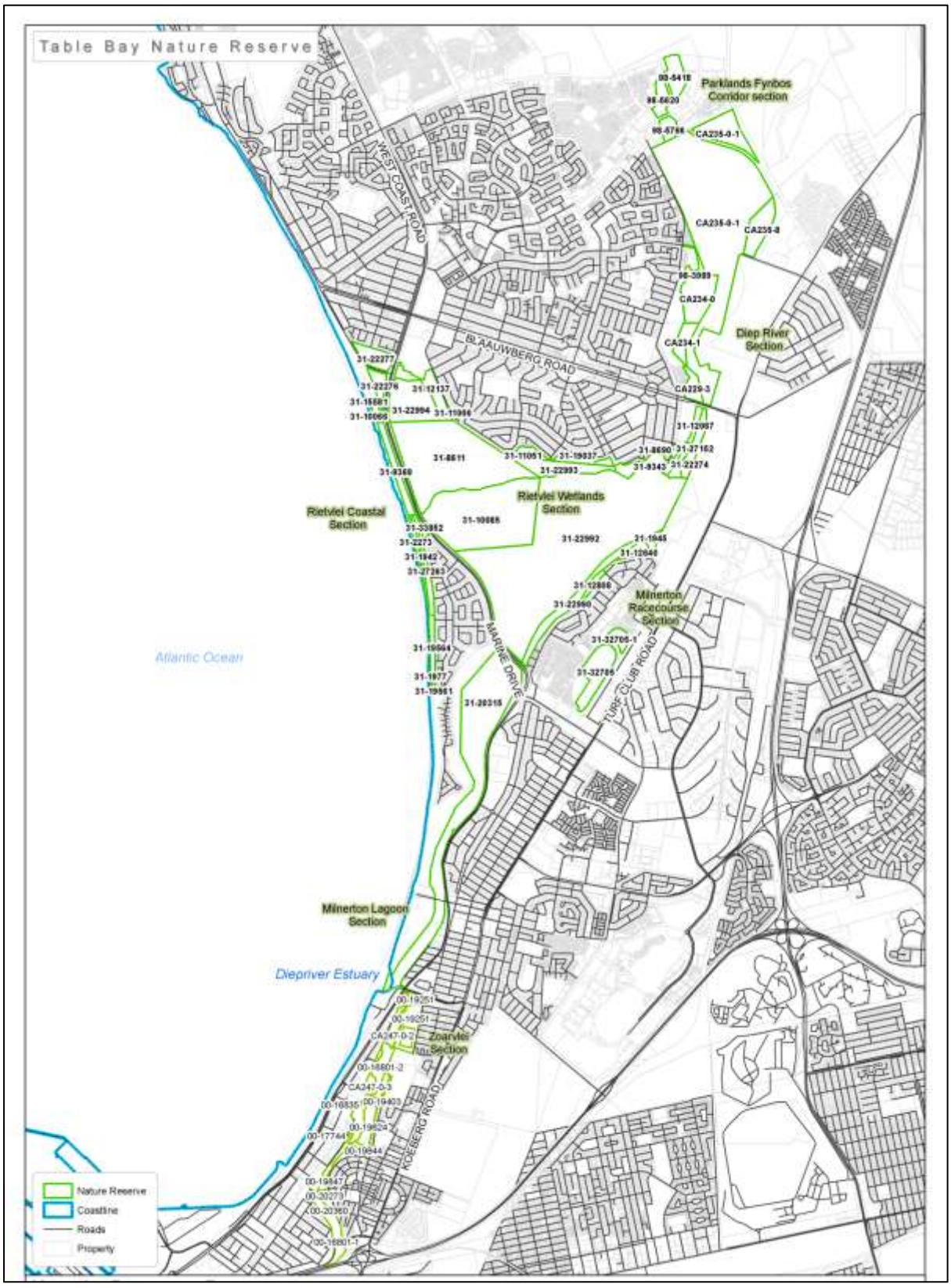
Table 4 below lists all the properties (erven and portions of erven) that fall within Table Bay Nature Reserve:

Table 4: Erven and portions of erven of Table Bay Nature Reserve

OBJECT ID	LANDOWNER	GEOGRAPHIC INFORMATION SYSTEM (GIS) NUMBER	HECTARES
196	WWF	31-10085	76,40662339390
197	WWF	31-8611	84,28479648630
198	CITY OF CAPE TOWN	31-20315	85,45251421030
199	CITY OF CAPE TOWN	31-22992	219,19454025500
200	CITY OF CAPE TOWN	31-22994	21,97855691660
201	CITY OF CAPE TOWN	31-22277	7,19781937471
202	CITY OF CAPE TOWN	31-22276	4,22571018463
203	CITY OF CAPE TOWN	31-9369	7,41691674469
204	CITY OF CAPE TOWN	31-12137	8,80626713381
205	CITY OF CAPE TOWN	31-2273	2,14612868231
206	CITY OF CAPE TOWN	31-19564	3,82682743156
207	CITY OF CAPE TOWN	31-19561	0,39158727989
208	CITY OF CAPE TOWN	31-1946	0,29344792281
209	CITY OF CAPE TOWN	31-1942	2,75945057602
210	CITY OF CAPE TOWN	31-1977	0,06270867643
211	CITY OF CAPE TOWN	31-27263	5,61351232284
212	CITY OF CAPE TOWN	31-9343	9,32893676808
213	CITY OF CAPE TOWN	31-12640	3,69305752643
214	CITY OF CAPE TOWN	31-12808	2,07483063751
215	CITY OF CAPE TOWN	31-15581	0,36852918393
216	CITY OF CAPE TOWN	31-10066	1,38674559461
217	CITY OF CAPE TOWN	31-11006	0,08552909625
218	CITY OF CAPE TOWN	31-33852	0,46496853574
219	CITY OF CAPE TOWN	31-22993	12,88885192150
220	CITY OF CAPE TOWN	31-27152	7,15343293561
221	CITY OF CAPE TOWN	31-22274	3,16884178657
222	CITY OF CAPE TOWN	31-22990	13,80709485680
223	CITY OF CAPE TOWN	31-1945	2,12068652905
224	PRIVATE	31-12067	2,41531954353
225	CITY OF CAPE TOWN	31-8690	0,47802554384
226	CITY OF CAPE TOWN	31-8689	0,45003275773
227	CITY OF CAPE TOWN	31-11051	4,52806448505
228	CITY OF CAPE TOWN	31-19037	3,14445471189
231	CITY OF CAPE TOWN	98-5418	7,80884534699
232	CITY OF CAPE TOWN	98-5766	3,82950242862

233	CITY OF CAPE TOWN	98-5620	5,44656525478
234	CITY OF CAPE TOWN	98-3989	2,90040006919
235	CITY OF CAPE TOWN	CA234-0	15,41235071350
236	CITY OF CAPE TOWN	CA234-1	5,95999663127
237	CITY OF CAPE TOWN	CA235-8	11,19627007200
238	CITY OF CAPE TOWN	CA229-3	4,85970839678
239	CITY OF CAPE TOWN	CA235-0-1	154,23957996700
240	CITY OF CAPE TOWN	31-32705-1	3,74576661160
241	CITY OF CAPE TOWN	31-32705	14,23982955880
280	CITY OF CAPE TOWN	00-19403	0,57819102163
281	CITY OF CAPE TOWN	00-19251	7,41698263135
282	CITY OF CAPE TOWN	00-19253-2	0,22550019269
283		CA247-0-4	0,32442027415
284		CA247-0-3	2,23829728564
285	CITY OF CAPE TOWN	00-16801-2	5,88295656819
286		CA247-0-2	4,56604217124
287	CITY OF CAPE TOWN	00-20273	1,22336954059
288	CITY OF CAPE TOWN	00-20360	1,12574802721
289	CITY OF CAPE TOWN	00-19847	1,01595763492
290	CITY OF CAPE TOWN	00-19248	0,21819993223
293	CITY OF CAPE TOWN	00-16833	0,13795666266
295	CITY OF CAPE TOWN	00-17742	0,01131015250
296	CITY OF CAPE TOWN	00-17741	0,06065996180
298	CITY OF CAPE TOWN	00-17743	0,13011485882
300	CITY OF CAPE TOWN	00-19585	0,35360228143
302	CITY OF CAPE TOWN	00-16837	0,16880869224
304	CITY OF CAPE TOWN	00-16838	0,10983358374
306	CITY OF CAPE TOWN	00-16839	0,12017722884
308	CITY OF CAPE TOWN	00-16840	0,12554253705
311	CITY OF CAPE TOWN	00-19844	1,36772748289
312	CITY OF CAPE TOWN	00-17744	0,13855154046
315	CITY OF CAPE TOWN	00-19624	5,22921387612
316		CA247-0-1	0,27881501723
319	MILNERTON ESTATES LTD	00-16802	0,01226501204
320	MILNERTON ESTATES LTD	00-16834	0,05350863490
322	MILNERTON ESTATES LTD	00-16835	0,02787992513
324	CITY OF CAPE TOWN	00-16801-1	16,46847661730
326	CITY OF CAPE TOWN	00-19403	1,87093848722
330	CITY OF CAPE TOWN	00-19251	1,18136335401

For a graphic representation of the properties contained in Table Bay Nature Reserve, see map 4 below.



Map 4: Reserve erven

2.2 Landscape perspective

Table Bay Nature Reserve falls within the Cape Floristic Region (CFR), the smallest yet richest of the world's six floral kingdoms, and the only one to be found entirely within one country. This rich biodiversity is under serious threat for a variety of reasons, including conversion of natural habitat to permanent agriculture land, inappropriate fire management, rapid and insensitive development, overexploitation of water resources, and infestation by alien species. The region has been identified as one of the worlds 'hottest' biodiversity hot spots, and therefore deserve prioritisation (Myers *et al* 2000).

In response to this challenge, a process of extensive consultation involving various interested parties, including local government and non-governmental organisations (NGOs), resulted in the establishment of a strategic plan (C.A.P.E Project Team 2000) referred to as Cape Action for People and the Environment (C.A.P.E), which identified the key threats and root causes of biodiversity losses that need to be addressed in order to conserve the floral kingdom. This resulted in a spatial plan identifying areas that need to be conserved and a series of broad programme activities that need to take place over a 20-year period.

Based on the situation assessment and analysis of threats, three overarching, mutually complementing and reinforcing themes were developed:

- To establish an effective reserve network, enhance off-reserve conservation, and support bioregional planning
- To strengthen and enhance institutions, policies, laws, cooperative governance and community participation
- To develop methods to ensure sustainable yields, promote compliance with laws, integrate biodiversity concerns with catchment management, and promote sustainable eco-tourism

The C.A.P.E partnership was formed to implement the C.A.P.E vision and plan by strengthening institutions, supporting conservation efforts, enhancing education, developing tourism benefits, and involving people in conservation. The City of Cape Town was one of the 19 founding signatories of the C.A.P.E memorandum of understanding (MOU).

Table Bay Nature Reserve forms an important platform and integral link within the City of Cape Town's biodiversity network, as well as a link to the Cape West Coast Biosphere Reserve.

2.3 Physical Environment

2.3.1 Climate

The climate is described as Mediterranean, characterised by warm, dry summers from November to March, and mild, rainy winters from June to August. The warm, dry and windy summers in the region also result in a mean annual evaporation rate of 1,477 mm (Department of Water Affairs and Forestry 2005).

The south-western Cape is a winter rainfall area. The catchment of the Diep River has a mean annual precipitation ranging from approximately 1 200 mm in the north-east mountain area, to 400 mm in the south-west. The Diep River has an estimated mean annual runoff (MAR) of 40 million m^3. This runoff varies not only with the seasons – with very limited flow during the summer months – but also from year to year. The runoff for 1976/77, for example, was measured at 190 million m^3, while that for 1971/72 was 2,9 million m^3 (Jackson *et al*. 2008).

The reserve is situated between the high-water mark and approximately 25 m above sea level. Rainfall varies between 273 mm and 541 mm per annum, as measured on-site. Rainfall figures have been recorded since 2000 only. Appendix A1 is a graphic representation of the mean rainfall per month since recording started.

The prevailing summer wind comes from the south-east, and the winter winds from the north and north-west. The strongest winds are those from the south-east, persisting for much of the summer season.

2.3.2 Geology, geomorphology, soils and land types

The geology of the catchment is important, as it determines the extent and nature of the groundwater as well as the characteristics of any sediment that flows down the river (Jackson *et al*. 2008). The predominant geological formation in the Diep River Quaternary catchment belongs to the ***Malmesbury group***, followed by the ***Cape granite suite*** (DWAF 2002).

Table 5 provides a summary of the geological formations. The Malmesbury group comprises dark, medium-grained, sub-greywackes, with interbedded blue, sometimes purplish, shales. The Cape granite is light grey, and is porphyritic granite, which has intruded into the Malmesbury group. The Klipheuwel formation outcrops at the village of Klipheuwel. At the contact zone of the Klipheuwel and Cape granite suite, the feldspars in the granite are highly weathered to kaolinite (Jackson *et al*. 2008).

The coastal or lower portion of the catchment comprises Quaternary alluvial deposits overlying the bedrock of the Malmesbury group. The Klipheuwel and Cape granite suite comprise only a small percentage of the area, which means that the lagoon sediments comprise mainly of weathering products of the Malmesbury group. The sediments of the Malmesbury group consist of a variety of shales, greywackes, quartzites and grits, with occasional bands of conglomerate, limestone, dolomite and chert. In the Diep River catchment, arenaceous greywackes alternate with more argillaceous shales (Jackson *et al*. 2008).

Table 5: Geological formations within the Diep River catchment

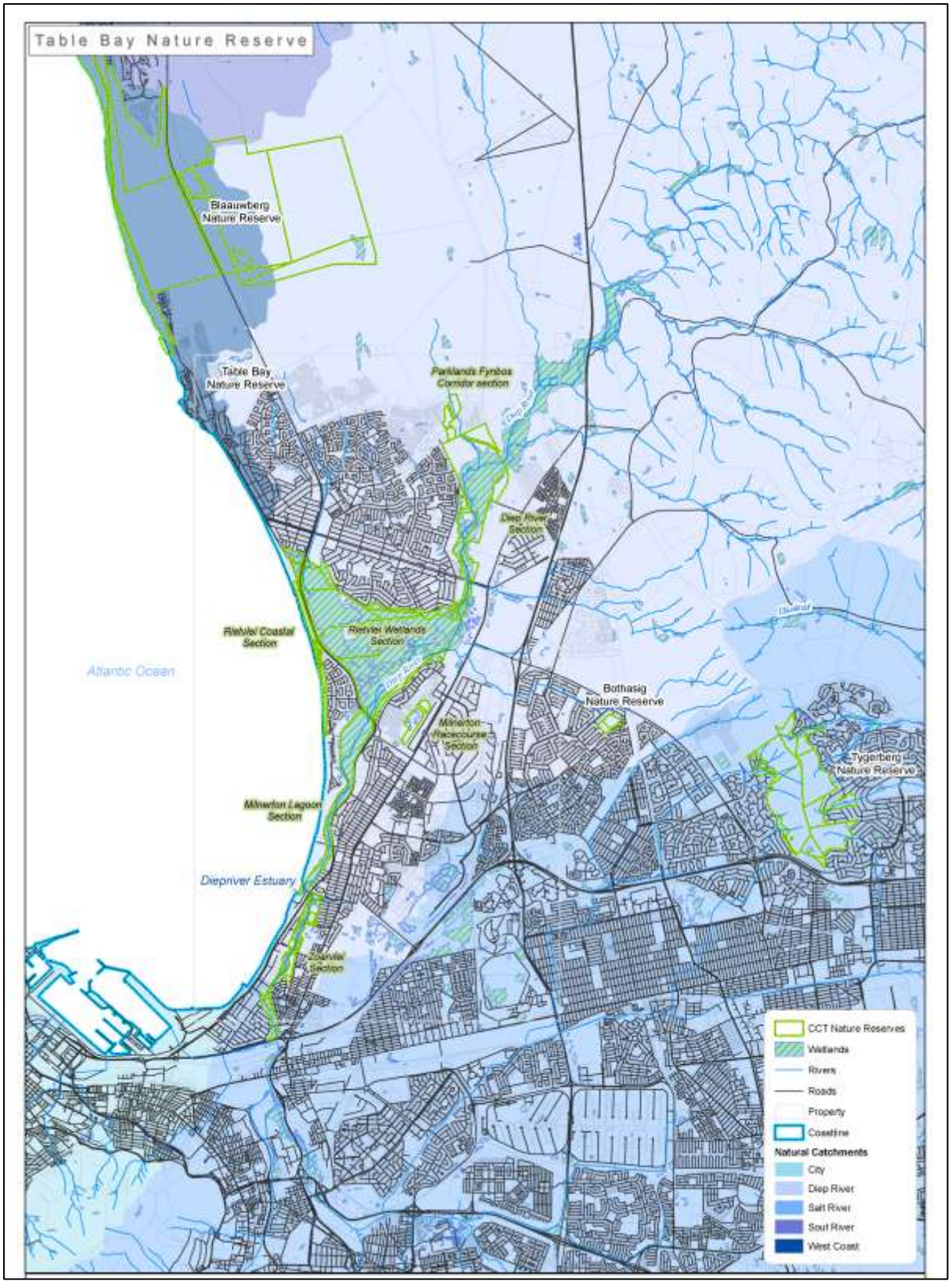
Label	Name	Hectares	%
Q	Quarternary	24 810	16,07
Ope	Peninsula formation – Table Mountain group	18	0,01
Cmk	Magrug formation – Klipheuwel group	9 911	6,42
N-Cma	Cape granite suite	22 297	14,45
Nf	Franschhoek formation – Malmesbury group	864	0,56
Nt	Tygerberg formation – Malmesbury group	41 237	26,72
Npr	Porseleinberg/Moorreesburg formation – Malmesbury group	11 130	7,21
Nmo	Moorreesburg formation – Malmesbury group	44 080	28,56
		154 347	100,00

The sediments in Milnerton Lagoon have a high percentage of clay due to the predominance of the Malmesbury group within the Diep River catchment. In other words, the clay fraction of the sediments in the lagoon is derived from the rocks in the catchment. The concentration of most elements was found to decrease from Rietvlei to the mouth of the lagoon. This is attributable to the increase of weathering of the sediments, resulting in a corresponding loss of calcium, magnesium, sodium, potassium, rubidium and strontium. A maximum thickness of 23,5 m is recorded for the Quaternary sediments overlying the basement rocks (Jackson *et al*. 2008).

2.3.3 Geohydrology, hydrology and aquatic systems

2.3.3.1 Catchments

The catchment, consisting of the Diep River and its tributaries (see map 5), lies in the south-western Cape, where climatic conditions are characterised by a winter rainfall regime, with high summer evaporation. Precipitation is of a frontal nature, with cold fronts approaching the catchment from the west (Jackson *et al*. 2008).



Map 5: Catchments, including rivers and wetlands

2.3.3.2 Aquifers

Based on the geology, this area can be divided into two distinct aquifer systems (DWAF 2002): an upper, primary aquifer and an unconfined to semi-confined deeper, secondary aquifer located in the granites and Malmesbury group rocks. In places, these two aquifers are separated by clay, which is absent when the rock strata crop out at the surface (Jackson *et al*. 2008).

The primary aquifer is situated in a 2–3 m thick surficial scree and alluvial gravel deposit located next to the Diep River. These deposits are sub-angular to angular in nature, and fairly well sorted. The rest-water level within this aquifer is shallow, about 0,5 m below the surface during the dry summer months. The secondary aquifer is located in the underlying granites and Malmesbury group rocks, which retain and transmit the groundwater in cracks, fissures, joints and faults caused by weathering, cooling and deformation (Jackson *et al*. 2008). The primary aquifer is not extensively developed in the catchment. However, the associated Quaternary deposits do occur in the area to the north-west of Kalbaskraal and along the coast in the Milnerton area. The sands are neither particularly thick nor coarse-grained (i.e. permeable), and although groundwater is present, it is not considered a major aquifer. The primary aquifer essentially provides a storage zone for groundwater, from which there may be some delayed release into Rietvlei at the onset of summer as the levels in the vlei start to drop. However, this is not considered to be a significant amount (Jackson *et al*. 2008).

The ***Malmesbury group***, within which much of the secondary aquifer is located, constitutes 63% of the Diep River catchment. The Malmesbury group comprises mainly shale, which is a rock type not conducive to producing high yields of, or good-quality, groundwater due to the mineralised nature of the rock type. Although there are exceptions to this generalisation, the Malmesbury group is considered to yield very little groundwater (Jackson *et al*. 2008).

A borehole yield analysis indicated that 32% of boreholes in this group yield less than 0,5 ℓ/s. Groundwater from the Malmesbury group is generally of a sodium-chloride-alkaline nature, and, in the more argillaceous units, sodium, magnesium, chloride and sulphate often exceed recommended allowable limits for drinking water. Springs from the Malmesbury group are very limited, although there is a thermal spring at Malmesbury (temperature is 33 ^{o}C), which circulates from a depth of approximately 1 200 m. The groundwater contribution to surface water flow (base flow) of the Diep River is therefore negligible (Meyer 2001).

The ***Cape granite suite*** comprises 14% of the Diep River catchment, and outcrops in the town of Malmesbury. The groundwater yields from granite are typically low. In this case, a borehole yield analysis indicated that 42% of boreholes in the granite yield less than 0,5 ℓ/s. Also, although water quality from the granites is typically acceptable, it is variable, and, in this area, is typically of a sodium-chloride sulphate nature. The groundwater within the granites typically occurs within the zones of weathering and at the contact zone margins between the Malmesbury group rocks and the granites. The groundwater from the granites will essentially not contribute to the Diep River base flow (Meyer 2001).

