INTEGRATED
RESERVE MANAGEMENT PLAN

WOLFGAT NATURE RESERVE

June 2011

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INTEGRATED RESERVE MANAGEMENT PLAN

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City of Cape Town

WOLFGAT NATURE RESERVE

June 2011

ISBN NUMBER

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List of abbreviations used

APO	**annual plan of operations**
C.A.P.E	**Cape Action for People and the Environment**
CDF	**Conservation Development Framework**
CFN	**Cape Flats Nature**
CFR	**Cape Floristic Region**
IDP	**Integrated Development Plan**
IMEP	**Integrated Metropolitan Environmental Policy**
IRMP	**Integrated Reserve Management Plan**
LBSAP	**Local Biodiversity Strategy and Action Plan**
METT-SA	**Management Effectiveness Tracking Tool South Africa**
MOU	**memorandum of understanding**
RPC	**Reserve Planning Committee**
SANBI	**South African National Biodiversity Institute**

PART 1

DESCRIPTION

1. INTRODUCTION

Wolfgat Nature Reserve, currently covering 261,84 ha, was declared a reserve for 248 ha in 1986. It protects spectacular coastal limestone cliffs along Baden Powell Drive. The reserve comprises Cape Flats Dune Strandveld vegetation, and conserves more than 150 different plant species. Evergreen shrubs, annual and perennial daisies, vygies and Arum Lilies are common. A colony of *Larus dominicanus* (Kelp Gulls) nest on the limestone cliffs, while *Haematopus moquini* (African Black Oystercatchers) scurry along the rocky and sandy shores.

Wolfgat Nature Reserve is named after the *Hyaena brunnea* (Brown Hyena or Strandwolf), which occurred in Cape Town as recently as the 1840s. A fossil den site of the Brown Hyena was found in the Wolfgat Nature Reserve cliffs in 1962, dating back approximately 45 000 years.

The vegetation conditions in Wolfgat Nature Reserve range from very high to low, subject to dense alien infestation in areas, spot fires, dumping and poaching.

The strategic management planning process – resulting in the development of an Integrated Reserve Management Plan (IRMP) – for Wolfgat 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 nature reserve. The reserve objectives contribute to realising the purpose and desired states. For each desired state, a number of management objectives are identified. These management objectives 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.

In context, 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.

1.1 Aim of the Integrated Reserve Management Plan

The aim of the IRMP is to ensure that Wolfgat 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 action, and providing management guidelines.

The reserve planning process for Wolfgat Nature Reserve takes place against the backdrop of (i) the City of Cape Town's Integrated Development Plan (IDP) (Anon 2010); (ii) the City of Cape Town's Integrated Metropolitan Environmental Policy (IMEP) (Anon 2003[1]); (iii) the City of Cape Town's biodiversity strategy (Anon 2003[2]) and Local Biodiversity Strategy and Action Plan (LBSAP) (Anon 2009[1]); and (iv) 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 Wolfgat Nature Reserve is supported by a State of Biodiversity report (Holmes *et al*. 2008), operational guidelines, and a monitoring and evaluation framework to ensure ongoing implementation and review of protected-area management activities (figure 1).

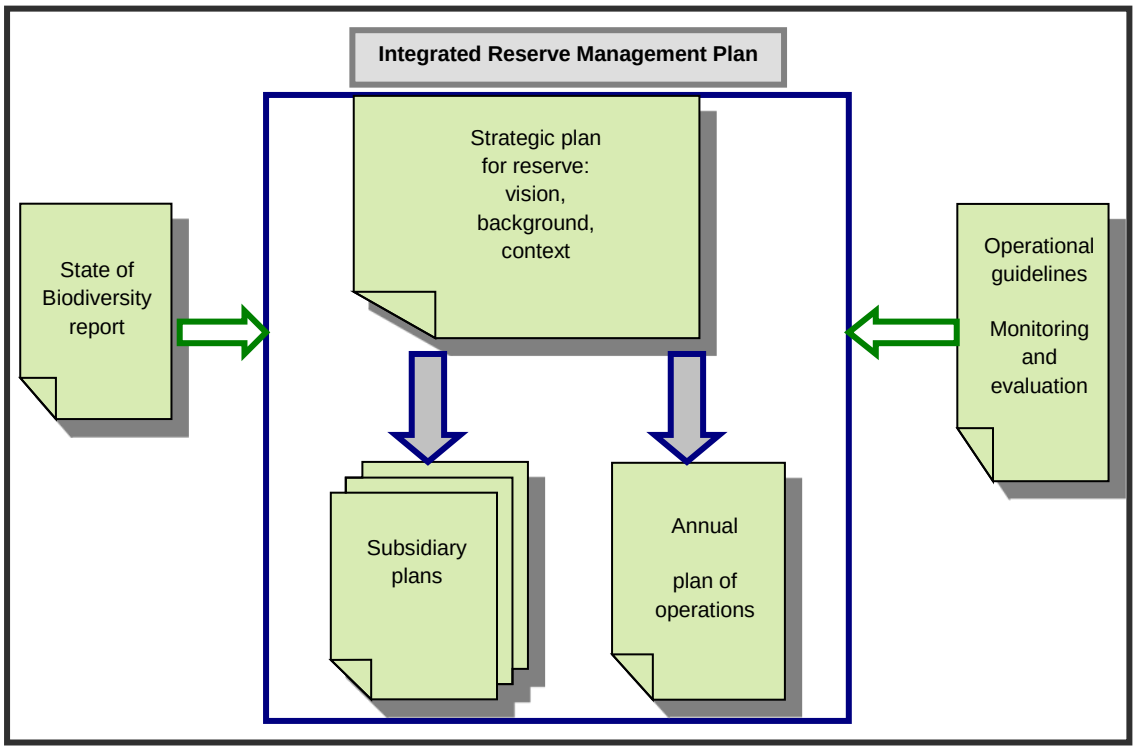


Figure 1: The elements of the IRMP

The IRMP for Wolfgat 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).

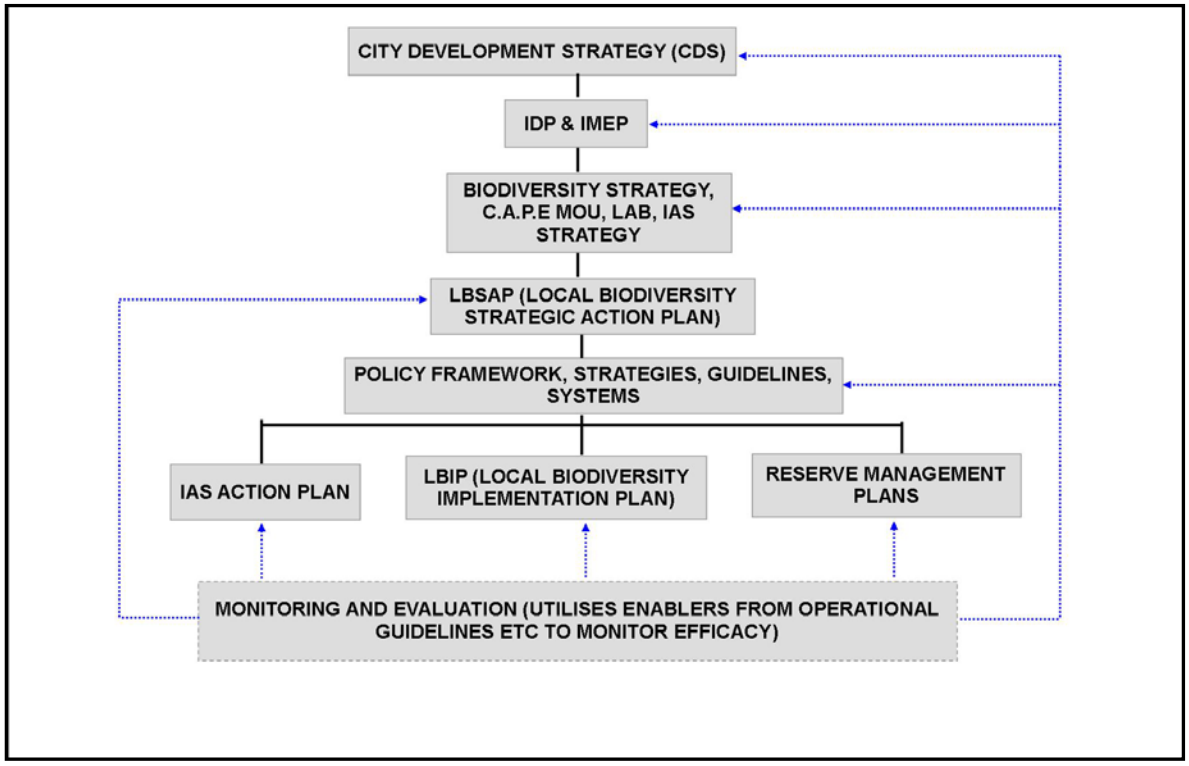


Figure 2: Legal and planning framework for the IRMP

Where possible, emphasis has been placed on the following:

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

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

The drafting of this IRMP has been guided by a small interdisciplinary Reserve Planning Committee (RPC), comprising the branch manager, the regional manager, the area and reserve managers, various specialists, and other interested and affected persons. Repeated drafts of the IRMP were presented to, and discussed by, the RPC before broader circulation for public participation.

Pre-engagement workshops were held with community partners from March to May 2010. This afforded key community partners an opportunity to give their input at an early stage. Where practically possible, the ideas and outputs from the workshops have been incorporated into the IRMP.

1.2 Location and extent

Wolfgat Nature Reserve is situated south of Mitchells Plain on the False Bay coastline between the Mnandi and Monwabisi recreational beach resorts. The reserve is approximately 261,84 ha in extent, was proclaimed as a local authority nature reserve in 1986 (then 248 ha in extent), and is managed by the City of Cape Town.