The ***Klipheuwel group*** comprises 6% of the Diep River catchment, and the more arenaceous Magrug formation can have relatively high groundwater yields (~ 2 ℓ/s), with the quality typically between 40 and 250 mS/m. However, the limited occurrence of the Klipheuwel group within the area means that it is unlikely to contribute significantly to the base flow of the Diep River (Jackson *et al*. 2008).

In conclusion, the underlying bedrock of the catchment will contribute very little toward sustaining the Diep River flow. This is supported by the fact that the Diep River to all intents and purposes does not flow during the dry summer months (Jackson *et al*. 2008).

2.3.3.3 Rivers and wetlands

The Department of Water Affairs and Forestry (DWAF) had three flow-gauging stations in operation on the Diep River for different periods of time between 1968 and 1981. They are near Malmesbury, on the Mosselbank River at Klipheuwel, and at Vissershok (Jackson *et al*. 2008).

According to the data provided, the highest MAR was recorded in 1977, while the highest monthly flow was recorded in July 1977. For all the stations, the flow reduces to zero in the summer months. The data show a gradual increase in flow between 1965 and 1988, after which there is a reduction back to previous levels (Jackson *et al*. 2008).

About 90% of the Diep River catchment is now under cultivation, meaning that the use of water for agriculture is a possible factor in the reduced runoff. The land cover classes are shown in table 6, with a list of the land cover classes and associated regional extent, relative to the total catchment area. “Cultivated: temporary – commercial dryland” (wheatfields) is the predominant land cover category within the catchment. This is based on 1996 data, and therefore does not reflect the more recent expansion of residential development in the Table View area (Jackson *et al*. 2008). The capacity of farm dams in the catchment totals 18 x 10^6

m^3, of which 15,5 x 10^6 m^3 is located in the Mosselbank catchment, the main tributary of the Diep River (Richards & Dunn 1994).

Table 6: Land cover classes for the Diep River catchment (sorted according to area)

DESCRIPTION	Sum_Hectares	%
Herbland	13	0.01
Urban / built-up land: commercial	55	0.04
Improved grassland	85	0.05
Degraded: thicket & bushland (etc)	116	0.08
Barren rock	139	0.09
Mines & quarries	313	0.20
Waterbodies	756	0.49
Wetlands	802	0.52
Urban / built-up land: industrial / transport	834	0.54
Cultivated: permanent - commercial dryland	1131	0.73
Forest plantations	2662	1.72
Unimproved grassland	2741	1.77
Degraded: shrubland and low Fynbos	3118	2.02
Thicket & bushland (etc)	4106	2.65
Urban / built-up land: residential	5618	3.63
Urban / built-up land: residential (small holdings: shrubland)	6038	3.90
Cultivated: permanent - commercial irrigated	8959	5.79
Shrubland and low Fynbos	18394	11.89
Cultivated: temporary - commercial dryland	98836	63.88
	154715	100.00

The Diep River flows into the north-eastern corner of the Rietvlei wetlands at the Blaauwberg Road bridge, and then into the Milnerton Lagoon, and finally Table Bay. The flow varies significantly from year to year as well as with the season, and often does not flow at all during the height of summer (Jackson *et al*. 2008).

Additional inflow into the Rietvlei wetlands includes flow from the stormwater drains and the sewage works. Stormwater flows are directly related to rainfall patterns. The Bayside canal, which discharges into the north-west corner of Rietvlei, varies from less than 1 000 m^3 per day in summer, to between 7 000 and 10 000 m^3 per day (Harding 2008).

The treated effluent from the Potsdam Wastewater Treatment Works (WWTW) is discharged into a channel along the eastern boundary of Rietvlei wetlands, which conveys the effluent to the head of the lagoon at the Otto du Plessis Road bridge. The channel was constructed in 1991–1992 to prevent Potsdam's effluent from polluting Rietvlei. As a result, the vlei was largely disconnected from the flow of the river, although treated effluent does still flow into

the vlei when the channel overflows during winter rains. Presently, 15% of the effluent is reused (Botes 2004).

There is insufficient information available for the accurate quantification of seasonal variations in water levels of the Rietvlei wetlands. However, anecdotal data exist to suggest that in the dry summer months, the water levels in the central portion of the Rietvlei drop below ground level, causing the central pans to dry out completely – usually by January. In the wet winter months, these pans are again inundated with water (Jackson *et al*. 2008).

Freshwater flow into the lagoon comes both via the channel carrying the Potsdam effluent, and a natural channel flowing from the western side of the Rietvlei wetlands. There are also some stormwater discharges along the eastern bank. The other major source of water in the lagoon is the sea, although the extent of the saltwater intrusion is dependent on a number of factors, including whether or not the mouth is open. Other factors include siltation, water abstraction upstream, and canalisation of the river adjacent to Rietvlei. Nevertheless, a tidal range of 3,8 cm has been recorded opposite the Otto du Plessis Road bridge (Jackson *et al*. 2008).

The Diep River estuary, comprising the Rietvlei wetlands and the Milnerton Lagoon, covers an area of around 900 ha, and is the largest temporary vlei in the south-western Cape. Rietvlei is essentially triangular in shape, with the Diep River flowing in at its north-east corner. From there, it stretches for over 2 km in an east-west direction, with the southerly point of the triangle at the Otto du Plessis Road bridge marking the boundary between Rietvlei and the Milnerton Lagoon. The lagoon is a long, winding channel, bordered by a road, a golf course and the Woodbridge Island residential development, and ultimately flows into Table Bay along the west coast (Jackson *et al*. 2008).

The estuary includes a variety of habitats, from artificial deepwater lakes to shallow, seasonally inundated pans, reed beds and other estuarine habitats. Despite its history of modifications, and its location in a highly urbanised environment, it is considered to be the most important area for water birds in the region, and provides feeding, roosting and breeding habitat for migrant birds (Jackson *et al*. 2008).

Ryan *et al.* (1988) ranked this estuary sixth of the 65 coastal wetlands in the south-western Cape on the basis of the number of birds present, and sixth or seventh of all larger estuaries in the country in terms of conservation value.

At the same time, the estuary is an important recreational site, and supports some fishing and bait-collecting activities (Jackson *et al*. 2008).

2.3.3.3.1 Estuary mouth dynamics

Palaeontological evidence suggests that, in the past, the mouth of the Diep River was to the north of its current position, opposite the north-west corner of Rietvlei. During the middle of the last glacial period, the sea level was 18 m lower than its present level. In the Rietvlei basin, local erosion and deepening of the river beds was associated with the lower sea level. The sea-level rise during the latter part of the last glacial period resulted in renewed deposition of sediments, which filled the northern opening. The formation of coastal dunes started, the vegetation came to resemble the present flora, and the river outlet finally took its present position (Jackson *et al*. 2008).

Historically, the estuary mouth was almost permanently open to the sea. However, over a period of around 20 years, from the early 1970s until 1991/92 with the construction of the channel associated with the sewage works, the mouth closed on a regular basis, albeit for varying periods. It was then either breached by floods or artificially opened by the town engineers once the water level in the lagoon reached between 1,9 and 2,0 m above mean sea level. Since the construction of Woodbridge Island and the channel, the mouth has again remained open (Jackson *et al*. 2008). The periodic closure of the mouth was probably due to both reduced water flows and siltation, resulting in reduced tidal flows that were no longer strong enough to keep the mouth open (Jackson *et al*. 2008).

Prior to 1970, the Diep estuarine system was very dynamic, and this dynamism would have meant that the mouth was not always permanently open. Over the last 300 years there has been considerable movement of the mouth. The present fixed position of the mouth is the result of stabilisation by virtue of infrastructure construction and developments (Pers. Comms., Neil van Wyk, 2011).

2.3.3.3.2 Water chemistry

The salinity patterns in the estuary are complicated by the fact that the salt content is derived from both seawater intrusion in the lower reaches as well as the river water, which itself is alkaline and relatively high in salt derived from the Malmesbury shales of the catchment. Nevertheless, when the river is flowing, there is a normal salinity gradient, with the upper part of the estuary being dominated by fresh water, with some saline water occurring near the mouth and in the deeper areas of the lower lagoon. In summer, the condition depends on whether the mouth is closed or open. When the mouth is closed, the high evaporation rates can lead to hyper saline conditions and a reversed salinity gradient. In the past, salinities of up to 13 parts per thousand (ppt) have been measured in the north-eastern corner of the Rietvlei wetlands (Jackson *et al*. 2008).

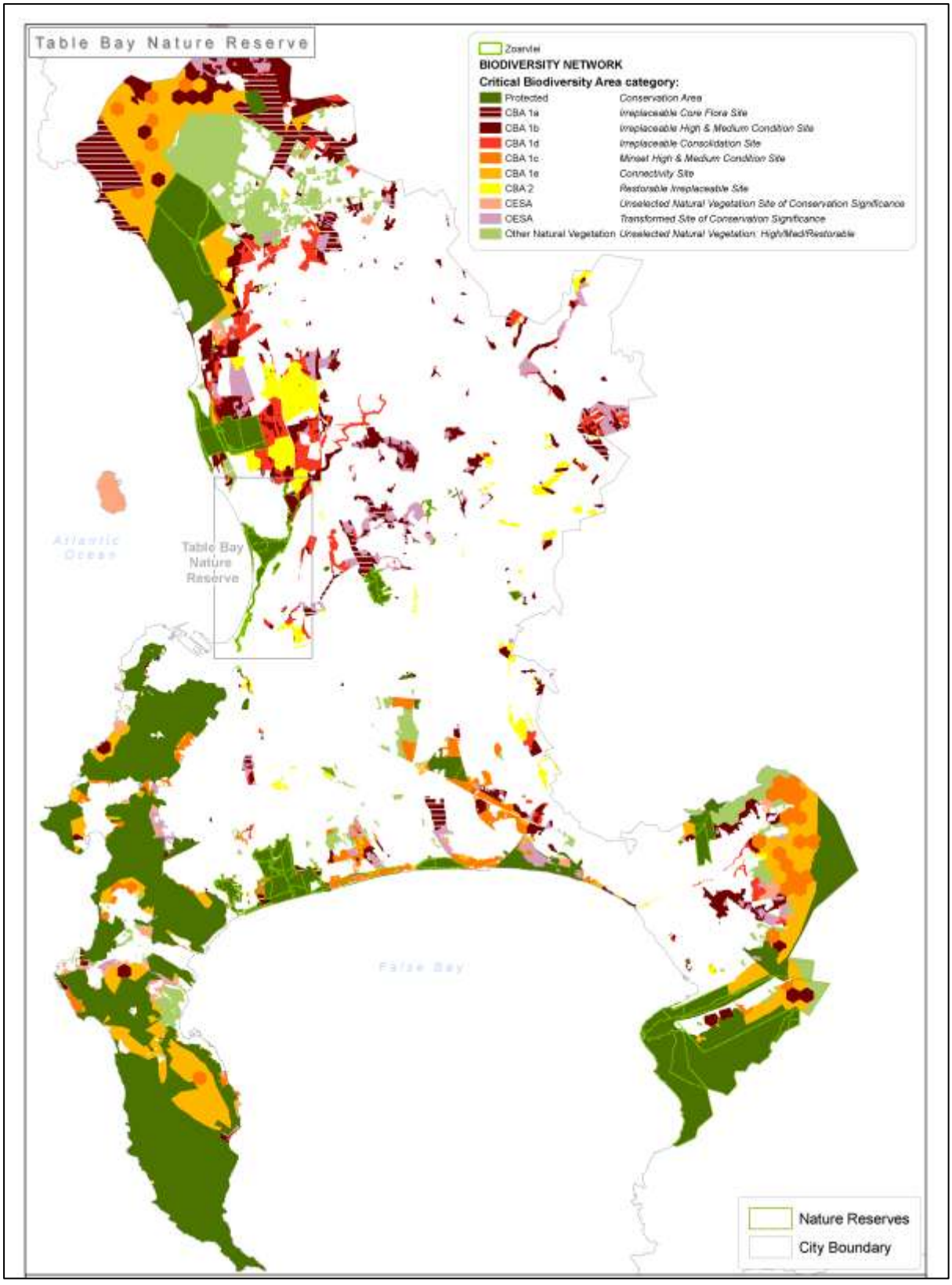
2.4 Biological environment

The biodiversity of Table Bay Nature Reserve is largely determined by the physical characteristics of the environment. These characteristics have been substantially altered as a result of various human interventions over the last two centuries. Therefore, changes in biodiversity were inevitable (Jackson *et al*. 2008). See map 6 below for a depiction of the reserve's location in terms of the City of Cape Town's biodiversity network and other nature reserves.

Appendix C contains a full reference species list for Table Bay Nature Reserve, drawn from the South African Biodiversity Database (www.biodiversity.co.za). This was compiled by combining the species lists from four locations on the database, namely Rietvlei, Zoarvlei, Milnerton Racecourse and Diep River. They cover the seven management sections as indicated in table 7:

Table 7: Coverage of the four biodiversity database locations over the seven management sections of Table Bay Nature Reserve

Management section	Biodiversity database locations
Parklands fynbos corridor	Diep River
Diep River	Diep River
Rietvlei coastal section	Rietvlei Wetland Reserve
Rietvlei wetlands	Rietvlei Wetland Reserve
Milnerton Lagoon	Rietvlei Wetland Reserve
Zoarvlei (Paardeneiland wetlands)	Zoarvlei
Milnerton Racecourse	Milnerton Racecourse



Map 6: Nature reserve and biodiversity network

2.4.1 Vegetation

Table Bay Nature Reserve is part of the CFR, one of six global floral kingdoms, and is characterised by high levels of endemism. The eco-region within which the reserve is situated is known as the southern coastal belt. The reserve now falls within a highly urbanised area, with only limited remaining vegetation in its surrounds (Jackson *et al*. 2008).

McDowell (1993) described the Rietvlei wetland as including five distinct wetland plant communities: perennial wetland, reed marsh, sedge marsh, open pans and sedge pans, as well as some strandveld (Jackson *et al.* 2008). A more recent survey (Withers *et al*. 2002) identified 12 different plant communities, although a number of them appear to be dominated by invasive alien species.

More recently, the natural vegetation in Table Bay Nature Reserve is delineated along six major vegetation types: Cape Flats Sand Fynbos, Cape Flats Dune Strandveld, Cape Lowland Freshwater Wetlands, Cape Estuarine Salt Marsh, Cape Inland Salt Pans, and Cape Seashore Vegetation.

Table 8 below indicates the general distribution of these vegetation types across the various management sections:

Table 8: Distribution of vegetation types over Table Bay Nature Reserve sections

Vegetation type/ management section	Cape Flats Sand Fynbos	Cape Flats Dune Strandveld	Cape Lowland Freshwater Wetlands	Cape Estuarine Salt Marshes	Cape Inland Salt Pans	Cape Seashore Vegetation
Parklands fynbos corridor	**X**					
Diep River	**X**		**X**			
Rietvlei coastal section		**X**				**X**
Rietvlei wetlands	**X**	**X**	**X**	**X**	**X**	
Milnerton Lagoon		**X**	**X**	**X**		
Zoarvlei (Paardeneiland wetlands)	**X**	**X**	**X**			
Milnerton Racecourse	**X**					

Figure 3 indicates the historic distribution of the three main vegetation types that occur in the reserve:

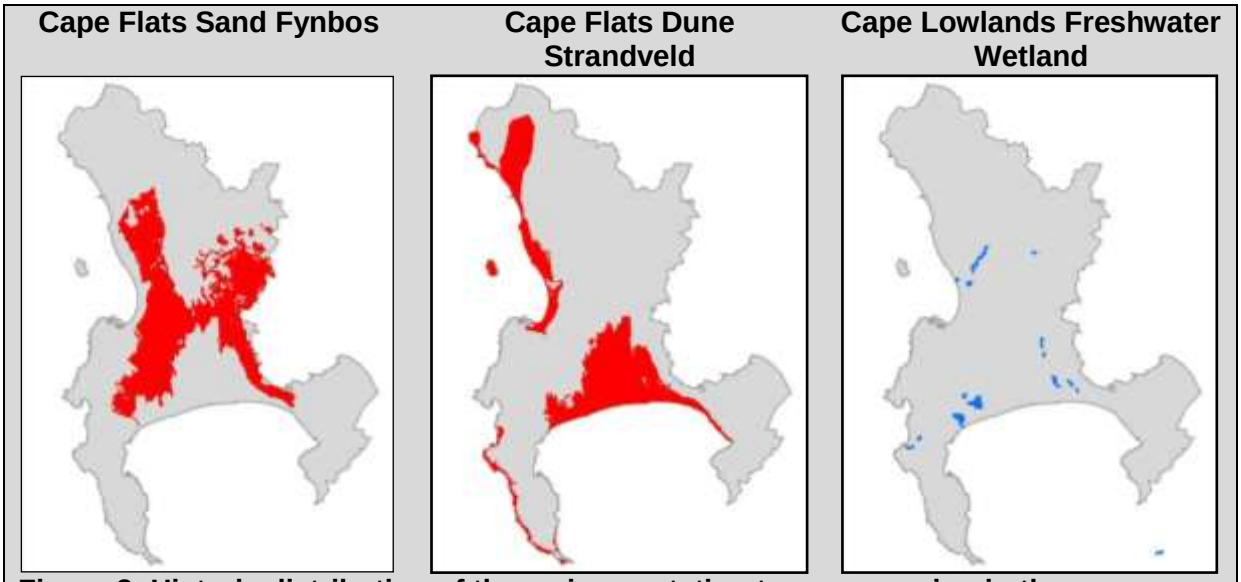


Figure 3: Historic distribution of the main vegetation types occurring in the reserve

A total of 412 plant species have been recorded within the reserve boundaries (see appendix C1 for a comprehensive plant species list). The 2008 ecosystem status for the vegetation types is as per table 9 below (Rebelo *et al*. 2006):

Table 9: Major national vegetation types in Cape Town, and their status

National vegetation type	Historical area in Cape Town (km^2)	% in Cape Town	Current area in Cape Town (km^2)	Conserved or managed in Cape Town (km^2)	National ecosystem status*
Cape Flats dune strandveld	401	100	180	64	EN
Cape Flats sand fynbos	547	100	77	5	CR
Azonal vegetation types					
Cape inland salt pans	2	3,0	2	2	VU
Cape Lowland Freshwater Wetlands	14	15,0	6	5	CR
Cape Seashore vegetation	3	4,0	3	2	LC

National vegetation types in **bold are confined to Cape Town.*
CR = Critically endangered, EN = endangered, VU = vulnerable, LC = least concern

2.4.1.1 Cape Flats Sand Fynbos

Cape Flats Sand Fynbos (Sand Plain Fynbos) is largely endemic to Cape Town, occurring on the Cape Flats from Blaauwberg and Koeberg hills, west of Tygerberg Hills, to Lakeside and Pelican Park in the south near False Bay, as well as from Bellville and Durbanville to Klapmuts and Joostenberg Hill in the east, and to the south-west of Bottelary Hills to Macassar and Firgrove in the south. It occurs on altitudes ranging from 20 to 200 m. Nearly 100% of this vegetation type occurs within the City of Cape Town area, and 85% is transformed. The vegetation occurs on moderately undulating and flat plains, with dense, moderately tall, ericoid shrubland containing scattered, emergent, tall shrubs. Proteoid and restioid fynbos is dominant, with asteraceous and ericaceous fynbos occurring in drier and wetter areas respectively (Rebelo *et al*. 2006).

The geology and soils are acid, tertiary, deep, grey, regic sands, sometimes white, often Lamotte form. The climate is a winter rainfall regime, with precipitation peaking from May to August. The annual precipitation ranges between 580 and 980 mm, with a mean of 575 mm. Mists occur frequently in winter. Mean daily maximum and minimum monthly temperatures range from 27,1 °C to 7,3 °C for February and July respectively, and frost occurs about three days per year. This is the wettest and the coolest of the West Coast sand fynbos types (Rebelo *et al*. 2006).

Endemic taxa include, for the low shrubs, *Cliffortia ericifolia, Leucadendron levisanus,* and the succulent shrub, *Lampranthus stenus* (Rebelo *et al*. 2006).

The vegetation type is ***Critically Endangered***, with a minimum national conservation target of 30%. However, less than 1% is statutorily conserved as small patches in Table Mountain National Park as well as some private conservation areas, such as Plattekloof and Blaauwberg Hill. This is the most transformed of the sand fynbos types, since more than 85% of the area has already been transformed by urban sprawl (Cape Town metropolitan area) and agricultural cultivation. Therefore, the conservation target remains unattainable. Most remaining patches are small pockets surrounded by urban areas, for example Rondevlei, Kenilworth, Milnerton, Fort Ikapa (6 Base ordinance), Plattekloof and Rondebosch Common. The majority of these patches have been designated as core flora conservation sites. They are mismanaged by mowing, fire protection and alien plant invasion (Rebelo *et al*. 2006).

Mowing eliminates serotinous and taller species, while fire protection results in a few common thicket species, such as *Carpobrotus edulis* and *Chrysanthemoides monilifera*, replacing the rich fynbos species. Alien woody species include *Acacia saligna*, *A. cyclops*

and species of *Pinus* and *Eucalyptus*. Dumping and spread of alien grasses (both annual and Kikuyu, *Pennisetum clandestinum*) are also a major problem. Alien acacias result in elevated nutrient levels and a conversion to *Eragrostis curvula* grassland and near-annual fires. Some 94 Red List sand fynbos plant species occur on the remnants within Cape Town. The endemics include six species listed as extinct in the wild, some of which are being re-introduced from botanical gardens (Rebelo *et al*. 2006).

2.4.1.2 Cape Flats Dune Strandveld

Cape Flats Dune Strandveld (Dune Thicket) is endemic to Cape Town, mainly in coastal areas at altitudes ranging from 0 to 80 m, but reaching up to 200 m in places. It occurs on flat to slightly undulating dunefield landscapes covered by tall, evergreen, hard-leaved shrubland, with abundant grasses and annual herbs in gaps. Structurally, strandveld is a tall, evergreen, hard-leaved shrubland, with abundant grasses, annual herbs and succulents in the gaps. Examples of prominent shrub species include *Euclea racemosa*, *Metalasia muricata*, *Olea exasperata*, *Chrysanthemoides monilifera* and *Roepera flexuosum*. Strandveld has few endemic species compared to fynbos. This vegetation type in its entirety occurs within the City of Cape Town area, and 56% is transformed (Rebelo *et al*. 2006).

The geology and soils are tertiary to recent calcareous sands of marine origin. The area has a mean annual rainfall of 350 mm in the north, and 560 mm in the south. Endemic species include *Lampranthus tenuifolius.* The vegetation type is ***Endangered***, with a minimum national conservation target of 24%, although only 6% is presently conserved (Rebelo *et al*. 2006).

2.4.1.3 Cape Lowland Freshwater Wetland

Cape Lowland Freshwater Wetland occurs throughout the Western Cape at altitudes ranging from 0 to 400 m. Some 14,7% of this vegetation type occurs within and 85,3% outside the City of Cape Town area. Transformation rates are however higher inside City of Cape Town borders (55%) than nationally (22%). The vegetation occurs on flats and in depressions, with extensive tall reeds of *Phragmitesaustralis* and *Typhacapensis*, temporarily or permanently flooded restiolands, sedgelands and rush beds as well as macrophytic vegetation embedded in permanent water bodies. Important species include *Senecio halimnifolius*, *Paspalum vaginatum*, *Pennisetum macrourum*, *Triglochin bulbosa*, *Bolboschoenus maritimus* and *Juncus krausii* (Mucina *et al*. 2006).

The geology, soils and hydrology consist of substrates built of fine sandy, silty or clayey soils over young Quaternary sediments, largely derived from weathering Cape supergroup shales, granites and Table Mountain sandstones. In places, especially on shales, these wetlands

can acquire a brackish character. Endemic species include the low shrub *Passerina paludosa* and, in water bodies, the aquatic herbs *Aponogetonangustifolius*, *A. distachyos* and *Cotula myriophylloides* (Mucina *et al*. 2006). The vegetation type is ***Critically Endangered***, with a minimum national conservation target of 24%, although only some 14% is conserved in the Cape Peninsula and Agulhas National Park (Mucina *et al*. 2006).

2.4.1.4 Cape Inland Salt Pans

Cape inland salt pans occur in small depressions dominated by low, succulent scrubs composed of creeping chenopods and salt-tolerant herbs and grasses. Originally, most of the saline pans were coastal lagoons, but they became dry after having been cut off from the sea. They may become temporarily flooded by winter rains, but remain mostly dry in summer (Mucina *et al*. 2006).

Important taxa in this vegetation type include *Morella cordifolia, Orphium frutescens, Senecio halimifolius, Sarcocornia capensis, S. mossiana* complex*, Atriplex cinerea* subsp*. bolusii, Lycium cinereum, Sarcocornia pillansia, Frankenia repens, Limonium equisetinum, L. kraussianum, Chironia baccifera, C. decumbens, C. tetragona, Malephra luteola, Plantago crassifolia* complex*, Sarcocornia natalensis, Halopeplis amplexicaulis, Elegia microcarpum, C. nudum, Sporobolus virginicus, Elegia verreauxii, Ficinia lateralis, F. ramosissima, Polypogon monspeliensis, Prionanthium pholiuroides* and *Tribolium hispidum* (Mucina *et al*. 2006).

Endemic taxa in the vegetation type include *Disphyma dunsdonii, Drosanthemum salicola, Lampranthus salicola, Dymondia margaretae, Limonium anthericoides, Dorotheanthus clavatus* and *Pseudalthenia aschersoniana* (Mucina *et al*. 2006).

The vegetation type is ***Vulnerable***, with a minimum national conservation target of 24%, although only some 20% is statutorily conserved in the Agulhas and West Coast national parks as well as in the Soetendalsvlei and Rocherpan nature reserves. Only 3% enjoys protection on private land (Rietvlei, Rhenosterkop), while 20% has been transformed for cultivated land, mines or by urban sprawl. Alien Australian herbaceous *Atriplex* species show invasive behaviour in places (Mucina *et al*. 2006).

2.4.2 Mammals

The mammal fauna of Table Bay Nature Reserve comprise mostly smaller mammals, many of which are nocturnal and inconspicuous, and are therefore seldom recorded, though

evidence of their occurrence in the reserve is made apparent by their middens, scat or spoor.

Grindley and Dudley (1988) listed 26 species of mammals that are likely to occur here. Rodents include the *Bathyergus suillus* (Cape Dune Molerat), the *Georychus capensis* (Cape Molerat), the *Tatera afra* (Cape Gerbil), the *Otomys irroratus* (Vlei Rat) and the *Rhabdomys pumilio* (Striped Field Mouse) (Lochner *et al*. 1994). However, 31 mammal species are currently listed for Table Bay Nature Reserve (see appendix C2). Other small mammals include *Raphicerus melanotis* (Cape Grysbok), *Sylvicapra grimmia* (Common Duiker), *Raphicerus campestris* (Steenbok), hares, mongooses and genet, but most are threatened by the encroaching development.

Recently, several sightings of *Aonyx capensis* (Cape Clawless Otter) and *Felis caracal* (Caracal) were recorded. Also occurring here are *Genetta genetta* (Small Spotted Genet), *Galerella pulverulenta* and *Herpestes ichneumon* (Small and Large Grey Mongoose).

Of the mammals listed for Table Bay Nature Reserve, none is considered to be threatened. It is also possible that some of the larger endangered mammals occurred here before the area had been developed. Historical records from 1608 refer to elephant spoor in the Rietvlei area (Jackson *et al*. 2008).

2.4.3 Birds

Table Bay Nature Reserve has a rich bird fauna, and 196 species have been recorded to date (see Appendix C3). The regional importance of the reserve as a temporary wetland for water birds has contributed to the fact that, of all the faunal groups, water birds have been the most intensively studied. Research dates back to 1938, and counts by the Cape Bird Club to 1947 (Jackson *et al*. 2008).

The available information was synthesised in a report by Kaletja and Allan (1993) – an appendix to the 1994 Rietvlei management plan – which listed 100 water-bird species from the area.

Kaletja-Summers *et al*. (2001) have also published more detailed information on long-term trends and seasonal abundance of water birds at Rietvlei between 1950 and 1997 (Jackson *et al*. 2008).

Of the species listed, 64 are residents of Rietvlei, 14 are migrants, and 22 are vagrants. In terms of overall numbers, migrant birds from the northern hemisphere (Palearctic waders and terns) made up 42% of the counts during summer, which can reach around 13 000

individuals. *Calidris ferruginea* (Curlew Sandpiper) was the most abundant species, with the maximum count exceeding 7 000. In contrast, during winter, the majority of the birds are resident species, with *Fulica cristata* (Red-knobbed Coot) and *Anas undulata* (Yellow-billed Duck) being particularly common. An estimated 37 of these birds are breeding at Rietvlei (Jackson *et al*. 2008).

Apart from the seasonal variations, there have been longer-term changes in some species, with some increasing, such as *Porphyrio madagascariensis* (African Purple Swamp-hen), *Gallinula chloropus* (Common Moorhen) and various plovers. Others were decreasing, such as *Egretta intermedia* (Yellow-billed Egret), *Tadorna cana* (South African Shelduck) and *Tringa nebularia* (Greenshank). Some new species have also been recorded, such as kingfishers and cormorants, which inhabit the deep water lakes (Jackson *et al*. 2008).

Kaletja-Summers *et al*.. (2001) found that there had been a progressive increase in the overall abundance of water birds between the 1950s and 1990s, although an analysis of census data for 2001–2003 by Keyser (2003) suggested a decline. These changes are probably linked to changes in the habitat, including the expansion of certain types of vegetation, and the invasion of alien species (Jackson *et al*. 2008).

Table 10 is an excerpt from appendix C3, which indicates the bird species of Table Bay Nature Reserve that are listed as either vulnerable or near threatened.

Table 10: Table Bay Nature Reserve's bird species Red List categories

Family	Species name	Common name	Threatened status
ACCIPITRIDAE	*Circus ranivorus*	African marsh-harrier	Vulnerable (VU)
ANATIDAE	*Oxyura maccoa*	Maccoa duck	Near threatened (NT)
CHARADRIIDAE	*Charadrius pallidus*	Chestnut-banded plover	Near threatened (NT)
CICONIIDAE	*Ciconia nigra*	Black stork	Near threatened (NT)
FALCONIDAE	*Falco biarmicus*	Lanner falcon	Near threatened (NT)
FALCONIDAE	*Falco peregrinus*	Peregrine falcon	Near threatened (NT)
GRUIDAE	*Anthropoides paradiseus*	Blue crane	Vulnerable (VU)
HAEMATOPODIDAE	*Haematopus moquini*	African black oystercatcher	Near threatened (NT)
LARIDAE	*Sterna balaenarum*	Damara tern	Near threatened (NT)
LARIDAE	*Sterna caspia*	Caspian tern	Near threatened (NT)
PELECANIDAE	*Pelecanus onocrotalus*	Great white pelican	Near threatened (NT)
PHALACROCORACIDAE	*Phalacrocorax capensis*	Cape cormorant	Near threatened (NT)
PHALACROCORACIDAE	*Phalacrocorax coronatus*	Crowned cormorant	Near threatened (NT)
PHOENICOPTERIDAE	*Phoenicopterus minor*	Lesser flamingo	Near threatened (NT)
PHOENICOPTERIDAE	*Phoenicopterus ruber*	Greater flamingo	Near threatened (NT)
ROSTRATULIDAE	*Rostratula benghalensis*	Greater painted snipe	Near threatened (NT)

2.4.4 Reptiles

A total of 33 reptile species are known to occur within Table Bay Nature Reserve (see Appendix C4). These include 17 snakes, 13 lizards and geckos, 13 snake species and three tortoises and terrapin species. The snake species occurring in the reserve include *Naja nivea* (Cape Cobra) and several non-venomous species, such as *Lamprophis aurora* (Aurora House Snake), *Duberria lufrix* (Common Slug Eater), *Lamprophis inornatus* (Olive House Snake), *Lycodonomorphus rufulus* (Common Brown Water Snake) and *Pseudaspis cana* (Mole Snake).

Of the lizard species, the most common are *Bradypodion pumilum* (Cape Dwarf Chameleon), *Meroles knoxxi* (Knox's Desert Lizard), *Afrogecko porphyreus* (Marbled Leaf-toed gecko), *Acontias meleagris* (Cape Legless Skink), *Scelotes bipes* (Silvery Dwarf Burrowing Skink), *Trachylepis capensis* (Cape Skink), *Trachylepis homalocephala* (Red-sided Skink) and *Typhlosaurus caecus* (Cuvier's Blind Legless Skink). *Pelomedusa subrufa* (Marsh Terrapin) and *Chersina angulata* (Angulate Tortoise) also occur in the area.

2.4.5 Amphibians

Nine amphibian species have been recorded in Table Bay Nature Reserve (see appendix C5). The most common amphibians include *Amietia fuscigula* (Cape River Frog), *Strongylopus grayii* (Clicking Stream Frog), *Tomopterna delalandii* (Cape Sand Frog) and *Xenopus laevis* (Common Platanna).

2.4.6 Invertebrates

Though there is no official invertebrate species list for Table Bay Nature Reserve, it has been published that 84 aquatic invertebrates occur in the Rietvlei wetland section, with another 35 in the Milnerton Lagoon section (Grindley & Dudley 1988). They include examples from a wide variety of groups such as molluscs, crustaceans, polychaetes and insects, and, while some species occur across the estuary, in general there is a predominance of freshwater species in the Rietvlei wetlands and marine species in Milnerton Lagoon (Jackson *et al*. 2008).

Since many invertebrates have a relatively short life cycle, the populations can fluctuate greatly with the seasons, depending on the availability of water. Invertebrates are important as food for fish and wading birds (Jackson *et al*. 2008).

Although no detailed studies have been undertaken recently, it is likely that bottom-dwelling invertebrates in Milnerton Lagoon in particular, have suffered as a consequence of the apparent deterioration in water quality. *Callianassa kraussi* (Sand Prawn) was previously recorded as being abundant in the lower estuary between 100 m and 2,2 km upstream from

the mouth. Clark (1998) estimated the standing stock at approximately 40 million and, although they were being collected for bait, the level of harvesting was considered sustainable. The sand prawn population has subsequently declined (Jackson *et al*. 2008).

Insect surveys were so far only done at the Milnerton Racecourse section, and 14 species were recorded (see appendix C6). These species are *Anax imperator* (Blue Emperor), *Cacyreus marshalli* (Common Geranium Bronze), *Colias electo electo* (African Clouded Yellow), *Crocothemis erythraea* (Broad Scarlet), *Eichochrysops messapus messapus* (Cupreous Blue), *Gegenis niso niso* (Common Hottentot), *Papilio demodocus demodocus* (Citrus Swallowtail), *Pieris brassicae* (Cabbage White), *Pontia helice helice* (Meadow white), *Pseudonympha magus* (Silver-bottom Brown), *Tarucus thespis* (Vivid Blue), *Tramea limbata* (Ferruginous Glider), *Vanessa cardui* (Painted lady) and *Macroglossum trochilus* (African Humming Bird Moth).

According to the report by Grindley and Dudley (1988), no detailed studies have been conducted on the phytoplankton, although a number of diatoms have been recorded during other studies. These include *Coscinodiscus, Rhizoselenia, Biddulphia, Thallassiosira* and *Skeletonema* species (Jackson *et al*. 2008).

Though no recent studies have been undertaken, the zooplankton in the reserve was reported as being similar to that of other temporary brackish vleis on the Cape Flats, which are characterised by species that have resistant stages, and can survive dry periods, only to re-appear and multiply once the vlei is inundated with water. Many of these are crustacean, including *Entomostraca*, *Copepoda*, *Cladocera*, *Ostracoda* and *Conchostraca* (Jackson *et al*. 2008).

In the lagoon, together with the physical conditions, the zooplankton varies from the upper reaches, which are low-saline in winter and hypersaline in summer, to the estuary mouth, where there is significant intrusion of seawater and the associated marine species. Some 28 species have been recorded, including crustaceans, foraminifera, fish eggs and larvae of ascidians and polychaetes (Jackson *et al*. 2008).

Further baseline surveys as well as research and monitoring projects need to be conducted within the reserve to obtain sufficient data for documentation purposes.

2.4.7 Fish

Fourteen fish species have been recorded within Table Bay Nature Reserve (see appendix C7). The most common fish include indigenous species, such as *Anguilla mossambica steinitzi* (Longfin Eel), *Caffrogobius nudiceps* (Barehead Goby), *Galaxias zebratus* (Cape

Galaxia), *Lithognathus lithognathus* (White Steenbras), *Liza richardsonii* (Southern Mullet), *Mugil cephalus* (Flathead Mullet) and *Rhabdosargus globiceps* (White Stumpnose). Alien fish species, including *Cyprinus carpio* (Carp) and *Gambusia affinis* (Mosquito Fish), have also invaded the reserve.

Historically, the fish assemblage in the Diep River estuary was fairly diverse, with up 28 species having been recorded, although five of these were aliens introduced over the last century (Jackson *et al*. 2008).

A number of the fish are breeding in the estuary, with some species in their juvenile stage entirely dependent on estuaries as nursery areas, such as *Lithognathus lithognathus* (White Steenbras), *Rhabdosargus globiceps* (White Stumpnose) *and Mugil cephalus* (Flathead Mullet) (Jackson *et al*. 2008). Concern over the status of both the Cape stumpnose and white steenbras – both of which are dependent on estuaries as nursery areas – has led to their inclusion on the prohibited species list for commercial line fishing, which forms part of the amended regulations published under the Marine Living Resources Act in 2005 (Jackson *et al*. 2008).

In more recent times, water quality perturbations in the Diep River estuary have seen substantial changes in the fish assemblage over short time periods. High ammonia concentrations arising from malfunctions in the Potsdam WWTW have caused the decline of benthic organisms, such as gobies and *Callianassa kraussii* (Sand Prawns), as well as other invertebrate species. A reduction in this food source has contributed to a decline in the number of important line-fish species in the estuary. As a result, the estuarine fish assemblage in the estuary is now dominated by the opportunistic *Liza richardsonii*, which is able to survive in both estuarine and marine environments (Jackson *et al*. 2008).

Table Bay Nature Reserve represents 10% of the available estuarine nursery area for fish along the west coast. The estuary could make a significant contribution to fish recruitment into the marine commercial and recreational line and beach-seine fisheries for *Liza richardsonii* (Jackson *et al*. 2008).

2.5 Socio-political context

The relatively flat topography of the catchment makes it suitable for both agriculture and urban development. This, together with its proximity to Cape Town, has meant that it has become highly developed, with agricultural activities dating back to Van Riebeeck's time and the establishment of an outpost by the Dutch East India Company. The Diep River,

particularly its lower reaches, has therefore been significantly modified over the past few centuries (Jackson *et al*. 2008).

2.5.1 History

Records and maps from the time of Van Riebeeck's arrival in the Cape in 1652 show that the Diep River mouth was originally connected to that of the Salt/Black River by a channel on the sea side of what was Paardeneiland (Jackson *et al*. 2008). During the early and middle decades of this century, this channel became known as Zoarvlei. It was formed as a blind-ending, seasonal vlei, since the channel between the two mouths was effectively cut off from tidal interchange, which used to occur as a result of its connection to the Diep River and its estuary. Zoarvlei has now lost its connection with the Salt/Black River through canalisation, and its connection to Milnerton Lagoon is now retained by culverts and a weir. It is probable that the original Paardeneiland channel began to disintegrate in the mid-1800s (Beaumont & Heydenrych 1980) as a result of sedimentation of the lower Diep River. This was exacerbated by road and rail developments in the early 1900s, and the formation of the Paardeneiland industrial area (Knight Hall Hendry 1999).

The 'Klein Zoar' cottage sits in the centre of Zoarvlei at Wemyss Road. It is said to be the only surviving example of a pioneer house, and has been dated as pre-1750. The house was declared a national monument in 1971. It is rumoured to have been Wolraad Woltemade's house, but this has not been conclusively proven. Woltemade is a well-known character in Cape history, mostly for his heroic actions in 1779, when he rescued 12 men shipwrecked on the Paardeneiland coastline, before he himself drowned (Knight Hall Hendry 1999).

The Milnerton railway line runs across the Zoarvlei northern water body, and this held the key to much of the development of the area. In 1899, the railway to Milnerton was initiated. However, it was completed in 1902 only. This transport link opened the area owned by Milnerton Estates Limited for development. The railway was closed in 1957, and the road network dominated the transport system from then onwards (Knight Hall Hendry 1999).

Otto du Plessis Road was constructed and effectively cut the Zoarvlei wetlands off from Milnerton Lagoon, as well as from the Rietvlei wetlands. These areas are still connected by means of culverts under roads and bridges. The canalisation of Black River left Zoarvlei as an isolated wetland (Knight Hall Hendry 1999). Further developments such as Milnerton Ridge and Royal Ascot also subsequently cut the Milnerton Racecourse off.

Early maps also showed that the estuary was deep enough to allow sailing and fishing boats to sail upstream for some 13 km as far as the Dutch East India Company's post at

Vissershok. Farms were established on the banks of the river in about 1690, and, from as early as 1846, there were reports that Rietvlei was silting up, with maps also showing that the mouth had separated from that of the Salt River (Jackson *et al*. 2008).

Urbanisation increased since the founding of Milnerton Estates Limited in 1897 as well as the establishment of the road and rail links. In 1904, a bridge was constructed between Milnerton and the Zonnekus Peninsula on the seaward side of the estuary. Today, the bridge is known as the Wooden Bridge, and the peninsula as Woodbridge Island. In 1905, parts of the lagoon were dredged for rowing regattas, but further siltation led to a curtailment of boating activities by the late 1920s. A weir was then built across the mouth in 1928 to control water levels, but was largely washed away by floods in 1941 and 1942 (Jackson *et al.* 2008).

Increasing development pressure saw the construction of the West Coast freeway in the 1960s and mid-1970s, including road embankments and the Otto du Plessis Road bridge, which crosses the estuary between Rietvlei and the Milnerton Lagoon. Over this period, there were proposals to develop Rietvlei as both a fishing harbour and a marina. These plans were ultimately shelved, although the north-west part of the vlei – commonly known as Flamingo Vlei – was dredged to a depth of 9–10 m to provide fill for construction in the port of Cape Town. An area of the Milnerton Lagoon below the old wooden bridge was also dredged in 1985 to provide sand for the Woodbridge Island development (Jackson *et al*. 2008).