The reserve is approximately 30 km south of the Cape Town city centre and approximately 10 km east of Strandfontein, and is located at the following grid reference:

34º 04' 11.76" S; 18º 35' 55.26" E

The Baden Powell Drive highway (R103) divides Wolfgat Nature Reserve into a terrestrial and a coastal section. (See map 1 for Wolfgat Nature Reserve's location in Cape Town.)

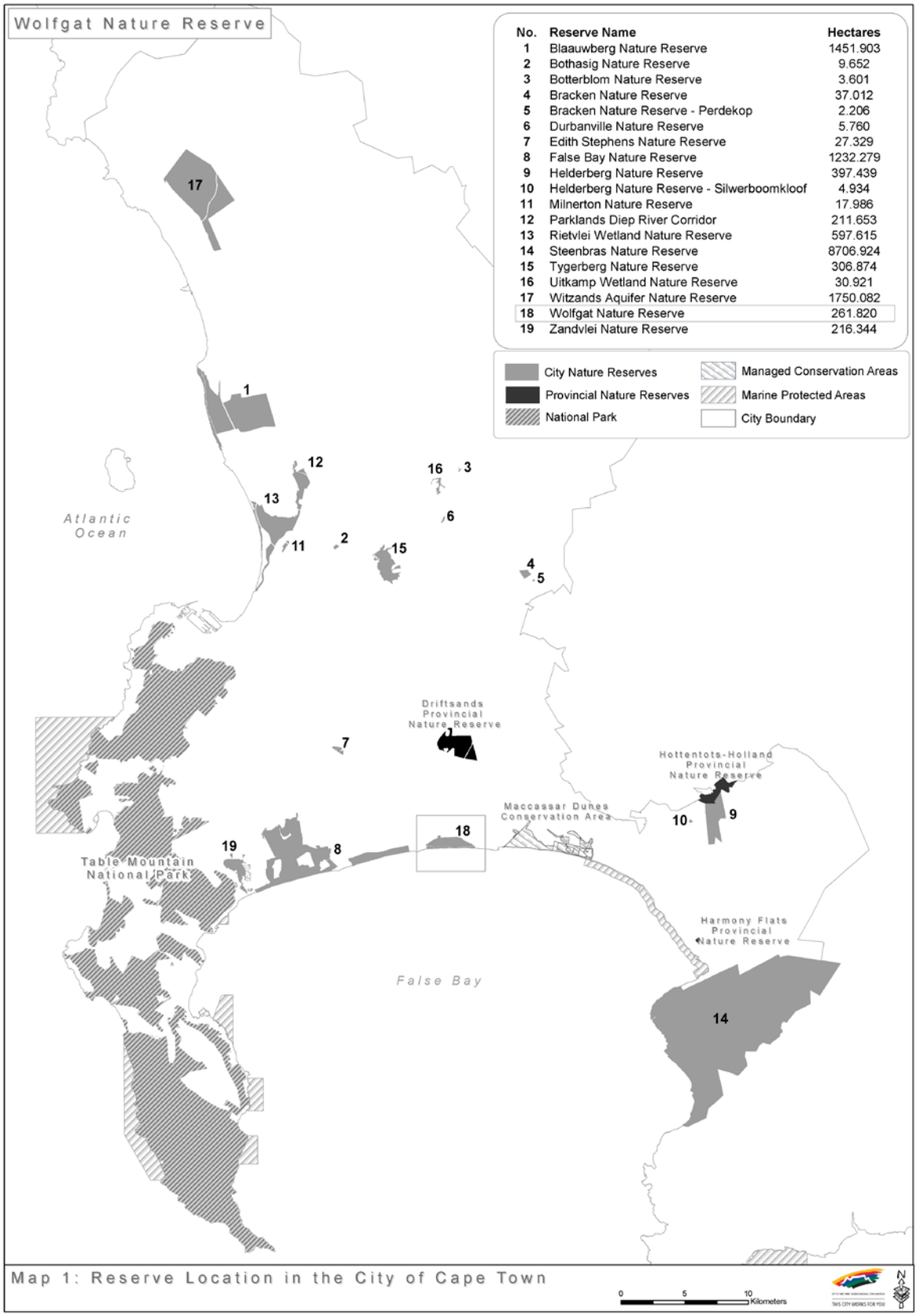
2. DESCRIPTION OF LANDHOLDINGS AND OWNERSHIP

2.1 Property details and title deed information

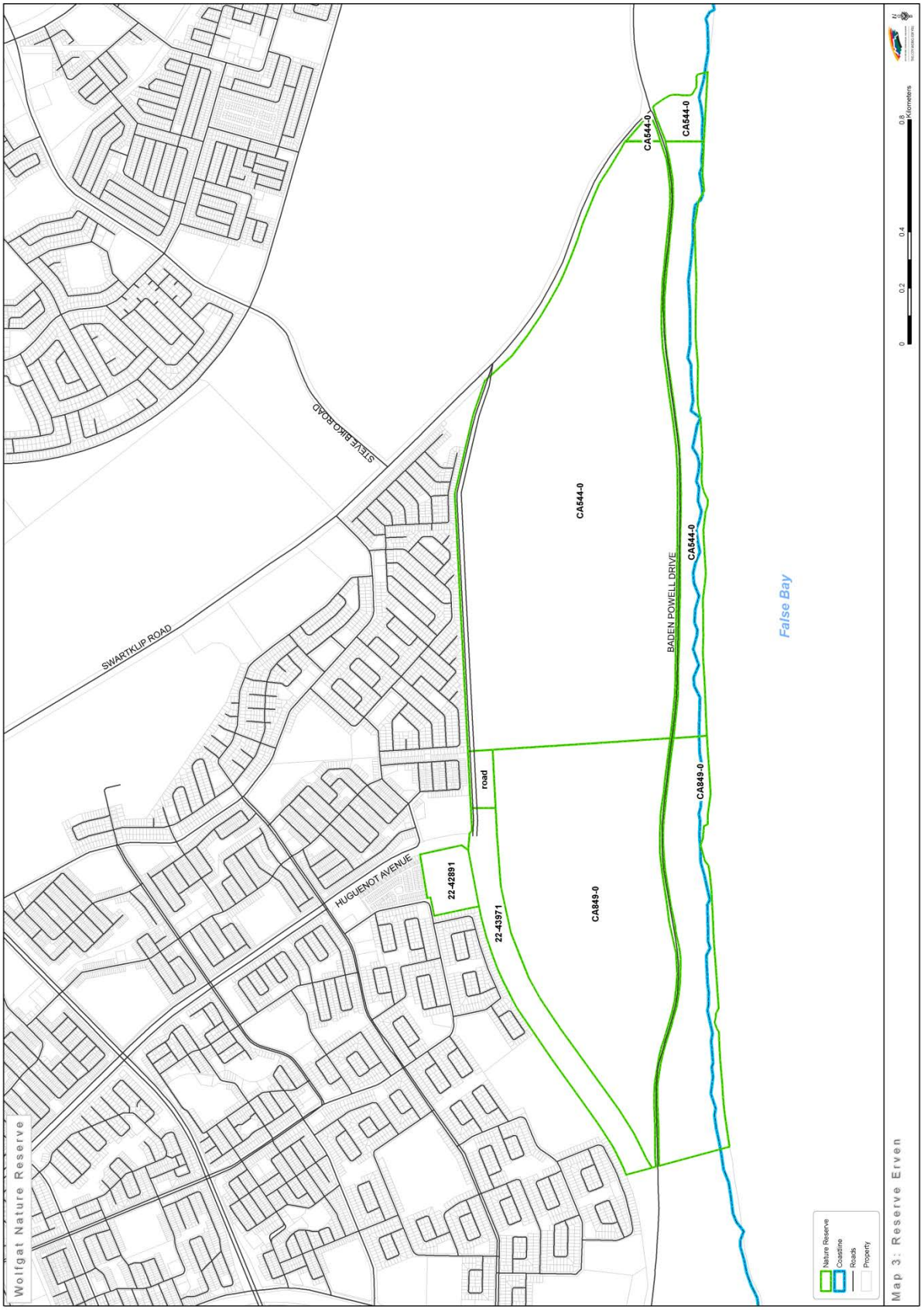
Wolfgat Nature Reserve was proclaimed a local authority nature reserve in April 1986 (P.N. 244/1986) under the protection of the then Parks and Forest Branch in the City Engineering Department of the City of Cape Town. The reserve was proclaimed in terms of the Provincial Gazette of the Cape of Good Hope (appendix 2). Also see appendix 3 for the Surveyor-General's diagrams, map 2 for Wolfgat Nature Reserve's boundary, and map 3 for Wolfgat Nature Reserve's erven.

Erven

- CA544-0: Eastern half of Wolfgat Nature Reserve, north and south of Baden Powell Drive
- CA849-0: Western half of Wolfgat Nature Reserve, north and south of Baden Powell Drive
- 22-42891: North of the existing Wolfgat Nature Reserve; small property where, at the northernmost point, the Wolfgat Environmental Educational Centre is to be built, with a network of paths as part of the development plan


Wolfgat 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 8706.924
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
Driftsands Provincial Nature Reserve
Hottentots-Holland Provincial Nature Reserve
Maccassar Dunes Conservation Area
Table Mountain National Park
Harmony Flats Provincial Nature Reserve
False Bay
0 5 10 Kilometers
Map 1: Reserve Location in the City of Cape Town

Wolfgat Nature Reserve
Reserve Boundary
Map 2: Reserve Boundary


Wolfgat Nature Reserve
STEVE BIKO ROAD
SWARTKLIP ROAD
HUGUENOT AVENUE
BADEN POWELL DRIVE
road
22-42891
22-43971
CA544-0
CA544-0
CA544-0
CA544-0
CA849-0
CA849-0
False Bay
Nature Reserve
Coastline
Roads
Property
0
0.2
0.4
0.8
Kilometers
Map 3: Reserve Erven

2.2 Landscape perspective

Wolfgat Nature Reserve falls within the Cape Floristic Region (CFR). The South African CFR is the smallest and 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 areas, 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 (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, resulted in the establishment of a strategic plan (C.A.P.E. Project Team 2000), referred to as Cape Action Plan for the Environment, which identified the key threats and root causes of biodiversity losses that need to be addressed in order to conserve the floral kingdom. This, in turn, 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 nature reserve network, enhance off-nature 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. This partnership works together 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).