In 1978, it was first proposed that Rietvlei be declared a nature area, with the proposal having been approved by Cabinet in 1982 and promulgated in 1984 (see appendix B1-1). In 1989, the wetland was declared a PNE under the Environmental Conservation Act (Act 73 of 1989). With the assistance of the Southern African Nature Foundation (now WWF-SA) and sponsorship from Caltex, the major part of Rietvlei and the Milnerton Lagoon was then purchased from Milnerton Estates, and the Rietvlei Wetland Reserve was established in 1993 under the auspices of the then Milnerton Municipality (now subsumed as part of the City of Cape Town) (Jackson *et al*. 2008).

The north-western part of the vlei, including the two dredged basins (Flamingo Vlei), belonged to Transnet, who subsequently donated the land to WWF-SA for incorporation into the reserve (Jackson *et al*. 2008). See appendix B4-1 for this deed of transfer.

In parallel with these developments, urbanisation of the areas surrounding Rietvlei and the Milnerton Lagoon continued. A golf course and the residential developments of Woodbridge Island and later Sunset Beach were constructed on the Zonnekus Peninsula, while the

suburbs of Table View and Blouberg took shape to the north of Rietvlei. These were accompanied by the development of urban infrastructure, including stormwater drains and sewage works (Jackson *et al*. 2008).

The Milnerton sewage works was constructed on the north-east bank of Rietvlei, and, in 1991–1992, a canal was excavated to prevent the treated sewage effluent from the works from entering Rietvlei. The canal channels the effluent along the eastern boundary of Rietvlei, until it merges with Rietvlei's own outflow at the top of Milnerton Lagoon. The works – now known as the Potsdam WWTW – has subsequently been expanded and upgraded from a capacity of 32 to 47 Mℓ/day, although some of this is reused. Presently, an environmental impact assessment (EIA) is under way for further expansion, which could potentially see a discharge of up to 105 Mℓ/day (Jackson *et al*. 2008).

Stormwater from mainly residential areas enters the estuary via a number of drains, including the Bayside canal, which enters at the north-western corner of the Rietvlei wetlands, and numerous others along the northern and eastern margins. Of particular concern are those that drain areas of low-cost and informal housing, both above and below the Blaauwberg Road bridge. Industrial developments in the area included the Caltex oil refinery (now Chevron), a fertiliser factory (Kynoch) and the Montague Gardens and Killarney Gardens industrial areas. Stormwater from Chevron is discharged above the sewage works, while that from Montagu Gardens enters the estuary via an open channel near the Theo Marais sports grounds. Stormwater from the Kynoch site, which is now closed and demolished, also discharges into the Theo Marais channel via the Duikersvlei stream. This originally contained high levels of nitrates and phosphorus, but has improved somewhat since the land has been rehabilitated (Jackson *et al*. 2008).

In summary, activities in the catchment, together with the intensive urbanisation around the reserve, have over the centuries not only physically modified the area, but have brought a variety of challenges, including reduced water flows, siltation and changes in the drainage patterns, a deterioration in water quality, and changes to the biodiversity (Jackson *et al*. 2008).

2.5.2 Socio-economic context

The greater part of the Diep River catchment is dominated by dryland agricultural activities, with 90% of it under cultivation. The region accounts for about a sixth of South Africa's grain production, mainly wheat, although there are also a growing number of vineyards and orchards. Livestock includes pigs, cattle and sheep, although the most common activity is poultry production. Many of these farms have small dams to provide the water required for

their activities. In addition to the agriculture, there are some quarries and informal sand works in the catchment, producing stone, gravel and sand (Jackson *et al*. 2008).

Although the catchment as a whole has a relatively low population, the lower reaches of the river where the reserve is situated fall within a highly urbanised environment. The 2001 census data put the population figure for the areas between Woodbridge Island and Sunningdale at over 55 000, and the area is one of the most rapidly growing areas of Cape Town. The residential areas are diverse, with those areas immediately adjacent to Table Bay Nature Reserve being characterised by middle to upper-income housing, with areas of low-cost and informal housing (such as Du Noon and Marconi Beam) being situated a bit further away (Jackson *et al*. 2008).

Despite the modifications that have taken place, the reserve remains highly valued for its natural attributes and the recreational opportunities it offers. A survey by Clark (1998) suggested that recreational activities are concentrated in or around the recreational deep-water lakes and the section of the Milnerton Lagoon between the mouth and the bridge. The majority (66%) of activities are land-based (picnicking, sightseeing, walking), with 34% being water-based activities, including fishing, swimming and boating. Of the boating activities, power boating, water-skiing and sailing are limited to the northern deep-water lake, while canoeing takes place primarily in the upper part of Milnerton Lagoon. The Milnerton Aquatic Club is situated on the eastern bank of the northern deep-water lake (Jackson *et al*. 2008).

Bait collection was also found to be popular, with two types occurring in the lower parts of the lagoon, namely prawn pumping for *Callianasa kraussi* (Sand Prawn) and the use of throw nets to collect *Liza richardsonii* (harders) and *Mugil cephalus* (springers). In recent years, the Sand Prawn has declined significantly. Legal fishing in the estuary is recreational, but there has been some illegal gillnetting, which could be for subsistence purposes (Jackson *et al*. 2008).

2.6 Protected-area expansion

There are several strategic future protected-area expansion plans for the reserve, and these are detailed per management section in table 11 below:

Table 11. Protected area expansion plans for the Table Bay Nature Reserve

Management section	Protected-area expansion plan(s)
Parklands fynbos corridor	Further parcels in the Parklands development must be ceded to the City of Cape Town in terms of the ROD. These blocks contain remnants of Cape Flats Sand Fynbos, and will be designated for future inclusion in Table Bay Nature Reserve to increase the size of the fynbos corridor section.
	Further parcels in the Sunningdale development must be ceded to the City of Cape Town in terms of the ROD. These blocks include remnants of Cape Flats Sand Fynbos, and will be designated for future inclusion in Table Bay Nature Reserve to increase the size of the fynbos corridor section, and ultimately

	to link to Blaauwberg Nature Reserve.
Milnerton Racecourse	The cinder running track is presently under Gold Circle ownership, but this may be ceded to the City of Cape Town for future inclusion in Table Bay Nature Reserve to increase the size of the Milnerton Racecourse section.
	The grass running track is presently under Gold Circle ownership, but a section of this may be ceded to the City of Cape Town for future inclusion in Table Bay Nature Reserve to promote connectivity between the two disjointed parts of the Milnerton Racecourse section.

3. PURPOSE, VISION/MISSION, SIGNIFICANCE/VALUE

3.1 Purpose of the protected area

Table Bay Nature Reserve is located in the CFR, which is an area of global biodiversity significance. The reserve conserves a unique combination of terrestrial and aquatic habitats, ecosystems and species, many of which are either rare or endemic to the area. Being closely associated with Table Bay, the name will be easily recognisable anywhere in the world.

The primary purpose of the reserve is the **conservation of the unique biodiversity and associated ecosystem features and functions** of the area.

In conserving this unique biodiversity, secondary objectives will be to develop high-quality visitor infrastructure, facilities and services, as well as to promote environmental education resources and experiences.

3.2 Vision and mission

The vision and mission statements below are drawn from previously published documents. It is important to note that not all the management sections in Table Bay Nature Reserve have written visions or mission statements. Therefore, the combined vision and mission statements for Table Bay Nature Reserve will encompass all the management sections.

3.2.1 Vision

Integrated Development Plan vision

The vision of the City of Cape Town remains as follows:

- To be a prosperous city that creates an enabling environment for shared growth and economic development
- To achieve effective and equitable service delivery
- To serve the citizens of Cape Town as a well-governed and effectively run administration

To achieve this vision, the City recognises that it must:

- actively contribute to the development of its environmental, human and social capital;
- offer high-quality services to all who live in, do business in, or visit the city as tourists; and
- be known for its efficient, effective and caring government.

C.A.P.E vision

We, the people of South Africa, are proud to be the custodians of our unique Cape Floral Region and share its full ecological, social and economic benefits now and in the future.

Environmental Resource Management Department (ERMD) vision

The Environmental Resource Management Department's vision is to ensure that sustainable and equitable development is combined with sound environmental practice for a healthy local environment, which sustains people and nature, provides protection for our unique resources, and results in an enhanced quality of life for all.

Biodiversity Management Branch vision

The Biodiversity Management Branch's vision is to be a City that leads by example in the protection and enhancement of biodiversity; a City within which biodiversity plays an important role, where the right of present and future generations to healthy, complete and vibrant biodiversity is entrenched; a City that actively protects its biological wealth, and prioritises long-term responsibility over short-term gains.

Table Bay Nature Reserve vision

The vision for Table Bay Nature Reserve is to become an internationally recognisable natural feature in Cape Town, and for the City of Cape Town to achieve this through the responsible management, monitoring and use of its natural assets, the building of partnerships with stakeholders, and the implementation of policies and legislation designed to promote its protection and sustainable use.

3.2.2 Mission

Biodiversity Management Branch mission

The Biodiversity Management Branch's mission is to manage biodiversity proactively and effectively, ensure an integrated approach to biodiversity between line functions and departments, actively pursue external partnerships, adopt a long-term approach to biodiversity, ensure sustainability of our rich biodiversity, adopt a holistic and multifaceted approach to biodiversity, continue to measure and monitor the City of Cape Town's

performance in the protection and enhancement of biodiversity, and continue to measure and monitor the state of biodiversity in Cape Town.

Table Bay Nature Reserve mission

Table Bay Nature Reserve's mission is to restore and maintain the natural environment and its associated ecological processes and services through the implementation of the management objectives of this IRMP.

3.3 Significance of property (biodiversity, heritage and social)

Table Bay Nature Reserve is significant in many respects, as discussed below:

3.3.1 Conservation status

The reserve encompasses the **Rietvlei PNE** (also known as the Rietvlei Wetland Reserve), which is also listed as an **IBA** and a **Core Flora Conservation Site**. Furthermore, the Milnerton Racecourse section is also designated as a Core Flora Conservation Site, and is set aside for conservation in terms of the **ROD** for the Royal Ascot development. Similarly, the Parklands fynbos corridor section is designated for conservation purposes in terms of the ROD for the Parklands and Sunningdale developments.

3.3.2 Ecosystem attributes

Table Bay Nature Reserve encompasses the Diep River **estuary**, which functions as a tidal interface and fish nursery and recruitment area; the Rietvlei **seasonal wetlands**, which provide feeding grounds for migratory water birds, and the Diep River **flood plain**, which attenuates floods in the catchment. The 11 km long wetland system from the Diep River to Zoarvlei promotes **wetland linkages, connectivity and catchment-to-coast** landscapes.

3.3.3 Regional context

The reserve is closely associated with the **Table Bay coast**, and protects a significant part of the Milnerton beach. It protects the entire **lower end of the Diep River catchment**, which connects Swartland Municipality to the Table Bay coast as well as Blaauwberg Nature Reserve to the edge of the Cape Town city centre. Furthermore, it forms the southernmost buffer zone of the **Cape West Coast Biosphere Reserve**, which extends to the West Coast National Park.

3.3.4 Biodiversity conservation

Table Bay Nature Reserve protects 412 plant species, 31 mammals, 196 birds, 33 reptiles, nine amphibians and 14 fish species. It also supports yet unlisted insect, invertebrate and planktonic communities. Of the birds, two species are listed as Vulnerable, and 14 are Near Threatened.

3.3.5 Vegetation types

The reserve protects six national vegetation types, including **Cape Flats Sand Fynbos** (Critically Endangered), **Cape Flats Dune Strandveld** (Endangered), **Cape Lowland Freshwater Wetlands** (Critically Endangered), **Cape Estuarine Salt Marshes**, **Cape Inland Salt Pans** (Vulnerable) and **Cape Seashore Vegetation**.

3.3.6 Conservation planning

Table Bay Nature Reserve forms a significant part of the City of Cape Town's **biodiversity network**, and aligns with the City of Cape Town's **biodiversity strategy**. It also aligns with the vision and mission statements of **C.A.P.E**, the **C.A.P.E Estuaries Programme** as well as the City of Cape Town's ERMD and Biodiversity Management Branch.

3.3.7 Nature reserve administration

The reserve's management is guided by section-specific **management objectives**, as well as four section-specific **management committees** that encompass all seven management sections of the reserve. (This IRMP will specify the creation of an all-encompassing Table Bay Nature Reserve Forum.)

3.3.8 User opportunities

In terms of user opportunities, Table Bay Nature Reserve is utilised by schools and students for **environmental education** purposes, by Friends groups, as well by various organised **recreational** groups, including water sports, birdwatching and fishing.

3.3.9 Visual perspective

The reserve is a central feature of Cape Town, and is clearly visible from most of the major access routes to the city, including the **R27 (West Coast road)**, the maritime routes to **Cape Town Port** and the flight paths to **Cape Town International Airport**. It is also clearly visible from **Table Mountain**, **Tygerberg Hills** and **Blaauwberg Hill**.

PART 2

MANAGEMENT POLICY FRAMEWORK

4. ADMINISTRATIVE AND LEGAL FRAMEWORK FOR THE MANAGEMENT AUTHORITY

4.1 Legal framework

A range of international, national and provincial legislation potentially applies to the management of nature reserves and estuaries in South Africa. Together with relevant municipal bylaws, management policies and strategies, these pieces of legislation are summarised in the following tables. Key pieces of legislation are discussed in more detail (Jackson *et al*. 2008).

4.1.1 International obligations

4.1.1.1 Convention on Wetlands of International Importance, especially as Waterfowl Habitat, 1971 (Ramsar Convention)

The mission of the Ramsar Convention is “the conservation and wise use of all wetlands through local, regional and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world”.

The Convention uses a broad definition of the types of wetlands covered in its mission, including lakes and rivers, swamps and marshes, wet grasslands and peatlands, oases, estuaries, deltas and tidal flats, near-shore marine areas, mangroves and coral reefs, and human-made sites such as fish ponds, rice paddies, reservoirs, and salt pans. (Pers. Comms., Niel van Wyk, 2011).

South Africa acceded to the Ramsar Convention in 1975, and has 20 designated Ramsar sites. In 1996, consideration was given to applying for Ramsar status for the Diep River estuary and Rietvlei wetlands, and a proposal to this effect was prepared. However, given the problems pertaining to the estuary, this was not submitted (Jackson *et al*. 2008).

4.1.1.2 Convention on the Conservation of Migratory Species of Wild Animals, 1979 (Bonn)

The Bonn Convention was developed to facilitate cooperation between states in the conservation of animals that migrate across their borders. Parties that are range states of a migratory species listed in appendix 1 to this convention are required to conserve and restore their habitats with a view to reducing the threat of extinction. The convention’s appendix 2 lists migratory species that require more specific agreements, such as species that have an unfavourable conservation status or require international agreements for their conservation and management. Each agreement should cover the whole range of the migratory species concerned, and should be opened to accession by all range states of that

species, regardless of whether they are parties to the convention. South Africa acceded to the convention in 1991. It is particularly relevant to Table Bay Nature Reserve, which is renowned for its water birds, including 14 migrants (Jackson *et al*. 2008).

4.1.1.3 Convention on Biological Diversity, 1992

The convention establishes three main goals: (1) the conservation of biological diversity; (2) the sustainable use of its components; and (3) the fair and equitable sharing of the benefits from the use of genetic resources. Contracting parties are required to develop national strategies, plans or programmes for the conservation and sustainable use of biological diversity. States must integrate the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programmes and policies (Jackson *et al*. 2008).

The convention also provides for the establishment of a system of protected areas or areas where special measures need to be taken to conserve biological diversity. Parties are required to promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings. They must rehabilitate and restore degraded ecosystems and promote the recovery of threatened species through the development and implementation of plans or other strategies. Parties must also prevent the introduction, control or eradication of those alien species that threaten ecosystems, habitats or species. South Africa ratified the convention in 1995 (Jackson *et al*. 2008). Table 12 below gives a summary of a greater range of applicable international conventions:

Table 12. Summary of applicable international conventions (Jackson *et al*. 2008)

International obligations	Description	Management implications
Convention on Wetlands of International Importance, especially as Waterfowl Habitat, 1971 (Ramsar Convention)	Aims to stem the progressive encroachment on, and loss of, wetlands. Contracting parties are to designate suitable wetlands within their territory, for inclusion in a list of wetlands of international importance.	Planning must be formulated and implemented to promote not only the conservation of wetlands included in the list, but also the wise use of wetlands within the territory of contacting parties.
Convention concerning the Protection of the World Cultural and Natural Heritage, 1972 (World Heritage Convention)	Recognises that parts of the cultural and natural heritage need to be preserved. Parties are to submit an inventory of sites for inclusion on the world heritage list.	The convention is applicable not only to world heritage sites within a state's territory, but also extends to natural heritage more generally, including estuaries.
Convention on the Conservation of Migratory Species of Wild Animals, 1979 (Bonn Convention)	Recognises that states must be the protectors of migratory species of wild animals that live within, and pass through, their national jurisdictional boundaries.	Where migratory species occur, concerted action is required for their conservation and effective management.
Convention for Cooperation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Region, 1981 (Abidjan Convention)	Covers the marine environment, coastal zones and related inland waters falling within the jurisdiction of the states of the West and Central African region who are contracting parties to it.	Requires parties to take all appropriate measures to prevent, reduce, combat and control pollution of the convention area caused by discharges from estuaries.
Convention on Biological Diversity, 1992	Contracting parties are to promote the protection of ecosystems, natural habitats and the maintenance of viable populations of	Requires the integration of conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral

Table 12. Summary of applicable international conventions (Jackson *et al*. 2008)

International obligations	Description	Management implications
	species in natural surroundings.	plans, programmes and policies.
United Nations Framework Convention on Climate Change, 1992	Aims to achieve stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.	Requires that precautionary measures be taken to anticipate, prevent or minimise the cause of climate change, and mitigate its adverse effects (including sea-level rise).

Key national legislation

The National Biodiversity Strategy and Action Plan highlighted the lack of effective estuary management due to estuaries not fitting within the mandate of any one department. This gap was addressed through enactment of the National Environmental Management: Integrated Coastal Management Act, Act 24 of 2008. This act introduced a requirement for estuary management plans (EMPs) and has therefore been a key driver behind the C.A.P.E Estuaries Programme (Jackson *et al*. 2008).

4.1.2.1 National Environmental Management: Integrated Coastal Management Act, Act 24 of 2008

The Integrated Coastal Management Act is intended to:

- establish a system of integrated coastal and estuarine management in the Republic, including norms, standards and policies, in order to promote the conservation of the coastal environment, maintain the natural attributes of coastal landscapes and seascapes, and ensure that development and the use of natural resources within the coastal zone are socially and economically justifiable and ecologically sustainable;
- define rights and duties in relation to coastal areas;
- determine the responsibilities of organs of state in relation to coastal areas;
- prohibit incineration at sea;
- control dumping at sea, pollution in the coastal zone, inappropriate development of the coastal environment, and other adverse effects on the coastal environment;
- give effect to South Africa's international obligations in relation to coastal matters; and
- provide for matters connected therewith.

In terms of the Act, estuaries are to be managed in accordance with a national estuarine management protocol, to be prescribed by the ministers of Environmental Affairs and Water Affairs within four years of the commencement of the Act. The protocol must:

- determine a strategic vision and objective for achieving effective integrated management of estuaries;
- set standards for the management of estuaries;

- establish procedures and guidance regarding how estuaries must be managed, and how the management responsibilities are to be exercised by different organs of state and other parties;
- establish minimum requirements for estuarine management plans;
- identify who must prepare estuary management plans and the process to be followed; and
- specify the process for reviewing estuarine management plans to ensure that they comply with the requirements of the Act.

4.1.2.2 National Environmental Management Act, Act 107 of 1998 (NEMA)

The principles set out in NEMA serve as guidelines to organs of state when exercising any functions or taking decisions that may have a significant impact on the environment. A significant principle in NEMA, for the purposes of estuary management, provides that sensitive, vulnerable, highly dynamic or stressed ecosystems, such as estuaries, require specific attention in management and planning procedures. Pertinent regulations made in terms of NEMA include the EIA regulations and the Regulations for the Control of Vehicles in the Coastal Zone (Jackson *et al*. 2008).

4.1.2.3 National Environmental Management: Protected Areas Act, Act 57 of 2003

The Protected Areas Act provides for the protection and conservation of areas representative of South Africa's biodiversity and ecosystems, through the declaration and management of protected areas. The system of protected areas includes, among others, special nature reserves, national parks, nature reserves and protected environments. The Minister may prescribe norms and standards for the management and development of protected areas, as well as indicators to measure compliance therewith (Jackson *et al*. 2008).

Although the Rietvlei Wetland Reserve was originally declared a PNE in terms of the Environmental Conservation Act, Act 73 of 1989, section 28(7) of the Protected Areas Act provides that an area that was a protected environment before the section took effect, must be regarded as having been declared in terms of the section. Thus, the provisions of the Act are directly applicable. The responsibility for overseeing implementation of these provisions, however, lies with Province, the responsibility for PNEs having been delegated to the provinces by the Environmental Conservation Act. This oversight function has not been established as yet (Jackson *et al*. 2008).

4.1.2.4 National Environmental Management: Biodiversity Act, Act 10 of 2004

The objectives of the Biodiversity Act include:

- the management and conservation of biological diversity;
- the sustainable use of indigenous biological resources; and
- giving effect to international obligations under the Convention on Biological Diversity, and the Ramsar and Bonn conventions.

This includes the protection of threatened species and ecosystems, and the management of threats to biodiversity such as alien and invasive species. Both aspects are pertinent to Table Bay Nature Reserve in as much as the area is inhabited by a number of threatened species, and has been invaded by a number of terrestrial and aquatic alien species (Jackson *et al*. 2008).