Cape Town is 2 460 km^2 in extent. It is home to 19 vegetation types, nine of which are Critically Endangered and six endemic. There are 3 250 plant species in Cape Town (30% of the species in the fynbos biome in less than 3% of the area), of which 13 are extinct and 319 threatened with extinction. (A total of 18% of South Africa's Red List species are found here, in 0,1% of the country's surface area.) Wolfgat Nature Reserve

links up with False Bay Nature Reserve to the west, and with the Monwabisi area to the east.

The reserve forms an important platform and integral link in the City of Cape Town's biodiversity network. This network ensures that parcels of land worthy of conservation are included in a protective network, connected to other parcels of conservation-worthy land (see map 5).

2.3 Physical environment

2.3.1 Climate

The climate is typically Mediterranean, with hot, dry summers and cool, wet winters. An average summer temperature of 20,4 °C and a mean winter temperature of 11,7 °C have been recorded. About 600 mm of rain falls every year. A strong onshore southeasterly blows, particularly during summer, and an onshore northwesterly during winter.

2.3.2 Geology, geomorphology, soils and land types

The area has few significant topographic features, mainly consisting of undulating south-east/north-west sand dunes of varying height (up to nearly 60 m above mean sea level). Underlying these dunes is a more or less continuous layer of calcrete or surface limestone, which is openly exposed in four south-east/north-west bands in the reserve. Calcrete is also exposed along much of the coastline, where it forms the Wolfgat Nature Reserve cliffs.

To understand the geology of Wolfgat Nature Reserve, a brief look at the past history of the area is required. Between 75 000 and 125 000 years ago during the Pleistocene (the last interglacial) period, the average sea level was between 3,5 and 18,5 m above its present level (Bowie 1966). At this time, marine sands were laid down. About 75 000 years ago, the climate became cooler and another glacial period commenced, during which large ice caps were formed and the sea level dropped by about 100 m (Bowie 1966). The climate changed from humid to extremely arid. The area became a wind-swept and sandy plain, and calcrete was formed at or near the surface.

Thereafter followed a period during which the Cape became cooler and wetter, and supported a large amount of flora. During the last Pleistocene period, compression of the climatic belts in the direction of the equator caused wind velocities to rise, creating an extensive system of parabolic, vegetation-bound coastal dunes (south-east orientated) across the newly exposed sand floor of the False Bay (Rogers 1980).

About 18 000 to 16 000 years ago, at the beginning of the Holocene period, the sea level started to rise to its present position (Bowie 1966). As it rose, it eroded the coastline northwards from the mouth of the False Bay, forming cliffs of calcrete-capped aeolinate at Wolfgat (Rogers *et al*. 1990), while Aeolian sands continued to be blown by strong winds (Bowie 1966). The dunes differ in colour (from white to brown) as well as in thickness, and, in some parts, the underlying calcrete is exposed or lies close to the surface (see figure 3).

The consolidated dunes on the Cape Flats were named the Wolfgat member of the Bredasdorp formation (Rogers 1980; Theron 1984). The dune sands were derived from exposed marine sources, and, therefore, they are rich in shell-hash that comes from the disintegration of invertebrates. These shells are made up of calcium carbon trioxide and thus form calcareous deposits with an alkaline pH (7,5–8,5). These soils (Mispah form) are low in important elements such as nitrogen, phosphates and potassium. Trace elements are also generally low, and the soils have an exceedingly poor agricultural potential (Low 1991).

Some degree of temporary wetting in winter is found in several of the dune valleys and in pockets on the calcrete, but is not as nearly marked as in other places on the Cape Flats, where a drastic change in the flora occurs because of this.

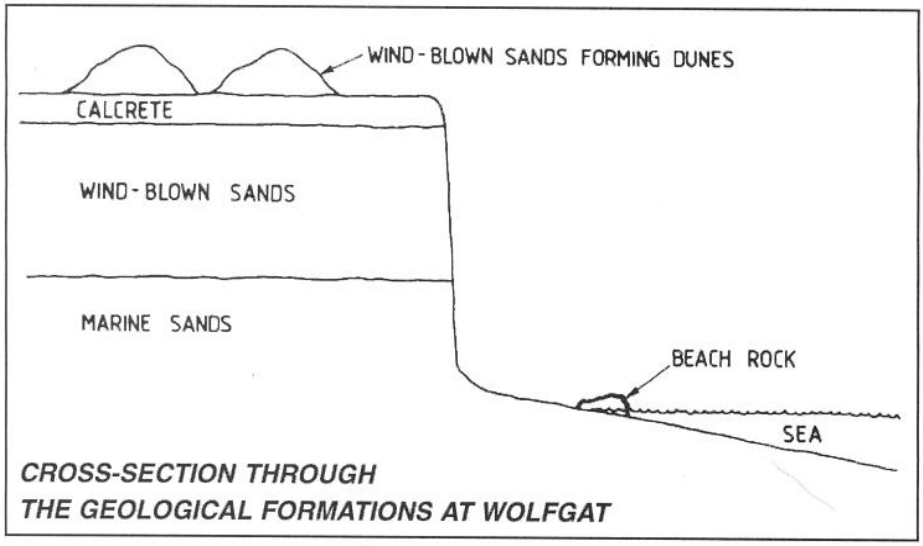


Figure 3: Geological formations in Wolfgat Nature Reserve (Environmental Management Branch 2000)