All organs of state are required to prepare an invasive species monitoring, control and eradication plan for land under their control as part of their environmental plans in accordance with NEMA. In the case of municipalities, such plans must be part of their IDPs.

This plan must include the following (Jackson *et al*. 2008):

- A detailed list and description of any listed invasive species occurring on the land
- A description of the parts of the land that are infested with such listed invasive species
- An assessment of the extent of such infestation
- A status report on the efficacy of previous control and eradication measures
- The current measures to monitor, control and eradicate such invasive species
- Measurable indicators of progress and success, and indications of when the control plan is to be completed

Where the area is a protected area in terms of the Act, the management authority of the protected area must incorporate an invasive species control and eradication strategy into the area management plan. The management authority must also at regular intervals prepare and submit to the Minister or the provincial MEC for Environmental Affairs a report on the status of any listed species that occurs in that area (Jackson *et al*. 2008).

4.1.2.5 National Water Act, Act 36 of 1998

The purpose of the Act is to ensure that the national water resources are protected, used, developed, conserved, managed and controlled appropriately. This involves a variety of activities, two of which are of particular relevance to the management of the Diep River estuary, namely catchment management and management of the use of water (Jackson *et al*. 2008).

The Act provides for the establishment of catchment management agencies, so that water resource management may be delegated to the regional or catchment level. To date, however, only two agencies have been established, namely Inkomati and Breede-Overberg catchment management agencies. The Minister of Water Affairs assumes the powers of a catchment management agency in areas where such agencies have not been established (Jackson *et al*. 2008).

Included among the functions of a catchment management agency are (Jackson *et al*. 2008):

- investigating, and advising interested persons on, the conservation management and control of water resources in its water management area;
- promoting community participation in the conservation management and control of water resources; and
- coordinating the related activities of water users and the water management institutions.

The Act provides for the Minister to prescribe a system for classifying water resources, which may establish guidelines and procedures for determining different classes of water resources. It may also set out water uses for instream or land-based activities, which must be regulated in order to protect the water resources. Once the Minister has prescribed the system for classifying water resources, he/she must determine, for every significant water resource, quality objectives based on such classification. Such objectives may relate to the reserve, the instream flow, the water level, the presence and concentration of particular substances in the water, and the characteristics and quality of the water resource. The Minister is required to determine the reserve for all or part of that water resource. The Act provides for a preliminary determination of the reserve to be made, until a system for classifying water resources has been prescribed, or a class of a water resource has been determined (Jackson *et al*. 2008).

Section 21 sets out water uses that require a water use licence. Those significant for the purposes of the Diep River include (Jackson *et al*. 2008):

- impeding or diverting the flow of water in a watercourse;
- discharging waste, or water containing waste, into a water resource through a pipe, canal, sewer, sea outfall or other conduit;
- disposing of waste in a matter that may detrimentally affect the water resource;
- altering the bed, banks, course or characteristics of a watercourse; or

- in any manner disposing of water that contains waste from, or has been heated in, any industrial or power-generation process.

The Potsdam WWTW is authorised to discharge effluent into the Diep River in terms of a licence issued under section 21 (Jackson *et al*. 2008).

4.1.2.6 Marine Living Resources Act, Act 18 of 1998 (amended in 2000)

The Marine Living Resources Act provides for the utilisation, conservation and management of marine living resources. In so doing, it recognises the need for the conservation of marine ecosystems, protection of marine biodiversity, and the minimisation of marine pollution. In order to accomplish this, the Minister may declare marine protected areas (MPAs), where certain activities are prohibited. These include fishing or attempting to fish, constructing or erecting any building or other structure on or over any land or water within an MPA, or discharging or depositing waste or any other polluting matter. An area may be declared an MPA for the protection of fauna and flora, to facilitate fishery management, or to diminish any conflict that may arise from competing uses in that area (Jackson *et al*. 2008).

Table 13 below lists the national legislation that applies to Table Bay Nature Reserve. Although this list is extensive, it is by no means complete, and should be updated as new legislation is gazetted.

Table 13. Summary of applicable National legislation

National legislation	Description	Management implications	Lead agent
Constitution of the Republic of South Africa Act; No 108 of 1996	Lists South African citizens' environmental rights	Chapter 2: Bill of rights assigns citizens with particular rights	N/A
Marine Living Resources Act, Act 18 of 1998	Provides for the conservation of marine ecosystems and biodiversity, and the sustainable utilisation of marine living resources	The Minister may declare certain areas as MPAs, within which permission is required to carry out certain activities, including fishing, the construction or erection of buildings, and the dredging or extracting of sand or gravel.	Department of Agriculture, Forestry and Fisheries
National Environmental Management Act, 107 of 1998 ('NEMA')	Provides for cooperative environmental governance by establishing principles for decision making, institutions to promote cooperative governance, and procedures for coordinating environmental functions	A duty of care is imposed to prevent or remedy significant pollution or degradation of the environment, especially sensitive, vulnerable, highly dynamic or stressed ecosystems, such as estuaries.	Department of Environmental Affairs
EIA regulations, 2006 (issued under NEMA)	Regulates procedures and criteria for the submission, processing, consideration and decision of applications for environmental authorisation of activities	Approval by the environmental authorities is required to carry out activities listed in the EIA regulations. This includes certain activities within the coastal zone. Approval is dependent on the findings of the EIA.	Department of Environmental Affairs / Department of Environmental Affairs and Development Planning (DEA&DP)
Regulations for the Control of Vehicles in the Coastal Zone, 2001 (issued	Provides a general prohibition on the recreational use of vehicles in the coastal zone	Vehicles may not be used in the coastal zone, unless such use is authorised in terms of a permit or exemption, or is a permissible use under the regulations.	Department of Environmental Affairs and Development Planning (DEA&DP)

Table 13. Summary of applicable National legislation

National legislation	Description	Management implications	Lead agent
under NEMA)			
National Water Act, Act 36 of 1998	Aims to ensure that water resources are protected, used, developed, conserved, managed and controlled appropriately	Water resources are defined in the Act to include estuaries. The Act sets out various water uses for which a water use licence is required, including the taking of water from a water resource.	Department of Water Affairs
National Heritage Resources Act, Act 25 of 1999	Introduces an integrated and interactive system for the management of national heritage resources. In terms of the Act, heritage resources may include landscapes and natural features of cultural significance.	The responsible heritage resources authority must be notified of certain categories of development where this may result in heritage resources being affected. The authority may then request that an impact assessment report be submitted.	South African Heritage Resources Agency (SAHRA)/Heritage Western Cape
Local Government: Municipal Systems Act, Act 32 of 2000	A municipal council must adopt a single, inclusive and strategic plan, which links, integrates and coordinates plans, and takes into account proposals for the development of the municipality.	An adopted IDP is the principal strategic planning instrument that guides and informs all planning and development and all decisions with regard to planning, management and development in the municipality.	Department of Provincial and Local Government
Mineral and Petroleum Resources Development Act, Act 28 of 2002	Aims to ensure that mineral and petroleum resources are developed in an orderly and ecologically sustainable manner, while promoting justifiable social and economic development	An application for mining requires an EIA to be conducted and an environmental management programme to be submitted, which evaluates the impact of the mining on the environment, and determines the environmental management objectives.	Department of Minerals and Energy
National Environmental Management: Protected Areas Act, Act 57 of 2003	Aims to establish a national system of protected areas as part of a strategy to manage and conserve biodiversity and ecosystems	Where a protected area is declared, restrictions may be applied to development or activities that are inappropriate for the area.	Department of Environmental Affairs / CapeNature
National Environmental Management: Biodiversity Act, Act 10 of 2004	Provides for the management and conservation of biodiversity, and of the components of such biological diversity, within the framework of NEMA. Provides for cooperative governance in biodiversity management and conservation.	Gives effect to ratified international agreements relating to biodiversity (i.e. Ramsar convention, Bonn convention and Convention on Biological Diversity). Provides for identification and listing of vulnerable and threatened ecosystems and species, and for bioregional plans.	Department of Environmental Affairs
National Environmental Management: Integrated Coastal Management Act, 2008	Establishes a system of integrated coastal and estuarine management, including norms, standards and policies, in order to promote the conservation of the coastal environment. Further aims to control dumping at sea, pollution in the coastal zone, and inappropriate development of the coastal environment. Estuaries are to be managed in accordance with a national estuarine management protocol. This must set standards for the management of estuaries, establish procedures regarding how estuaries are to be managed, and establish minimum requirements for estuarine management plans.	Estuaries would form part of 'coastal public property' and 'coastal waters', and would consequently be inalienable and under trusteeship of the state. The development of an estuarine management plan must follow a public participation process consistent with the national estuarine management protocol. Imposes a duty to avoid causing adverse effects on the coastal environment. The duty of care in NEMA applies to any impact that has an adverse effect on the coastal environment. Effluent that originates from a source on land may not be discharged into an estuary, unless authorised in terms of a general authorisation or a coastal waters discharge permit.	Department of Environmental Affairs
Conservation of Agricultural Resources Act, Act 43 of 1983 (CARA)	CARA regulations contain a list of alien invasive vegetation, categorised according to their legal status. Act regulates sale position and use of listed species.	Alien invasive plant legislation to be included under Biodiversity Act in future	

Table 13. Summary of applicable National legislation

National legislation	Description	Management implications	Lead agent
National Veld and Forest Fire Act, Act 101 of 1998	Relates to veld fire prevention, fire protection associations, fire danger indexing, enforcement of fire legislation, and the fighting of fires		
Environmental Conservation Act, Act 73 of 1989	The Environmental Conservation Act is the other law that relates specifically to the environment. Although most of this Act has been replaced by NEMA, there are still some important sections that remain in operation. These sections relate to: • protected natural environments; • littering; • special nature reserves; • waste management; • limited development areas; • regulations on noise, vibration and shock; and • EIA.		
National Environmental Management: Air Quality Act, Act 39 of 2004	To provide for enhancing the quality of ambient air for the sake of securing an environment that is not harmful to the health and well-being of the people	Promulgated to give effect to section 24(b) of the Constitution. South African air quality information system (SAAQIS) is a web-based system that provides information on the quality of ambient air across the country	
Animal Protection Act, Act 71 of 1962	To consolidate and amend the laws relating to the prevention of cruelty to animals		
Animal Diseases Act, Act 35 of 1984	Provides for control measures relating to animal diseases		
Animal Health Act, Act 7 of 2002	Regulates animal health		
Game Theft Act, Act 105 of 1991	Regulates the ownership and protection of game		
Mountain Catchment Areas Act, Act 63 of 1970	Provides for catchment conservation		

Provincial legislation

4.1.3.1 Nature and Environmental Conservation Ordinance, No. 19 of 1974 (as amended)

The Ordinance provides for the establishment of provincial, local and private nature reserves and related conservation measures, including the regulation of hunting. It also separately provides for the protection of flora, wild animals, and fish in inland waters. With respect to fishing, a permit is generally required, subject to various conditions and some exemptions. The limitations cover issues such as the type and size of fish, bag limits, season, and

method of fishing and sale of fish. The Ordinance also prohibits the sale or purchase, except under permit, of bait species (Jackson *et al*. 2008).

Table 14 below summarises the relevant provincial legislation. Although this list is extensive, it is by no means complete, and should be updated as new legislation is gazetted.

Table 14: Summary of relevant provincial legislation

Provincial legislation	Description	Management implications	Lead agent
Municipal Ordinance, No. 20 of 1974	Consolidates and amends the law relating to municipalities, village management boards and local boards, and deals with municipal services	Provides for the draining of stormwater or discharge of water from any municipal service works into any natural watercourse	Municipality
CapeNature and Environmental Conservation Ordinance, No. 19 of 1974 (amended in 1999)	Deals with the establishment of nature reserves, the protection of wild animals, the protection of fish in inland waters, and the protection of flora	Prohibits the deposition of substances likely to be injurious to any fish or fish food. An angling licence is required for angling in inland waters.	CapeNature
Western Cape Nature Conservation Board Act, Act 15 of 1998	The purpose of this Act is to promote and ensure nature conservation, render services and provide facilities for research and training, and generate income.	Biodiversity agreements are signed under this Act.	CapeNature
Land Use Planning Ordinance, No. 15 of 1985	Regulates land use planning applications in the Western Cape	Applications for departure, rezoning and subdivision, where applicable, need to be submitted in terms of this Ordinance.	DEA&DP
Western Cape Planning and Development Act, Act 7 of 1999	Provides for principles, policies, guidelines and parameters for planning and sustainable development, including environmental protection and land development management.	Sets out general planning and development principles that apply throughout the province. These include principles of environmental protection, including that development in unsuitable environments, such as areas with a high water table, swamps, flood plains, steep slopes and areas sensitive to driftsands, should be discouraged. However, this Act has not yet taken effect.	DEA&DP
Problem Animal Control Ordinance, No. 26 of 1957	Regulates problem animals		CapeNature

4.1.4 Municipal bylaws (City of Cape Town)

4.1.4.1 Milnerton Municipality: Bylaw relating to the Use and Control of the Rietvlei Water Area, 1977

The Bylaw regulates the recreational water use at the Rietvlei deep-water lakes. See annexure B1-2 for the complete text. It provides for the present suite of recreational activities that take place in the Rietvlei deep-water lakes. Any activities that are not provided for may

not be practised in the recreational water area. Recently, a revision of the Bylaw was requested to amalgamate similar bylaws from other former municipalities that are now subsumed into the City of Cape Town. This revision also aims to align the Bylaw with new national regulations on small vessels.

Together with this Bylaw, the Council resolution relating to fishing and boating in the Rietvlei PNE further determines the present recreational use patterns in the reserve. See appendix B3-1 for the complete resolution.

4.1.4.2 Bylaw relating to Stormwater Management, 2005

The Bylaw provides for the management of stormwater in the City of Cape Town, including the regulation of activities that may have a detrimental effect on the development, operation or maintenance of the stormwater system. The stormwater system is defined to include natural facilities, including watercourses and their associated flood plains used for the disposal of stormwater. Similarly, the definition of stormwater includes natural precipitation, groundwater and spring water conveyed by the stormwater system, as well as sea water within estuaries (Jackson *et al*. 2008). In the case of Table Bay Nature Reserve, there are numerous stormwater discharges draining both residential and industrial areas.

4.1.4.3 Wastewater and Industrial Effluent Bylaw, 2006

This Bylaw regulates the discharge of industrial effluent into municipal sewers, the protection of municipal sewers, and duties of property owners in respect of sewer installations. Its provisions should however be noted in the context of proposals to divert some of the more polluted stormwater discharges around the reserve to Potsdam WWTW, as written consent of the City of Cape Town is required to discharge stormwater into any municipal sewer (Jackson *et al*. 2008).

4.1.4.4 Dumping and Littering Bylaw, 2002

The Bylaw prohibits littering or the dumping of waste, described as any matter that is a by-product, emission, residue or remainder of any product, process or activity, and which has been discarded. Where the littering or dumping of waste takes place, the City of Cape Town may, by written notice, direct the relevant persons to cease the dumping or littering, or to prevent the continuation of the dumping or littering, and to take whatever steps the municipality considers necessary to clean up or remove the waste, to rehabilitate the affected facets of the environment, and to ensure that the waste and any contaminated material that cannot be cleaned or rehabilitated are disposed of lawfully (Jackson *et al*. 2008).

Table 15 below summarises the relevant municipal bylaws and regulations. Although this list is extensive, it is by no means complete, and should be updated as new legislation is gazetted.

Table 15. Summary of relevant municipal regulations

Municipal bylaw	Description	Management implications
Milnerton Municipality: Bylaw relating to the Use and Control of the Rietvlei Water Area, 1977	Provides for recreational activities to take place in the Rietvlei lakes. The Bylaw is presently under revision, and may be replaced with a new bylaw that would be applicable to all recreational water areas in the City.	The Bylaw regulates the recreational water use at the Rietvlei deep-water lakes, which are part of Table Bay Nature Reserve.
City of Cape Town: Dumping and Littering Bylaw, 2002	Provides that no person may litter, or permit the littering of waste, or dump or permit the dumping of waste	The depositing, discharge, spill or release of waste is prohibited.
City of Cape Town: Bylaw relating to Stormwater Management, 2005	Provides for stormwater management, and regulates activities that may have a detrimental effect on the operation of a stormwater system. Stormwater includes natural precipitation, groundwater and spring water conveyed by the stormwater system, as well as sea water within estuaries.	Written consent is required for activities affecting the stormwater system, including draining, abstracting or diverting water from the stormwater system, erecting any structure that would interfere with the stormwater system, or discharging any substance likely to damage the stormwater system or contaminate the water therein.
City of Cape Town: Wastewater and Industrial Effluent Bylaw, 2006	Deals with discharge of industrial effluent, protection of municipal sewers, and duties of property owners in respect of sewer installations. Stormwater includes sea water within estuaries.	Written consent of Council is required to discharge stormwater into any municipal sewer
City of Cape Town: Air Pollution Control Bylaw; LA 12649	The purpose of the Bylaw is to give effect to the right contained in section 24 of the Constitution of the Republic of South Africa Act, 1996 (Act 108 of 1996), by controlling air pollution within Council's area of jurisdiction; to ensure that air pollution is avoided, or where it cannot be altogether avoided, is minimised and remedied.	
Bylaw relating to Community Fire Safety; Province of the Western Cape; LA 11257	The purpose and scope of the Bylaw is to promote the achievement of a fire-safe environment for the benefit of all persons within the municipal area of jurisdiction, and to provide for procedures, methods and practices to regulate fire safety within the municipal area of jurisdiction.	
City of Cape Town: Draft Animal Bylaw, 2009	The purpose of the Bylaw is to formulate a new single bylaw, including ten different municipal bylaws on dogs as well as the Animal Protection Act of 1962. This includes chapters on dogs, cats, poultry and working equines.	

Table 16 below lists legislation that applies to human resource management and the administration of a reserve. Although this list is extensive, it is by no means complete, and should be updated as new legislation is gazetted.

Table 16: Summary of legislation applicable to human resource management and administration

Legislation	Description	Listed amendments
National legislation		
Occupational Health and Safety Act, 1993	To provide for the health and safety of persons at work, and for the health and safety of persons in connection with the use of plant and machinery;	Occupational Health and Safety Amendment Act, Act 181 of 1993

	the protection of persons other than persons at work against hazards to health and safety arising out of, or in connection with, the activities of persons at work; to establish an advisory council for occupational health and safety, and to provide for matters connected therewith.	
Basic Conditions of Employment Act, Act 3 of 1997	Provides for control measures pertaining to employment	Amendment Act 11 of 2002
Labour Relations Amendment Act, Act 66 of 1995	The labour relations act aims to promote economic development, social justice, labour peace and democracy in the work place.	Amendment Act 12 of 2002
Local Government Municipal Systems Act, Act 32 of 2000	Establishes core principles, process and mechanisms relating to local government	
Promotion of Equality/Prevention of Unfair Discrimination Act, Act 4 of 2000	Provides for the prevention of discrimination and other related matters	
Criminal Procedure Act		
Firearms Control Act		
Civil Aviation Act, Act 13 of 2009		
Fencing Act, Act 31 of 1963	Regulates all matters relating to fencing	
Hazardous Substances Act, Act 15 of 1973	Controls substances which may cause injury or ill health to, or death of, human beings by reason of their toxic nature	
Land Survey Act, Act 8 of 1997	Regulates land surveying, beacons and other related matters	
Promotion of Access to Information Act, Act 2 of 2000	Promotes access to information	
Promotion of Administrative Justice Act, Act 3 of 2000	Provides for the promotion of administrative justice	Amendment Act 53 of 2002
Regional Services Council Act, Act 109 of 1985	Regulates and controls land, land usage and other related matters	
Skills Development Act, Act 97 of 1998	Promotes the development of skills	
State Land Disposal Act, Act 48 of 1961	Regulates the disposal of state owned land	
Subdivision of Agricultural Land Act, Act 70 of 1970	Regulates the subdivision of agricultural land	
Tourism Act, Act 72 of 1993	Provides for the promotion of tourism and regulates the tourism industry	
Municipal Ordinance 20 of 1974	Regulates pollution and waste management	
South African National Road Agency Limited (SANRAL) and National Road Act, Act 7 of 1998		
Provincial legislation		
Western Cape Constitution, Act 1 of 1998	Introduces a constitutional framework for the province	
Western Cape Land Administration Act, Act 6 of 1998	Regulates land and land usage	
Western Cape Planning and Development Act, Act 7 of 1999	Regulates planning and development within the province	

Municipal legislation		
City of Cape Town: Bylaw relating to Filming	The Purpose of the By-law is to regulate and facilitate filming in the CCT	Provincial Gazette 6277, 24 June 2005
Bylaw relating to Streets, Public Places and the Prevention of Noise Nuisances, 2007	The purpose of the by-law is to regulate activities in streets and public places and prevent excessive noise nuisance	Promulgated 28 September 2007, PG 6469; LA 44559
City of Cape Town: Outdoor Advertising and Signage Bylaw, 2001	To regulate the placement of outdoor advertising and signage	Promulgated 5 December 2001, PG 5801

4.2 Administrative framework

4.2.1 Organisational structure

Table Bay Nature Reserve is managed by the ERMD's Biodiversity Management Branch in the City of Cape Town. The reserve is located within the Milnerton area of the northern region, and is the management responsibility of the area manager, assisted by nine permanent staff members, one intern and two students. The operational management of the reserve is supported by various other City of Cape Town departments, including, but not limited to, City Parks, Roads & Stormwater, Law Enforcement, Water and Sanitation, Human Resources (HR) and Finance.

Table 17 below summarises various applicable organisational strategies and plans that affect and determine the operations of reserve management. Although this list is extensive, it is by no means complete, and should be updated regularly.

Table 17: Summary of relevant organisational plans and strategies

Strategy	Description	Management Implications
City of Cape Town IDP, 2007/8– 2011/12	The principal strategic planning instrument that informs all planning and development within Cape Town. Recognises that the City will seek to create an environment that is conducive to growth and development, while protecting the environment to ensure sustainability.	The protection of natural aquatic environments is one of the objectives of the sustainable urban infrastructure and services strategic focus area.
iKapa Growth and Development Strategy, 2008	Serves as a White Paper for the Western Cape. It aims to guide municipal IDPs, local economic development, and district and metropolitan growth and development strategies. Recognises that water, biodiversity, and coastal and marine systems and resources have been identified as priorities.	The promotion of ecologically sustainable development is one of the five goals of the strategy to guide policy-making, programming and resource allocation. Requires sustainable resource use to respond to climate change, ecosystem degradation and threats to key strategic natural resources.
City of Cape Town Coastal Zone Management Strategy, 2003	Presents an institutional management framework that will facilitate an effective and efficient Coastal Zone Management Strategy. Recognises that estuaries play a significant role in the coastal zone as essential components to healthy ecosystems, as nurseries to many fish species and as key recreation nodes. Aims to develop and implement management plans for each of the estuaries in Cape Town by working with relevant directorates, including catchment management agencies, City Health, Scientific Services and the Wastewater Department.	Estuary management is one of the coastal management strategic objectives. Management plans for each estuary must include mechanisms for monitoring the health of the estuary, a commitment to a continual improvement, emergency response mechanisms, and clear accountability and responsibility for implementation of the management plan. The final estuary management plan must be integrated with the relevant sustainable coastal management plan for the area.
City of Cape Town IMEP, 2003	Seeks to recognise and protect Cape Town's unique coastal and marine environment and biodiversity. The City commits to the integration of environmental	A commitment by the City to apply the precautionary principle that states that, if the environmental consequences of a proposed

	considerations in all its functions and activities, including strategic planning initiatives.	activity are of significant impact or concern, and are uncertain, the activity should not be undertaken.
City of Cape Town Biodiversity Strategy	Plans to ensure conservation by mainstreaming biodiversity; identifying key areas of biodiversity, and establishing structures to manage the initiatives	Has seven strategic objectives: (1) A network of biodiversity areas and nodes (2) Use of corridors, links and mixed-use areas to connect the network (3) Conservation of biodiversity in freshwater aquatic systems (4) Invasive alien species management (5) Biodiversity legislation and enforcement (6) Biodiversity information and monitoring system (7) Biodiversity education and awareness

4.2.2 Reserve decision-making mechanisms

4.2.2.1 Reserve advisory boards

Table Bay Nature Reserve has four section-specific management and monitoring committees that track projects and discuss local issues. Table 18 represents the distribution of these management committees over the various management sections:

Table 18. Section-specific management committees of the Table Bay Nature Reserve

Management section	Section-specific management committee
Parklands fynbos corridor	Parklands Environmental Liaison Committee
Diep River	Rietvlei Management Working Group
Rietvlei coastal section	Rietvlei Management Working Group
Rietvlei wetlands	Rietvlei Management Working Group
Milnerton Lagoon	Rietvlei Management Working Group
Zoarvlei (Paardeneiland wetlands)	Zoarvlei Management Advisory Committee
Milnerton Racecourse	Milnerton Racecourse Environmental Management Committee

It is proposed, however, that these section-specific management committees be retained, but that, in addition, an overarching advisory forum be created for Table Bay Nature Reserve as a whole. The purpose of this forum would be to serve as an advisory committee, rather than a decision-making body.

It is however required that the City of Cape Town first draft a policy and guideline document for this forum and similar advisory bodies. This policy and guideline document should align with the City of Cape Town's public participation policy.

The policy and guideline document should take cognisance of the following: (1) Advisory forums must function effectively in accordance with their terms of reference and constitutions. (2) Duplication of members and discussion topics must be prevented. (3) Roles and responsibilities in terms of the accepted terms of reference and constitutions must be clarified and affirmed. (4) Local issues must be represented on the agenda, when required. (5) Ambiguities and inconsistencies must be eliminated.

A founding document with clear terms of reference must be drafted to provide clear guidelines for this board, while incorporating the requirements and individual needs of the different management committees. Special care must be taken to ensure stakeholder participation within a set of guiding principles. This forum will provide a legitimate platform to communicate management issues, and to ensure stakeholder participation.

The objectives of such an advisory forum would be to: (1) facilitate constructive interaction between the reserve and surrounding communities and stakeholders; (2) serve as a channel for communication and managing conflict; (3) assist the reserve to engage neighbouring communities and stakeholders to identify strategic issues and areas of mutual concern as well as work towards finding equitable solutions that benefit both the community and the reserve; and (4) serve as a platform for developing strategic partnerships with stakeholders.

The legislative framework for this advisory forum would be shaped by the following acts:

- The South African Constitution and the Bill of Rights
- NEMA (Act 107 of 1998)
- The National Environmental Management: Protected Areas Act (Act 57 of 2003)
- National Environmental Management: Biodiversity Act (Act 10 of 2004)

The present section-specific management committees should address local-area conservation-related issues common to that particular section and its neighbouring communities, as well as the implementation of section-specific projects. This will retain local participation in the reserve by keeping the agenda relevant to each of the management sections and their specific stakeholder interests.

Matters for consideration by the overarching advisory forum would be strategic in nature with the aim to facilitate better cooperation between the City of Cape Town, regional and national government, as well as strategic partners such as CapeNature and the Wildlife and Environment Society of South Africa (WESSA).

The representation on the advisory board and section-specific management committees must be clarified, as well as the process for the appointment of advisory forum members. In order to ensure the efficient functioning of the advisory board, the following areas require attention:

- **Stakeholder representation:** Representatives must be mandated in writing by groups whom they represent, and be appointed in terms of an appointment protocol.
- **Roles and responsibilities:** These must be underpinned by the terms of reference.

- **Information flow:** A feedback protocol must be incorporated into the agenda to facilitate communication between stakeholders.
- **Functional executive structure:** The chairman and vice-chairman must not be a reserve staff member. Subcommittees and working groups may be created. Administrative assistance can be provided by the City of Cape Town.

Table 19 below is a proposed structure for representation on this advisory forum:

Table 19. Nature Reserve Advisory Forum's proposed representation structure

Political representation	Subcouncil chairman
	Ward councillors
City line departments	Biodiversity Management
	Environment & Heritage
	City Parks
	Sport and Recreation
	Roads and Stormwater
	Catchment Management
Province	CapeNature
	DEA&DP
National Government	Department of Water Affairs
	Oceans and Coasts
NGOs	Friends group(s)
	Ratepayers'/homeowners' associations
	User groups/sports clubs
	Environmental groups (bird clubs)

5. PROTECTED-AREA POLICY FRAMEWORK & GUIDING MANAGEMENT PRINCIPLES

5.1 Management objectives

Although a broad, overarching set of management objectives for Table Bay Nature Reserve as a whole will follow in table 23 and 24, the following three management documents are currently implemented as subsidiary to this overarching IRMP:

- The Royal Ascot EMS, 2007
- The Blaauwberg fynbos corridor operational environmental management plan (OEMP), 2008
- Diep River estuary management plan, 2011

Their implementation will continue as long as the legal mechanisms that determine their existence are in place. These mechanisms are two records of decision and a City of Cape Town/C.A.P.E Estuaries Programme co-funded project.

5.1.1 Milnerton Racecourse section

The Milnerton Racecourse section's Royal Ascot EMS (Planning in Balance 2007) contains a set of management objectives contained in appendix D7. An overview of these objectives is given below in Table 20:

Table 20: Royal Ascot environmental management system objectives

ISSUE	OBJECTIVE
Contracts management	Choose suitably qualified contractors to undertake work within the conservation area
	Obtain the best value for money
	Achieve full transparency with respect to the use of funds set aside for conservation
Invasive-vegetation management	Prevent the homogenisation of the vegetation by invasive plant species (indigenous or alien)
	Limit the fuel load for fire
	Limit unnatural changes to ecosystem structure (e.g. nitrogen-fixing of the soil, changes to soil structure by roots, etc.)
Fire management	Protect human life
	Protect property
	Maintain biodiversity
	Reduce fuel load to prevent uncontrollable, catastrophic fires
	Stimulate vigorous new growth within vegetation associations
Rehabilitation	Improve biodiversity within the section
	Maintain the genetic integrity of species already occurring in the section
	Reduce negative impacts of surrounding land uses
	Maximise the conservation potential of the available area
	Increase the size of the effective natural remnant, where possible
Infrastructure management	Maintain existing infrastructure within the section
	Introduce additional infrastructure, if required (e.g. signage)
Fauna management	Minimise human and animal conflict
	Prevent alien species from outcompeting indigenous fauna
	Maintain reasonable population sizes of large animals that could affect the vegetation (grysbok and Cape hare)
	Ensure genetic viability of larger fauna, such as grysbok
	Maintain natural ecosystem function as far as possible
	Improve biodiversity by undertaking re-introductions of locally extinct fauna, where possible
Biological monitoring	Ensure collection of sound and reliable data
	Ensure that data assist with management decisions
	Monitor flora (plants), fauna (animals) and water (quality and levels)
Education and outreach	Promote understanding about the importance of preserving this section
	Foster the sense of ownership and responsibility toward the section
	Create interest about what is happening in and around this section
Review	Ensure that objectives, targets and procedures remain up to date, meaningful and implementable
	Maintain the EMS to expected relevant standards, and utilise the latest technology and accepted conservation practice norms

Similarly, the Blaauwberg fynbos corridor OEMP contains an extensive set of management objectives contained in appendix D6. An overview of these objectives is given below in table 21:

Table 21. Blaauwberg fynbos corridor operational environmental management plan objectives

ISSUE	OBJECTIVE
IMPLEMENTATION OF THE OEMP	To ensure the effective implementation of the various actions detailed in the OEMP
	To publicise the fynbos corridor
CONCEPTUALISATION AND STRATEGIC PLANNING	To ensure that the fynbos corridor is effectively utilised as both a biodiversity corridor and public amenity
MANAGEMENT OF DEVELOPMENT ABUTTING THE CORRIDOR	To ensure that abutting developments have a minimal negative impact on the fynbos corridor
	To manage the conduct of residents and landowners to facilitate environmentally sound management of the fynbos corridor and abutting areas
VEGETATION MANAGEMENT	To prevent the establishment or spread of alien vegetation, eliminate potential invasion, improve aesthetics, decrease fire risk, and avoid compromising the ecological integrity of any natural area
	To protect existing indigenous vegetation within the fynbos corridor
	To control access and movement to avoid damage to indigenous flora as well as prevent erosion within the corridor
	To enhance species diversity within the fynbos corridor
FAUNAL MANAGEMENT	To encourage habitation by wild animals as well as to monitor occurrence of animals and maintain carrying capacity of the fynbos corridor
WASTE MANAGEMENT	To control the incidence of illegal dumping and littering occurring within the fynbos corridor
STORMWATER MANAGEMENT	To reduce the negative impacts associated with stormwater
WILDFIRE PREVENTION	To prevent and control wildfires to retain the biodiversity of the area and reduce risk to residents and users
SAFETY AND SECURITY	To ensure that the fynbos corridor is safe for use by all users
INFRASTRUCTURE MAINTENANCE	To ensure that all infrastructure within the fynbos corridor and immediate surrounds is maintained and has no avoidable environmental impact associated with it
EMERGENCY PROCEDURES	To ensure an effective response to emergency situations within the fynbos corridor
REVIEW OF OEMP	To ensure that the OEMP is up to date and relevant to manage the fynbos corridor proactively and effectively

5.1.3 Diep River estuary management plan

The Diep River estuary management plan (Jackson *et al*. 2011) has an extensive set of management objectives contained in an action plan (see appendix D5 for a full breakdown of these objectives). An overview of these objectives is given below in table 22:

Table 22. Diep estuary management plan objectives

ISSUE	OBJECTIVE
WATER QUANTITY MANAGEMENT	To re-establish a regime more typical of an estuarine system
	To manage water levels, flood risk and seasonal drying
ESTUARINE ENVIRONMENTAL QUALITY MANAGEMENT	To establish binding resource quality objectives
	To meet interim and longer-term water quality objectives
	To reduce accidental discharges into the estuary
	To reduce inputs from informal settlements
	To manage short-term fluctuations in critical water quality parameters
BIODIVERSITY MANAGEMENT	To improve understanding of the ecological requirements of the central pans
	To improve knowledge of the biology of the estuary
	To manage invasive species
	To rehabilitate biodiversity
CONSERVATION AND PLANNING INITIATIVES	To develop and upgrade reserve infrastructure
	To develop conservation and eco-tourism
LEGAL/POLICY MEASURES	To formalise the expanded boundaries of the reserve
	To formalise the estuary management plan
	To improve the reserve's protection from encroachment of gardens and invasives
EDUCATION AND AWARENESS RAISING	To improve public awareness on the importance of wetlands and the Diep River estuary
	To promote awareness of, and compliance with, the estuary zoning plan
	To document and promote awareness of the rehabilitation initiative
	To promote awareness of health and sanitation issues around the estuary
	To promote and market the reserve
RESOURCE REQUIREMENTS	To increase capacity of human resources
	To improve availability of financial resources to implement the action plan

5.1.4 Overarching biodiversity and heritage objectives

Table 23 below outlines the broad, overarching biodiversity and heritage objectives and associated plans for Table Bay Nature Reserve. These objectives feed into low-level plans, which are not contained in this IRPM, though may be compiled in the future as appendices or as separate documents.

Table 23: Biodiversity and heritage objectives of Table Bay Nature Reserve

High-level objective	Objective	Sub-objective (where required)	Initiative	Low level plan
CONSERVATION OF REPRESENTATIVE, FUNCTIONAL ECOSYSTEMS To conserve a representative sample of the region's ecosystems in a linked landscape, and maintain or restore environmental processes to enable natural spatial and temporal variation in structural, functional and compositional components of biodiversity	**Representative ecosystems** To incorporate a spectrum of viable aquatic and terrestrial ecosystems characteristic of Table Bay Nature Reserve, and to re-introduce missing elements, where possible	**Consolidation and expansion of land areas** Consolidation of protected areas, focusing on underrepresented ecosystems, functional linkages and processes	(1) Identify underrepresented habitats/ecosystems (2) Consolidate reserve boundaries (3) Incorporate untransformed vegetation (4) Establish corridors linking the reserve with catchments and neighbouring conservation areas (5) Investigate conservation stewardship options with key landowners	**Reserve expansion plan**
		Re-introduction of biota Re-establishment, where possible, of locally extinct or depleted biodiversity components and populations in accordance with International Union for Conservation of Nature principles and guidelines and the City of Cape Town's draft policy on fauna management	(1) Re-establish indigenous herbivore complement within constraints of reserve size and urban setting	**Faunal management plan**
		Fire management Apply appropriate fire regimes in fynbos areas (frequency, season, intensity, size)	(1) Implement a fire management plan in accordance with objectives of conserving biodiversity and threatened biota (2) Monitor impact of fire management regime	**Fire management plan**
		Threatened biota Maintain viable populations of threatened species in order to meet obligations in terms of international agreements and conventions	(1) Maintain viable populations of rare/threatened plant and animal species (identify, locate and monitor populations of priority species)	**Threatened biota plan**
		Monitoring plan Implement and maintain an approved monitoring plan	(1) Implement and maintain a biological monitoring programme for the reserve	**Monitoring plan**
	Rehabilitation: Rehabilitate degraded areas, including the re-establishment of natural biodiversity patterns, and the restoration of key processes which support the long term persistence of biodiversity.	**Vegetation** Re-establish physical, chemical and biological processes in degraded vegetation areas	(1) Rehabilitate all old, degraded sites	**Vegetation rehabilitation plan**
		Alien plants and other alien biota Control and, where possible, eliminate alien biota to facilitate re-establishment of natural biodiversity patterns and processes in invaded areas	(1) Establish the distribution and density of invasive species (2) Prioritise areas and species for alien removal, focusing on biodiversity restoration (3) Implement removal programmes for	**Invasive alien plant management plan & alien biota**

			priority species and areas	**management plan**
MITIGATE INTERNAL and EXTERNAL PRESSURES To reduce threats and pressures and limit environmental impacts resulting from non-biodiversity management aspects and operations on surrounding land and resource use	**Reconciling biodiversity with other reserve objectives** To ensure that non-biodiversity management aspects of reserve operations (revenue generation, visitor, resource use, developments and management activities) are informed and constrained by biodiversity conservation objectives, and that the impacts of these activities on biodiversity are minimised	**Internal developments** Minimise the impacts associated with the development of visitor and reserve management infrastructure, and ensure that such developments do not compromise biodiversity objectives	(1) Reserve zoning (2) Develop and implement Conservation Development Framework (CDF) (3) Developments in accordance with EIA process (NEMA) and corporate policies (4) Establish visitor carrying capacities (5) Implement green standards and environmental best practice based on corporate policy	**CDF**
		Internal activities Minimise the impacts associated with visitor and reserve management activities, and ensure that such activities do not compromise biodiversity objectives		
		Extractive resource use Minimise the impacts of extractive resource use, and ensure that such activities are aligned with corporate guidelines, are within management capacity constraints, and do not compromise biodiversity objectives	(1) Quantify current extractive resource activities (2) Define opportunities and constraints in line with corporate guidelines (3) Regulate resource use according to adaptive management process	**Sustainable resource use management plan**
	Reconciling biodiversity with external threats To reduce external threats and pressures, and limit impacts of surrounding land and resource use on biodiversity conservation within the reserve	**External developments** Minimise the impacts associated with inappropriate developments outside the reserve	(1) Engage regional land management authorities, including IDPs and spatial development frameworks at local and regional level (2) Align with bioregional planning, including explicitly identified areas for the maintenance of important biodiversity patterns and processes, with appropriate land use guidelines (3) Provide input into planning and decision-making processes for external development that may compromise reserve and biodiversity network objectives (4) Negotiate to ensure that external developments are not visually obtrusive or out of character with the park	**Cooperative governance;** **communication plan**
		External activities Negotiate to ensure that external resource and land use does not detrimentally affect ecological processes within the reserve	(1) Mitigate or improve the management of external, potentially detrimental impacts (2) Encourage eco-friendly resource use and land management practices on adjacent properties (3) Mitigate the impacts of oil and other pollution events through appropriate contingency planning	**Contingency plan, cooperative governance; communication plan**
		Hydrological and water chemistry changes Participate in activities for the maintenance of river flow regimes and water chemistry within limits for the maintenance of ecosystem processes in aquatic ecosystems within the reserve	(1) Lobby for appropriate catchment categorisation (currently general authorisation) (2) Enforce legislation applicable to the management and protection of aquatic resources (3) Facilitate regular assessments of river health (4) Address the issue of sewage and other point-source pollution of aquatic systems	**Cooperative governance and communication plan**
		Illegal harvesting of resources	(1) Public liaison (2) Law enforcement	**Protection plan,**

		Prevent the illegal collection, removal and destruction of physical and biological resources		**security plan**
WILDNESS/ REMOTENESS To maintain and restore wildness/remoteness in the reserve so that the spiritual and experiential qualities of wildness are maintained, enhanced or, where necessary, restored	**Range of experiences** Provide a range of visitor experiences	N/A	(1) Reserve zoning (2) Develop CDF and sensitivity-value analysis	**(1) CDF (2) Reserve expansion plan (3) Invasive-alien plant management plan**
	Sense of place Maintain or restore appropriate sense of place	N/A	(1) Implement and update CDF (2) Establish and apply appropriate visitor carrying capacity (3) Negotiate to ensure that external developments are not visually obtrusive or out of character with the reserve	
CULTURAL HERITAGE MANAGEMENT To investigate and manage all cultural assets	**Conserve and manage cultural heritage assets**	N/A	(1) Develop a database of all tangible and intangible cultural assets, including inventory, maps and relevant documents (2) Develop site management plans for each cultural heritage site, with monitoring systems in place for management priorities and prescriptions (3) Facilitate appropriate interpretation of cultural heritage associated with the reserve	**Cultural heritage management plan**

5.1.5 Overarching socio-economic objectives

Table 24 below outlines the socio-economic objectives and associated plans for Table Bay Nature Reserve:

Table 24: Socio-economic objectives of Table Bay Nature Reserve

High-level objective	Objective	Sub-objective (where required)	Initiative	Low-level plan
Nurture productive and mutually beneficial partnerships that result in gains in economic and/or biodiversity equity	Enhance socio-economic benefits to local communities	N/A	(1) Contribute to local community development by supporting the Expanded Public Works Programme/poverty relief projects (2) Contribute to local skills development by supporting the skills and learnership programmes (3) Identify and facilitate the creation of business opportunities in association with the reserve (4) Support community-based social development initiatives	**Local socio-economic development plan**
	Increase environmental awareness, and encourage participation in conservation initiatives	Inspire visitors and communities to consider the environment as an interrelated and interdependent system, of which they are an integral part	(1) Develop and implement an interpretation plan that feeds into both the education and zoning plans (2) Implement environmental education and youth development programmes suited to the needs of each focus group (i.e. tailor-made	**Education development plan**