2.3.3 Hydrology and aquatic systems

Because of the generally high and sharp topography of the area, drainage occurs away from the dune system, towards the Eerste River and the coast. Consequently, soils are generally well drained, both due to the topographic nature of the dune and the sandy nature of the substrate. Locally, drainage is impeded, and this is evident in occasional dune slacks and depressions, and probably on the limestone of the system.

Wolfgat Nature Reserve has no catchments, rivers, freshwater aquatic systems or estuaries, but has seasonal dune slack wetlands. During 1995, the Council for Scientific and Industrial Research produced a report on the Cape Flats, “Cape Flats Aquifer: Current Status”, that gives insight into the history and status of the area. Extracts from this report are given below. A few areas are seasonally inundated. These are indicated and include an old quarry site (see map 4).

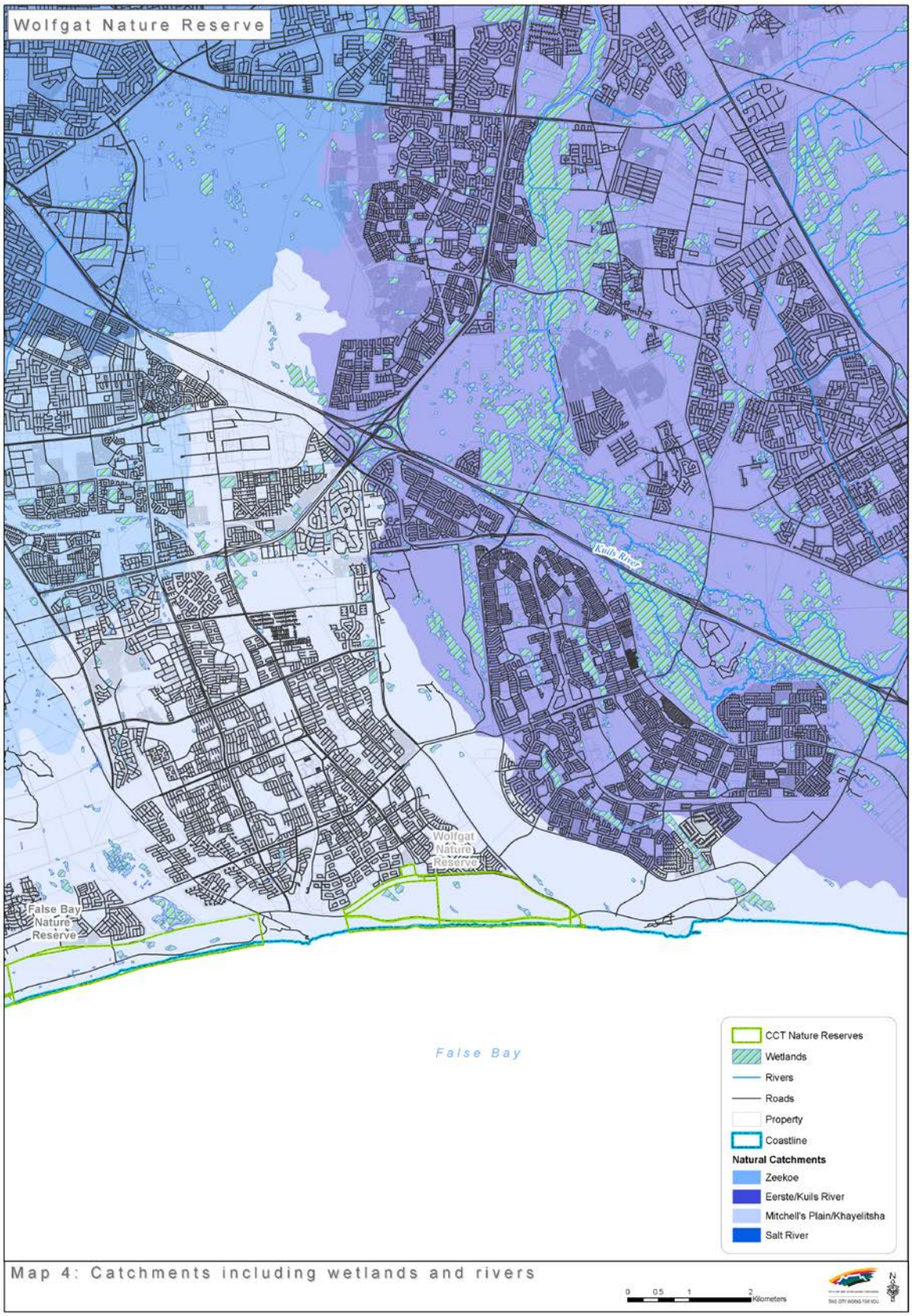
The Cape Flats aquifer consists of Cenozoic deposits, underlain essentially by impervious Malmesbury shales or Cape granite. On the Cape Flats, the groundwater either flows west towards Table Bay, or south towards False Bay. The main part of the aquifer, south of the N2 freeway, flows in a westerly direction towards Zeekoevlei, or south towards Monwabisi/Mnandi.