		Educate learners, educators and other community focus groups to be able to take environmental action	programmes for each focus group)	
		Support educators and community leaders with resource and information materials	(1) Establish and market the environmental education centre with a range of interpretive and information resources	
Support cooperative governance that will build custodianship	Maintain good reserve/community/stake-holder relations	N/A	(1) Identify and involve all relevant stakeholders for participation in the reserve advisory forum (2) Develop effective communication mechanisms and responsibilities for representatives	**Stakeholder relationship plan**
	Effective cooperative governance	Minimise degrading impact and consequences of inappropriate development in and around the reserve	(1) Establish and maintain good working relationship with relevant government departments as well as internal City departments	
		Ensure support/buy-in for management decisions through participatory decision-making processes	(1) Define roles and responsibilities with stakeholder groups, partnerships and government through written agreements	
Become the nature-based visitor destination of choice in the region	Develop, manage and enhance a range of sustainable visitor products	N/A	(1) Design customer satisfaction survey (2) Analysis of current product usage and identification of opportunity	**Visitor plan**
			(1) Plan for visitor infrastructure and facilities as identified by the CDF (2) Develop and implement the infrastructure management plan (in compliance with State of Infrastructure report) (3) Compile a State of Infrastructure report	**Infrastructure programme**
	Conserve and manage cultural heritage assets	N/A	(1) Develop a database of all tangible and intangible cultural assets, including inventory, maps and relevant documents (2) Develop management plans for each cultural heritage site, with monitoring systems in place for management priorities and prescriptions (3) Facilitate appropriate interpretation of cultural heritage associated with the reserve	**Cultural heritage management plan**
Grow the domestic visitor profile to be representative of South African society	Grow the domestic visitor profile of the reserve to be representative of regional demographics	N/A	(1) Promote and manage access to the reserve (2) Develop and support dedicated access programmes, or incorporate a 'dedicated access' element into existing programmes (3) Actively market reserve resources and services	**Marketing plan**
Enhance the City of Cape Town's reputation	Enhance the reserve's reputation	N/A	(1) Develop and implement a communication plan to promote reserve activities	**Communication programme**
Advance strategic human resource management	To ensure good human resource management	N/A	(1) Implement and support learnerships and volunteer programmes (2) Ensure that all staff have access to training initiatives as per the Workplace Skills Plan (WPSP)	**Staff capacity-building programme and institutional**

			(3) Ensure adherence to all corporate human resource policies	**development plan**
Financial management	Ensure sound financial management practices are applied to and underpin the reserve	N/A	Manage cost spending appropriately	**Financial sustainability programme**
Good corporate governance management	Manage risk profile effectively	N/A	Conduct legal review	**Risk management programme**

5.2 SWOT analysis

Table 25 below is a preliminary strengths-weaknesses-opportunities-threats (SWOT) analysis for Table Bay Nature Reserve:

Table 25: Preliminary SWOT analysis

STRENGTHS	WEAKNESSES
Conservation strengths: Encompassing a PNE and IBA, two core flora conservation sites and two sites protected by means of RODs	**Lack of awareness:** Vision of the reserve, information about the management sections, environmental legislation
Ecosystems strengths: Encompassing a tidal estuary, seasonal wetlands, a flood plain, a coastal system, wetland linkages, connectivity corridors and catchment-to-coast benefits	**Fragmentation of natural areas:** Bisections of roads, railways, developments, bulk services
Regional strengths: Associations with Table Bay coast, lower end of the Diep River catchment, and the Cape West Coast Biosphere Reserve	**Skills and training weaknesses:** Field-ranger skills, law enforcement
Biodiversity strengths: Protecting 412 plant, 31 mammal, 196 bird, 33 reptile, nine amphibian and 14 fish species	**Compliance management capacity weakness**
Vegetation strengths: Protecting six national vegetation types, namely Cape Flats sand fynbos, Cape Flats dune strandveld, Cape lowland freshwater wetlands, Cape estuarine salt marshes, Cape inland salt pans and Cape seashore vegetation	**Present lack of office and administrative space**
Planning strengths: Forms part of the City of Cape Town's biodiversity network, promotes the biodiversity strategy, and aligns with C.A.P.E and the C.A.P.E Estuaries Programme	**Shortage of qualified environmental and/or conservation staff in the industry**
Administrative strengths: Section-specific management objectives, management committees as well as a proposed overarching advisory board	**Shortage of public support for conservation objectives**
Usage strengths: Utilisation for **environmental education** purposes and by Friends and **recreational** groups, including water sports, birdwatching and fishing	**Discontinuity of management** of the biodiversity network
Resource strengths: Permanent staff, dedicated budget, facilities secured, fixed	**Old vlei bylaw governing water sports**

and movable assets in place, communications	**recreation**
OPPORTUNITIES	**THREATS**
Awareness-raising opportunities: Media releases, open days, public forums, informative signage, printed publications	**Impacts from bulk services on environment:** Stormwater, sanitation, wastewater treatment, road lighting
Connectivity opportunities: Corridors to Blaauwberg Hill and Tygerberg, and various wetland linkages	**Uncontrolled access:** Person, pets, domestic animals, off-road vehicles
Training opportunities: WPSP, cooperative training, internships	**Edge effects from developments:** Dumping, littering, alien plants
Partnership building with other law enforcement agencies	**Alien and invasive infestations**
On-site administrative office building in development	**Unnatural fire regime:** Either too often or complete exclusion
Career-streaming opportunities for students and interns	**Negative public perceptions:** Nuisance of dust, seeds, pollen, insects, smoke from fires
Liaison with Friends groups, and supportive relationships	**Crime and security:** Illegal occupation, theft of infrastructure, arson, break-ins at neighbouring residents
Stewardship opportunities for nearby landowners who share in the biodiversity network. Ysterplaat airforce base, Wingfield military base, Intaka Island at Century City	**Increasing development:** Population growth, more bulk services, more pressure on environment
Creation of an overarching **advisory board**	**Irregular funding:** Students, interns, operating budgets
Revision of old bylaws, and drafting of a new **Recreational Water Areas Bylaw**	**Loss of biodiversity:** Adjacent rural areas being developed
Closer **user interface and better service delivery** with new on-site office	**Changing political structures:** Discontinuity in political support

5.3 Protected-area management policy framework and guiding principles

5.3.1 Community participation

Table Bay Nature Reserve will strive to nurture productive and mutually beneficial partnerships that result in equitable access to biodiversity and natural heritage benefits. This will be achieved through the creation of job opportunities in support of Expanded Public Works Programme and poverty relief initiatives, as well as through implementing City-funded projects. Participation in skills development and learnership programmes and support of community-based social development initiatives could contribute to the development of local skills.

The reserve will contribute to raising environmental awareness and encouraging participation in conservation initiatives. This will be done through an environmental education plan that will aim to:

- inspire visitors and communities to consider the environment as an interrelated and interdependent system, of which they are an integral part;
- educate learners, educators and community focus groups, and support such groups with resource and information materials;
- develop and implement environmental education programmes suited to the needs of various focus groups; and
- develop and implement an interpretation plan that complements the environmental education plan.

The Rietvlei Education Centre is owned by the Friends of Rietvlei, and co-managed by the Friends and the City of Cape Town for the purposes of running environmental education programmes and hosting meetings and events relating to the environment. Presently, the Rietvlei Education Centre is expanding its environmental education programme to encompass all local schools, as well as linking with the environmental education initiative at the nearby Southern African Foundation for the Conservation of Coastal Birds (SANCCOB).

In order to develop and maintain good reserve-community-stakeholder relations, all relevant stakeholders need to be identified. The development of an effective communication system in order to address interested and affected parties is required. Where necessary, task teams and working groups may be established in order to assist the reserve with key issues.

There are currently several officially registered users that lease pieces of land, either within or directly adjacent to the reserve. The Milnerton Aquatic Club leases a piece of land on the eastern shore of the Rietvlei deep-water lake for the purposes of promoting water sports recreation. This lease is contained in appendix B5-2.

The Cape Radio Flyers lease a small piece of land on the seasonal pan area, east of the R27, for the purposes of promoting radio-controlled aviation. Their lease expires in 2014, and will most likely not be renewed. The lease of the Cape Radio Flyers is contained in appendix B5-3.

SANCCOB leases a portion of land to the north of the Rietvlei deep-water lake as a seabird rehabilitation centre. SANCCOB's lease is contained in appendix B5-4.

The Western Province Motor Club is situated at the Killarney raceway on the eastern shore of the Diep River management section. The motor club's lease of this piece of land is contained in appendix B5-5. Just south of the Killarney raceway is the Milnerton Riding Club, who leases another piece of land east of the Diep River management section. The purpose of the Milnerton Riding Club is to operate as a horse-riding estate. Their lease is contained in Appendix B5-6.

5.3.2 Safety and security

A safety and security audit aimed at completing a rapid and verifiable analysis of the current security situation, security services, infrastructure, staffing and social context has been carried out in Table Bay Nature Reserve. See appendix D1 for the audit report's executive summary.

5.3.3 Culture-historical, archaeological and paleontological management

Table Bay Nature Reserve is presently not characterised in terms of Cultural Historical attributes. City's Cultural Resources Department should review the area and a Cultural historic, archaeological and paleontological zoning should be developed.

5.3.4 Tourism development and recreational management

The reserve's tourism and recreational potential is focused around the water area. The recreational activities are regulated by the Milnerton Municipality Bylaw relating to the Use and Control of the Rietvlei Water Area (see appendix B1-2), as well as the Council resolution relating to fishing and boating in the Rietvlei PNE (see annexure B3-1).

A fully integrated precinct plan should be developed for the reserve. This plan will indicate suitable tourism and recreational development nodes, and will be guided by the infrastructure and zoning plans.

5.3.5 Infrastructure management

Table Bay Nature Reserve has a large amount of infrastructure. Various departments within the City of Cape Town share responsibility for these structures. A full reserve infrastructure

audit needs to be completed, and current infrastructure uses and structural integrities should be documented. Infrastructure has to be mapped.

Infrastructure that is or could be used should be included in a five-year maintenance plan. Infrastructure with no use should be demolished and the sites rehabilitated.

5.3.6 Biodiversity conservation management

5.3.6.1 Community-based natural resource management

The reserve provides a range of goods and services that contribute to the well-being of society. Turpie and Clark (2007) produced a preliminary estimate of the Diep River estuary's economic value. They identified the following values:

Direct-use values: These values comprise the use of the natural resources of the estuary for commercial or subsistence purposes. These can be consumptive uses, such as the use of fish as food, or non-consumptive, such as the use of the estuary for recreation.

Consumptive uses: Approximately 8 tons of fish are harvested from the Rietvlei wetlands and Diep River estuary system annually (Lamberth & Turpie 2003). When the monetary value of the catch is to be extrapolated from these figures, it is likely to be around R20 000. *Phragmites* reeds can be harvested for use in thatching or the production of arts and crafts, although no estimate of the value of this resource is available.

Non-consumptive uses

Property values: Turpie and Clark (2007) estimated the property value attributable to the Diep River estuary to be R657,2 million, ranking it fourth in the top 20 temperate estuaries of South Africa as far as this criterion is concerned. Using the approach adopted by the authors – based on annual turnover and associated commission – this translates into an annual income in the real-estate sector of R36,34 million. Since municipal property rates are linked to property value, the estuary could also be considered as contributing to the income of the local authority.

Recreation and tourism: Turpie and Clark (2007) estimated the tourism value of temperate estuaries to be around R2 billion a year. Although no specific value was provided for the Diep River estuary, it was stated that the majority of estuaries are worth between R10 000 and R1 million in terms of tourism value. Clark (1998) identified the activities in this reserve to be a mixture of land-based (picnicking, sightseeing, walking, etc.) and water-based activities, including fishing, swimming and boating. Clark (1998) included an assessment of the harvesting of bait species in the Diep River estuary, including *Callianassa kraussi* (Sand Prawn), *Liza richardsonii* (Harder) and *Mugil cephalus* (Springer).

The harvesting of these natural resources within Table Bay Nature Reserve is currently permitted. Research on the amount of harvesting and the species harvested across the city is currently under way. Investigations are required to determine whether current harvesting patterns are sustainable, and whether there are potential threats associated with them.

5.3.6.2 Fire management

Fire plays an essential ecological role in the life cycle of certain vegetation types. Fire is crucial to the long-term conservation of species within Table Bay Nature Reserve, and is therefore considered an important component of reserve management. Fire management involves influencing the season, frequency and intensity of fires, and reconciling ecological and practical requirements. Too frequent fires, or fires that burn out of phase with the natural burning regime, present a threat to slower-growing species, which may be entirely eliminated. However, if fire is completely excluded from the area, certain species may invade, while others never get the opportunity to germinate, resulting in species losses. Vegetation that is allowed to burn too frequently will become degraded, and alien plants, especially grasses, will invade. Grasses maintain a shorter fire cycle and permanently change the vegetation structure and biodiversity value of the area.

The fire management programme for Table Bay Nature Reserve involves the monitoring of large wildfires as well as smaller natural and unnatural fires. Historical records of fire events in the reserve area as well as post-fire monitoring records must be documented to determine veld ages. Minimal interference takes place when naturally ignited fires occur. In case of human-induced fires that would simulate a natural fire, the same management response would apply. Natural fires are limited in urban settings. All possible actions are taken to prevent the spread of fire onto the adjacent properties. All unnatural fires that threaten the reserve ecologically, or pose a threat to infrastructure and/or public safety, are controlled.

Prescribed burning of vegetation is a management option in areas where vegetation becomes senescent (old) and there is a risk of species loss. The use of prescribed burning practices would assist in maintaining a vegetation mosaic that promotes plant and animal diversity. Accurate fire records and post-fire monitoring data will inform fire planning for the reserve. The decision to administer prescribed burns is considered on an annual basis and, if required, planned and implemented accordingly.

Fire may be used to keep fuel loads low so as to reduce the risk of uncontrolled fires, particularly on the urban edge and in areas that become a potential risk to infrastructure and public safety. Firebreaks and other fire control measures required by law will be implemented where necessary and feasible.

Reasonable pre-fire season protection measures are necessary, as well as a plan of action in the event of a wildfire. Interaction with various City of Cape Town departments and independent stakeholders as well as continuous public and private landowner involvement are essential. The development of fire protection and response plans is an important component of the reserve's fire management approach. While the reserve forms part of the Fire Protection Association (FPA), it remains important and critical to develop a detailed fire management plan, which details the burning frequencies for vegetation types such as Cape Flats Sand Fynbos and Cape Flats Dune Strandveld, the resources required as well as roles and responsibilities. Currently, fire management implementation in Table Bay Nature Reserve involves the following:

- The application of guidelines on seasonal burning intervals and species requirements acquired from relevant documents and biophysical specialists
- Accurate record keeping of all fires, including details and maps
- Use of fire data and GIS for recording and mapping
- Application of post-fire monitoring programmes
- Application of fire data to determine prescribed burning needs
- Development and implementation of a fire protection and response plan, including affected stakeholders, such as additional City of Cape Town departments and private landowners neighbouring the reserve

5.3.6.3 Catchment management

Table Bay Nature Reserve falls within the Diep River catchment. The Diep River originates in Malmesbury and Riebeeck-Kasteel, outside the City of Cape Town boundary. As no cross-border catchment management forum currently exists, this needs to be set up.

5.3.6.4 Soil erosion and control

The reserve is a deposition basin for silt, and, as a result, very little soil erosion takes place. Where erosion takes place as a result of human activities, plans must be made to address this. The shoreline of the deep-water lakes is eroding due to the excessive depth of these water areas into which the shores are slowly sinking.

Soil management implementation in Table Bay Nature Reserve includes the following:

- The maintenance of all management tracks and footpaths
- Identification and recording of all soil erosion sites, including the assessment and development of restoration plans, where required
- Use of soil erosion data and GIS for recording and mapping
- Application of monitoring programmes at identified soil erosion sites

- Accurate documentation of management actions applied to restoration sites, including results from areas responding to these actions

5.3.6.5 Invasive-species management

The management of invasive species is a priority in Table Bay Nature Reserve. Alien biota need to be controlled and, where possible, eliminated in order to facilitate the re-establishment of natural biodiversity and processes in invaded areas.

Invasive-species management within the reserve is applied in accordance with the City of Cape Town's Invasive Species Strategy and in coordination with various government-funded initiatives, including Working for Water and Working for Wetlands. Invasive alien plant species could spread rapidly should management fail to continue implementing a properly planned and coordinated management programme. The emphasis on the maintenance of woody alien plant species should shift to a balanced holistic approach focusing on all invasive species, including herbaceous plants, aquatic weeds and alien fauna.

Some species that still pose a great risk to the reserve are the Australian *Acacia saligna*, *A. Cyclops* and *Eucalyptus* species, as well as *Pennisetum clandestinum* (Kikuyu) and *Eichhornia crassipess* (Water Hyacinth). Several other species are also listed as such, and are being managed in terms of the City of Cape Town's Invasive Alien Species Strategy.

In order to protect indigenous species from alien invasives, the following is required:

- Prioritisation of areas for management, focusing on biodiversity restoration
- The implementation of removal programmes for priority species and areas
- The development and implementation of an invasive and alien-plant management plan and a management plan for alien fauna

5.3.6.6 Species introductions

The options of re-introducing locally extinct species must be investigated. Fauna species that previously occurred in the reserve and are no longer present or exist in low numbers only may have to be augmented by re-introductions.

For this to take place, detailed proposals are required by the City of Cape Town's Fauna Management Committee, as is an investigation into the availability of suitable habitat for the species with reference to public utilisation of areas. A full investigation needs to be done into the historical occurrence and status of the species, as well as the effect of re-introducing such species to the area. Re-introduction of potentially dangerous species as well as species may require a public participation process.

All proposed re-introductions need to be recommended and approved by the fauna and flora management committees as well as provincial authorities before implementation. The implementation of any re-introduction programme must also be specified in a plan of action, and documented accurately.

5.3.6.7 Strategic research

Research subjects that are required for management intervention at Table Bay Nature Reserve need to be identified. Several externally promoted research projects are presently being conducted in the reserve, and are supported by reserve management.

The use of the reserve as a study area should be encouraged. Research activities, however, should not have a negative impact on the biodiversity or other uses of the reserve. Copies need to be obtained of all data, results and published papers from previous research projects within the reserve.

5.4 Sensitivity-value analysis

The reserve is a significant asset to the City of Cape Town, and makes valuable contributions to national vegetation targets of threatened vegetation types listed in the National Spatial Biodiversity Assessment (Driver *et al*. 2005). The development of the sensitivity-value analysis and zoning plan is one of the steps required in compiling a Conservation Development Framework (CDF) for the reserve. CDFs are tools to reconcile the various land use needs, and delineate visitor user zones as well as the positioning of infrastructure, access points, roads and facilities.

CDFs are in response to the requirements of the Biodiversity Act (2004), and seeks to comply with the spatial planning requirements of the Act. The CDF will ensure that best practice and sustainable development principles are integrated with spatial planning in protected areas.

The sensitivity-value analysis is the landscape analysis portion of the broader CDF. It is a multi-criteria decision support tool for spatial planning, designed to present the best available information in a format that allows for defensible and transparent decision making. The sensitivity-value analysis process is based on the principle that the acceptability of a development (or placement of a structure) at a site is based on the site's value (arising from the site's biodiversity, heritage, aesthetic or other values) and its sensitivity or vulnerability to a variety of disturbance (Holness 2005). The sensitivity-value analysis, the CDF and the associated zoning plan form part of an adaptive management system. They will grow and change over time as the understanding of the landscapes and ecosystems improves. They

do however not replace the need for detailed site and precinct planning and EIA compliance at site level.

At the time that the sensitivity-value analysis was undertaken, the Table Bay Nature Reserve concept did not yet exist. Initially, three separate reserves, Rietvlei Wetland Nature Reserve, Diep River Nature Reserve and Milnerton Racecourse Nature Reserve, were proposed to be proclaimed separately. Due to the Diep River and the Milnerton Racecourse being relatively small in comparison to Rietvlei, they were not covered in the sensitivity-value analysis process. As a result, the sensitivity-value analysis covers the Rietvlei wetlands only (see appendix D4). Subsequently, it was decided to amalgamate these areas, including the adjacent corridors and wetland linkages, into a combined Table Bay Nature Reserve. All geographic information work was carried out in ESRI's ArcMap Version 9.3.1 GIS, using the ArcInfo licence level, with Spatial Analyst and 3D Analyst extensions. The methodology used for both the sensitivity-value analysis and the zoning process was adapted from Holness and Skowno (2008) and SRK Consulting (2008a; b).

5.5 Section-specific zoning plans of Table Bay Nature Reserve

A combined zoning plan for the reserve must still be compiled. However, the various management sections have been zoned separately. Figure 4–6 depict the zoning plans for the various management sections of the reserve, excluding the Zoarvlei section, which still needs to be compiled.