The areas west of Baden Powell Drive (R310) up to the Cape Flats Wastewater Treatment Works have been identified most suitable for water extraction from the Cape Flats aquifer. Water is currently being extracted in bulk in the Philippi agricultural area, Mitchells Plain and Strandfontein. It is calculated that this aquifer recharges at an annual rate of approximately 15 to 20 million m^3, with negligible contributions from the Kuils River system, Zeekoevlei and groundwater sources. It is proposed that the extraction rate should not exceed the average recharge rate.

The report noted that it would be “slightly more difficult (than in the case of the Atlantis Water Resource Management Scheme) to fully exploit the (Cape Flats aquifer) resource, as urban planners totally ignored the aquifer when developing the Cape Flats”. Concerns are expressed where the groundwater is close to the surface, as this could lead to the pollution of the aquifer because the water resource is not used for drinking water only but for other purposes as well. This report also highlights that the Cape Flats aquifer can still be used as a water supply, even though development has already covered the best extraction positions.

The marine system of Wolfgat Nature Reserve forms part of the False Bay coastline, and protects 36 ha of rocky shoreline. The biogeographical region extends from Mnandi

beach resort to Monwabisi beach resort, and is influenced by the Benguela and Agulhas current ecoregions as well as waters within the southern oceans.



Map 4: Catchments including wetlands and rivers

2.4 Biological environment

2.4.1 Vegetation

The indigenous vegetation is broadly classified as Cape Flats Dune Strandveld. Strandveld found at Wolfgat is a mixture of thicket (broad-leaved shrubs) and asteraceous fynbos communities. These communities represent different stages in the post-fire succession, with thicket elements establishing only in older vegetation.

The vegetation found at Wolfgat Nature Reserve and Macassar Dunes Conservation Area (to be included in the protected-area expansion plan) is classified as Endangered Cape Flats Dune Strandveld. This is of the False Bay form, which is significantly different to the form on the West Coast. This False Bay subtype is rapidly approaching a status of Critically Endangered.

The various plant communities and their distribution are affected by the geology, soil type (highly alkaline), soil depth and micro-climate. Wolfgat Nature Reserve shows much variation in species composition, and the vegetation generally increases in height and diversity away from the coast. A chief cause of this phenomenon is the 'wind-clipping' effect produced by the salt-laden and sand-laden onshore winds that reduce the vegetation to a height of less than 0,5 m in places (Holmes 2008). (refer to appendix 18 for summarised description of vegetation types occurring in the City of Cape Town).

Indigenous plant species present at Wolfgat Nature Reserve reflect those commonly encountered on calcareous substrates of the Cape Flats. Several distinct groups or suites of species are found on the cliff tops, embryo and foredunes, inland dunes and limestones (see appendix 4 for the plant species list).

Calcareous sand vegetation types in the subregion fall within the Dune Thicket category described by Low and Rebelo (1998). More specifically, Langeberg Dune Strandveld is found along the upper Cape west coast, with Cape Flats Dune Strandveld stretching from north of Bokbaai to Gordon's Bay, and Overberg Dune Strandveld between Hangklip and Cape Agulhas (Rebelo *et al.* 2006; also see Low & Pond 2004).

Four species are classified as Threatened or Near Threatened. These are *Euphorbia marlothiana* (Data Deficient and taxonomically problematic), *Solanum crassifolium*, *Satyrium carneum* (Near Threatened) and *Tetraria brachyphylla* (Near Threatened) (Holmes 2008).

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 fewer endemic species compared to fynbos. This vegetation type is considered Endangered, with over 56% of the original extent having been transformed. The conservation target of 24% is still obtainable, but the remaining strandveld is being developed at an alarming rate, and only 6% of the original extent is formally protected (Holmes 2008).

Parts of the study area have been invaded by the woody Australian species *Acacia cyclops* (Rooikrans) and *A. saligna* (Port Jackson), which predominate along the coast and inland respectively. Rooikrans tends to dominate in Wolfgat Nature Reserve and the Macassar Dunes Conservation Area coastal dunes. Both species appear to infest parts where disturbance of the natural vegetation, such as clearing and burning, has occurred. Like the indigenous scrub species, acacias tend to form low, dense thickets nearer to the coast, whereas taller stands are found on the stabilised back dunes, often with trees of 5–6 m in height. However, due to invasive-species clearing programmes, the entire Wolfgat Nature Reserve has undergone initial clearing of woody invasive plants as of the beginning of 2011 (see appendix 5). The requirement now is to continue with follow-up clearing, and to initiate the eradication of the invasive herbaceous species. Wolfgat Nature Reserve adjoins the coastline, and, therefore, a list of marine plant species have been compiled (see appendix 6).