5.5.1 Rietvlei wetlands, Milnerton Lagoon and Milnerton Racecourse sections

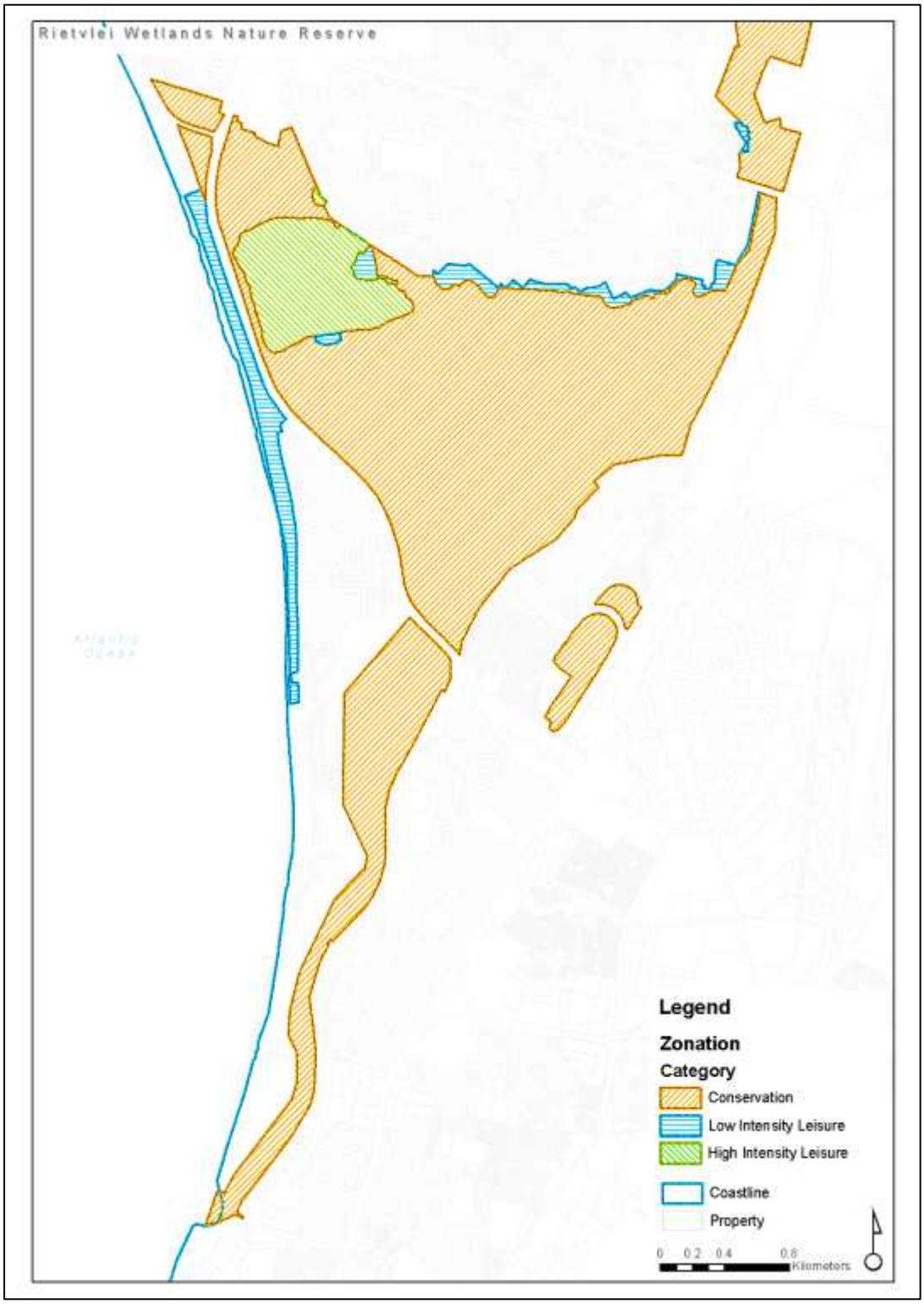


Figure 4: Zoning plan for the Rietvlei wetlands, Rietvlei coastal section, Milnerton Lagoon and Milnerton Racecourse

5.5.2 Diep River section and Parklands fynbos corridor section

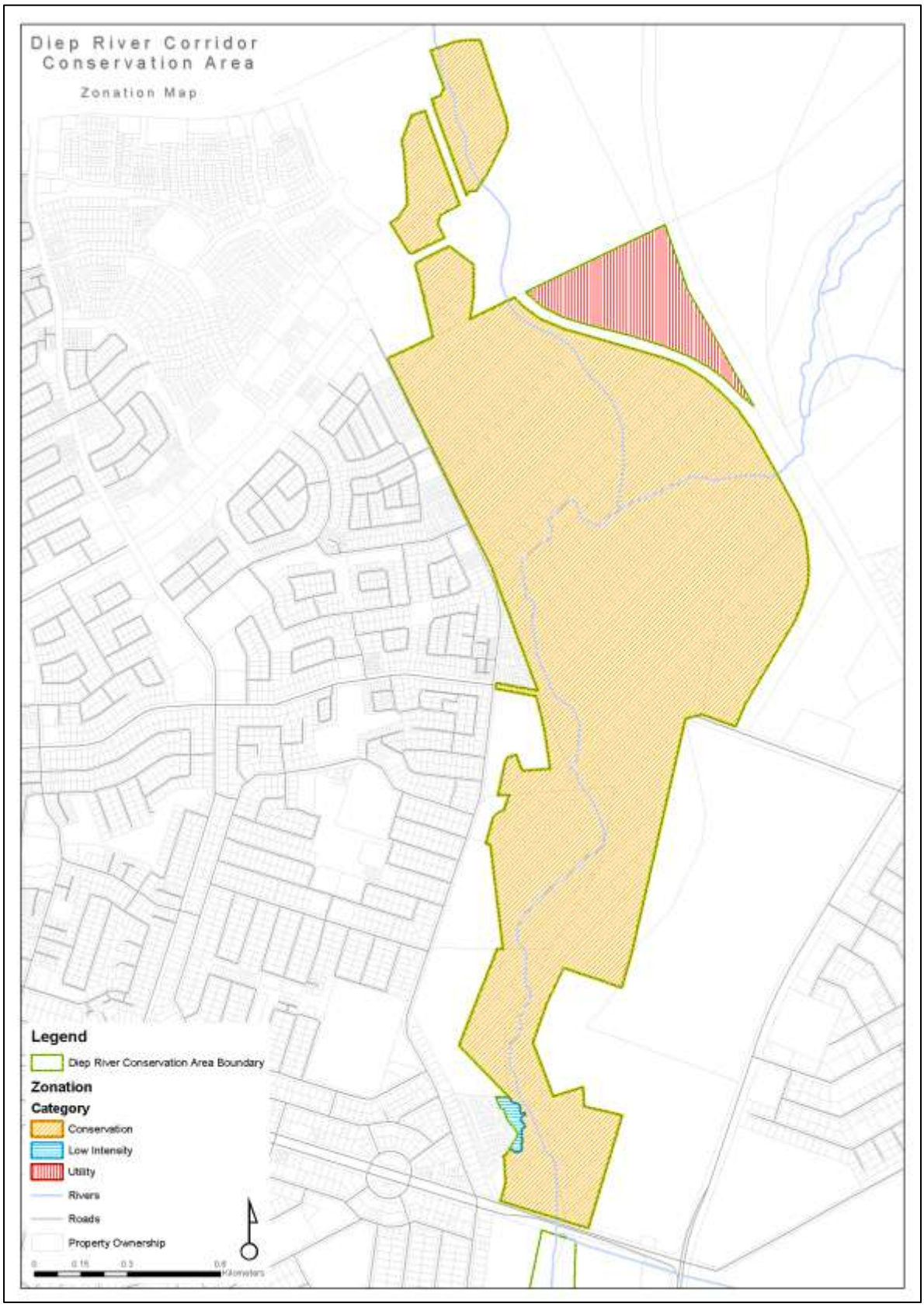


Figure 5: Zoning plan for the Diep River and Parklands fynbos corridor sections

5.5.3 Milnerton Racecourse section

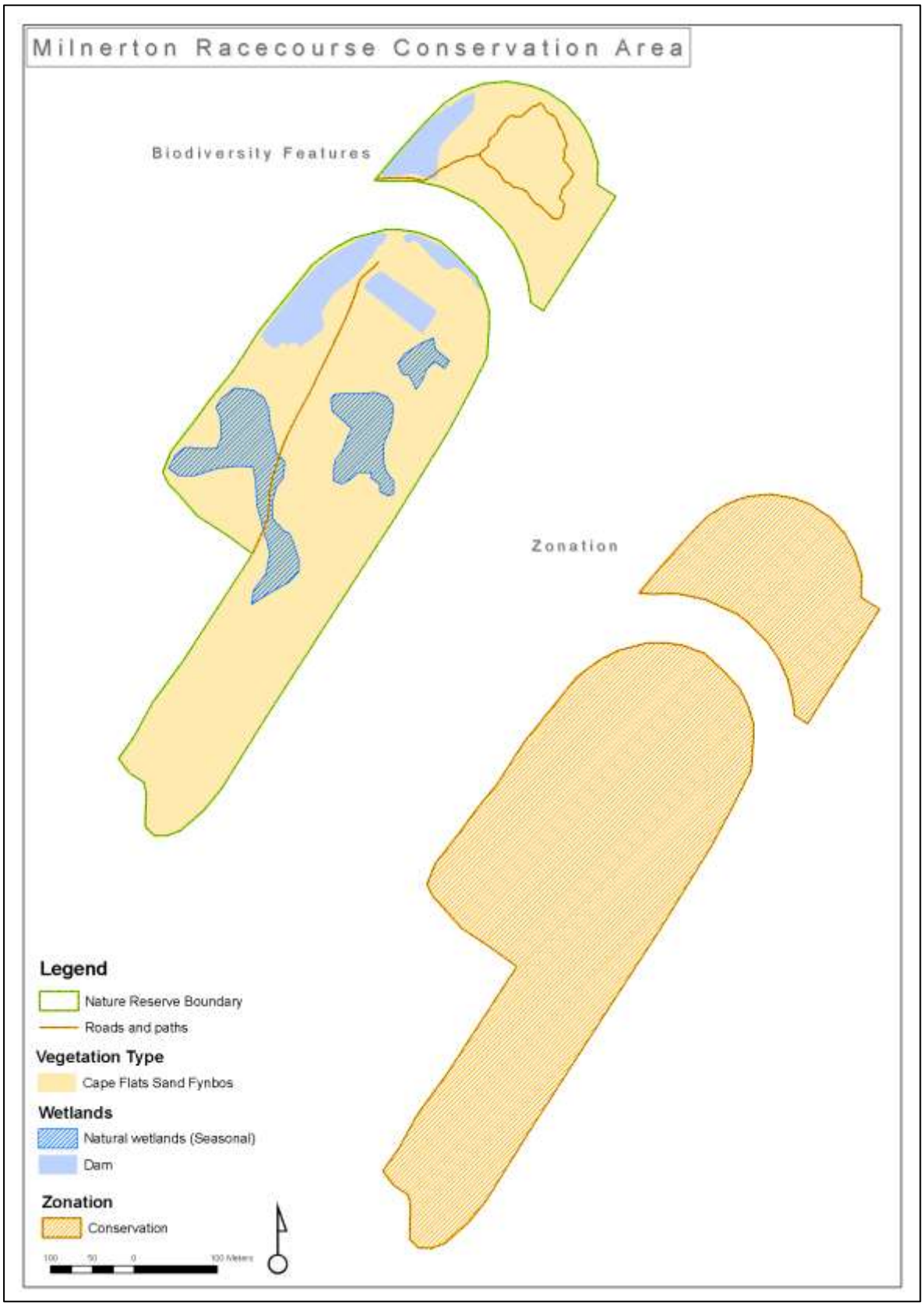


Figure 6: Zoning plan for the Milnerton Racecourse section

5.5.4 Zoning informants

The sensitivity-value analysis is but one of the values underlying the identification of broad tourism use zones. Although the biodiversity analysis is an objective scientific process, other informants to the zoning process are more subjective. Every attempt is made to place high sensitivity-value sites into stronger protected zones. The zoning process, however, is a compromise between the environment and development. The high-value biodiversity assets often need to be made available in an appropriate manner to the eco-tourism market.

Underlying decision-making rules used in the zoning planning process include the following:

- The zoning process is aimed at striking a balance between environmental protection and the development required to meet the broader economic and social objectives of the reserve.
- The zoning process takes into account existing development footprints and tourism access routes.
- An underlying principle is that, from a biodiversity perspective, for any kind of development, an existing transformed site is preferable to a greenfields site.
- Infrastructure costs are dramatically increased when developments take place away from existing infrastructure.
- Existing tourism nodes and access routes are a reality of the economic landscape, and it would not be possible to shut down existing tourism sites compromising the development objectives of the reserve.
- Where existing development nodes, tourist sites and access routes occur in areas with high sensitivity-value, the broad use zoning aims to keep the development footprint as small as possible, preferably within the existing transformed site.
- Where possible, sites with high biodiversity sensitivity-value are put into stronger protection zones.
- Peripheral development is favoured and, where possible, should be located outside the protected area.
- The designation of a broad use zone does not imply that all sites within that zone would be suitable for all the development types anticipated. Detailed site-level planning is still required, and many sites may prove unsuitable at a site level of planning, or during an EIA.
- Special management areas (overlays) need to be formalised and links made to the management plans.

5.5.5 Zoning definitions and descriptions

The zoning definitions and descriptions were workshopped with management staff, and the following five categories were determined:

- Primary conservation zone
- Conservation zone
- Low-intensity leisure zone
- High-intensity leisure zone
- Utility zone

Appendix D5 outlines the zoning and zone descriptions. These are based on the zoning used for the CapeNature reserves (Holness & Skowno 2008), as there should be general alignment of the broader use zones to enable comparison and integration if provincial conservation planning programmes so require.

6. DEVELOPMENT PLAN

A development plan is still to be completed within the detailed precinct planning for the high-intensity use zone. This plan will indicate suitable development nodes, and will be guided by the infrastructure and zoning management plans.

6.1 Reserve administration offices

In the interim, the development of an on-site reserve administration office is under way. This development is taking place on erf 8611, and was approved by WWF-SA in terms of the City of Cape Town's lease agreement. The letter of approval and a site development plan are contained in appendix D3-1.

The purpose of this development is to provide a facility from where the management staff can administrate the reserve, to function as a base of operations for the implementation of management strategies, and to serve as a point of contact between stakeholders and reserve management staff.

7. COSTING PLAN

Table 26: Costing plan of Table Bay Nature Reserve

Management actions	Responsibility	Approx. cost 2010/11	Time frame	Notes: MAOCC = Milnerton area operating cost centre
1) Establish and maintain a management committee				
Enlist a well-rounded group	City of Cape Town	R 0,00	2011	Costs internalised
Formulate constitution, vision and objectives	City of Cape Town	R 0,00	2011	Costs internalised
Hold regular meetings	City of Cape Town	R 0,00	2011	Costs internalised
2) Alien eradication				
Map area, determine species and density distribution, divide areas into compartments, and prioritise	City of Cape Town	R 0,00	Done	Costs internalised
Draw up an alien-clearing schedule	City of Cape Town	R 0,00	Done	Costs internalised
Estimate an appropriate total costing	City of Cape Town	R 0,00	Annually	Costs internalised
Source funding for implementation of clearing plan	City of Cape Town	R 0,00	Annually	Costs internalised
Implement clearing plans	City of Cape Town	R 100 000,00	2010/11	Invasive-alien species budget
Verify information annually	City of Cape Town	Acc. to plan	Acc. to plan	Acc. to plan
		R 100 000,00		
3) Fire management				
Forms part of the broader FPA	City of Cape Town	R 0,00	Annually	R1 000 joining+ R500 annual fee
Assess veld age; compile annual veld age maps	City of Cape Town	R 0,00	Annually	Costs internalised
Adopt and implement FPA's fire management plan	City of Cape Town	R 0,00	Annually	Costs internalised
- Acquire and maintain equipment	City of Cape Town	R 0,00	Annually	Costs internalised
- Implement fire protection	City of Cape Town	R 0,00	As needed	Costs internalised
Actively engage in fire awareness campaigns	City of Cape Town	R 5 000,00	As needed	MAOCC
		R 5 000,00		
4) Maintenance				
Monitor road on a continuous basis for soil erosion	City of Cape Town	R 0,00	As needed	Costs internalised
Monitor and repair fences	City of Cape Town	R 5 000,00	As needed	MAOCC
Monitor and repair signage	City of Cape Town	R 5 000,00	As needed	MAOCC
Repair areas affected by sheet and gully erosion	City of Cape Town – Transport; Roads & Stormwater	R 1 500,00	As needed	MAOCC
		R 11 500,00		
5) Monitoring:				
Fixed-point photography (FPP)				
Identify and set up FPP points	City of Cape Town	R 0,00	Mid-2011	Costs internalised
Implement FPP	City of Cape Town	R 0,00	End 2011	Costs internalised
Sustainable harvesting				
Identify sustainability indicators	City of Cape Town	R 5 400,00	End 2011	MAOCC
Determine potential resources to be utilised	City of Cape Town	R 0,00	End 2011	Costs internalised
Maintain database of existing resources harvested	City of Cape Town	R 0,00	Annually	Costs internalised
		R 5 400,00		
Other				
Establishing nature reserve				
Initiate interaction with landowner	City of Cape Town	R 0,00	Done	City of Cape Town is landowner
Conduct site assessment and biodiversity review	City of Cape Town	R 0,00	Done	NatConCorp
Negotiate and write management plan	City of Cape Town	R 0,00	Under way	Costs internalised
Prepare legal documents (incl. notarial deed)	City of Cape Town	R 0,00	Under way	Costs internalised
Submit 1st ministerial submission	City of Cape Town	R 1 000,00	Mid-2011	Head office
Conduct public participation	City of Cape Town	R 50 000,00	End 2010	Head office
Obtain MEC's signature	City of Cape Town	R 1 000,00	End 2010	Head office
Gazette proclamation of nature reserve	City of Cape Town	R 0,00	Mid-2011	
Lodge notarial deed on title deed with Deeds Office	City of Cape Town	R 0,00	End 2011	
		R 52 000,00		

Ensuring legal compliance Conduct annual audits of management of reserve	City of Cape Town	R 900,00 **R 900,00**	Annually	Head office

Summary table of agency costs for 2010/11

Management actions	**Responsibility** (SM – Swartland Municipality; CN – CapeNature)	**Approx. cost 2009/10**	**Time frame**	**Notes**
1) Establish and maintain a management committee		R 0,00		
2) Alien eradication		R 100 000,00		
3) Fire management		R 5 000,00		
4) Maintenance		R 11 500,00		
5) Monitoring		R 5 400,00		
6)Other		R 52 000,00		
Establishing nature reserve		R 52 000,00		
Ensuring legal compliance		R 900,00		

The purpose of this costing plan (see table 26) is to match available resources to activities with clear timeframes and responsibilities. The objectives are to clearly define the budget requirements in order to implement the management plan with clearly defined time frames and responsibilities.

PART 3

MONITORING & AUDITING

8. MONITORING & AUDITING

8.1 Annual audit procedure

8.1.1 Management Effectiveness Tracking Tool South Africa (METT-SA)

The METT-SA is a rapid, site-level assessment tool adapted from the World Bank and WWF's system (second edition 2007). The system is based on the idea that good protected area management follows a process with six distinct stages or elements.

It begins with understanding the **context** of existing values and threats, progress through **planning**, and allocation of resources (**inputs**), and, as a result of management actions (**processes**), eventually produces products and services (**outputs**), that result in impacts or **outcomes**.

METT-SA was compiled to be applied to the protected areas managed by all C.A.P.E partners. It may be necessary to adapt this system for off-reserve conservation efforts and stewardships.

When applying the METT-SA, it is important to consider that it is intended to report on progress in the reserve. The score allocation becomes the baseline against which future assessments are made to determine improvement. It is site-specific and should not be used to compare different sites. It can highlight trends in management, and gives an indication of where management practice needs to improve. It is not intended to replace more detailed assessments as part of adaptive management systems.

The METT-SA has certain limitations in the quantitative measurement of outcomes, but does adjust the overall score where certain criteria are not applicable to the site. This is not a tool for performance management of managers. METT-SA should be applied at three-year intervals.

METT-SA reviews were done for the Rietvlei PNE (see appendix D2-1) and for the Diep River fynbos corridor (see appendix D2-2). It is proposed that the METT-SA reviews that were done for the two separate management sections be combined for the entire reserve at the next instance.

8.1.2 Protected-area review

The protected-area review (PAR) is an internal review conducted annually to assist managers in assessing their sites, and to allow for adaptive management actions to take place, where required. It is proposed that the PARs that were conducted for the separate management sections be combined into one PAR from the start of the implementation of this IRMP.

8.2 Management plan review

This IRMP should constantly be updated with new information, and regularly reviewed and adjusted where necessary. To achieve this, at least the following set questions should be addressed:

- Did this management plan make a meaningful contribution to the reserve?
- Were individual management objectives realistic and achievable?
- Were the objectives unambiguous, or was there room for misunderstanding?
- Were budgets for each management objective realistic?
- Were the allocated budgets too much or too little?
- Were sufficient and qualified staff members allocated to each management objective?

8.3 Biodiversity monitoring

Table 27 below indicates the current monitoring arrangements in Table Bay Nature Reserve, which are accompanied by monitoring protocols:

Table 27: Current monitoring arrangements at Table Bay Nature Reserve

Action	Responsible party	Data-collecting tool	Frequency
Avifauna census	Reserve management	Visual surveys	Quarterly
Water quality status	Reserve management and Scientific Services	Collection of samples and in-field measurement	Monthly
Weather data	Reserve management	On-site observation	Daily
Shoreline erosion	Reserve management and surveyors	Geographic positioning system surveys	Annually
Antelope surveys	Reserve management	Drive counts	Annually
Small-mammal surveys	Reserve management	Pitfall traps, Sherman traps, trap cages and collections	Annually
Reptile and amphibian surveys	Reserve management	Pitfall traps, Sherman traps, trap cages and collections	Annually
Fish surveys	Reserve management and Oceans and Coasts	Trek-net and gill-net surveys	Ad hoc

PART 4

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