2.4.2 Mammals

A total of 15 mammal species have been observed or are likely to occur in the area. The most regularly recorded are *Galerella pulverulenta* (Small Grey Mongoose) and *Rhabdomys pumilio* (Striped Field Mouse). *Raphicerus melanotis* (Cape Grysbok) is also found within Wolfgat Nature Reserve. The only invasive mammal recorded in the reserve to date is *Mus musculus* (House Mouse).

Extensive and persistent dumping of rubble, refuse and other waste matter is unfortunately taking place. A negative consequence of this activity is the presence of the introduced House Mouse (*Mus musculus)* in the rubble piles, and, although not recorded, introduced *Rattus spp.* would undoubtedly also be present. These introduced species could compete with and negatively affect indigenous fauna. Vagrant dog and cat spoor is regularly found throughout the area, and it is suspected that packs of dogs regularly hunt in the reserve (see appendix 7 for mammal species list).

2.4.3 Birds

According to the biodiversity database of 2010, approximately 100 bird species have been recorded in Wolfgat Nature Reserve to date. Common birds include the *Colius*

stristus (Speckled Mousebird), *Elanus caeruleaus* (Black-shouldered Kite), *Falco rupicolus* (Rock Kestrel), *Pternistis capensis* (Cape Spurfowl), *Larus dominicanus* (Kelp Gull), *Cinnyris chalybea* (Southern Double-collared Sunbird) and the *Prinia maculosa* (Karoo Prinia) (see appendix 8 for bird species list).

2.4.4 Reptiles

According to the draft management plan dated June 2001, approximately 22 reptiles are associated with the habitat types found in Wolfgat Nature Reserve (nine lizards, 12 snakes and one tortoise). The reptiles found and presented in appendix 9 are all widespread, and none are restricted to strandveld vegetation. However, certain species are locally threatened by invasive alien vegetation, and the *Chersina angulata* (Angulate Tortoise) because of human predation (see appendix 9 for reptile species list).

2.4.5 Amphibians

According to the Wolfgat Nature Reserve draft management plan of June 2001, the reserve provides breeding habitat for two amphibians, namely the *Breviceps rosei* (Sand Rain Frog) and the *Strongolopus grayii* (Clicking Stream Frog). The Sand Rain Frog is a burrowing species, which lays its eggs underground and does not need wetland habitat to breed.

Although Wolfgat Nature Reserve does not provide the wetland breeding habitat required by the majority of amphibians in the Southwestern Cape, certain wide-ranging species may be encountered at times, especially during damp periods. The species most likely to be encountered are the *Bufo angusticeps* (Sand Toad) and the *Tomopterna delalandii* (Cape Sand Frog). The amphibians found and presented in appendix 10 are all widespread, and none are restricted to strandveld.

2.4.6 Fish

Wolfgat Nature Reserve has no water bodies, and, therefore, no freshwater fish species. However, as it does adjoin the False Bay coastline, a few marine fish species are found in the area (see appendix 11).

2.4.7 Invertebrates

While very little work has been done on invertebrates in Wolfgat Nature Reserve, the *Hetrodespupus* (Corn Cricket) is considered a species of special concern (see appendix 12).

The intertidal zone hosts a wide variety of marine life, including the *Gunnarre capensis* (Cape Reef Worm), chitons, mussels and other molluscs and barnacles.

2.5 Socio-political context

2.5.1 History

The name Wolfgat is derived from a fossilised Brown-Hyaena den ("wolf" = hyaena; "gat" = den) found along the coastline cliffs in 1962. Some 300 000 years ago, the Cape was inhabited by hunter-gatherers and Strandlopers. From 15 000 years ago, Khoikhoi used the Cape Flats as a rangeland, grazing both their cattle and sheep (Environmental Management Branch 2000).

Prior to 2004, Wolfgat Nature Reserve was managed by the City Parks and Nature Conservation Department, and was overseen by various individuals managing it from afar. There was no dedicated on-site nature reserve manager, and community interaction with the reserve was limited.

The South African National Biodiversity Institute (SANBI) identified Wolfgat Nature Reserve as having a unique assemblage of biodiversity prior to 2000, and as one of the Cape Flats Nature (CFN) (a project within SANBI) pilot sites in 2000 to create community involvement and interaction on the site (Business Presentation Group 2002).

CFN aimed to develop good practice by way of sustainable management of urban conservation sites in a way that benefits the surrounding communities, particularly the townships, where living conditions are poor (Business Presentation Group 2002). CFN had four focus areas: conservation, education, recreation and quality of life, and job creation. The project intended to enhance initiatives already on the way, catalyse activities where necessary, not to manage the pilot sites but to build capacity, assess different approaches, and spread good practice. CFN also raised funds locally and internationally from private and public sources to achieve its aims (Business Presentation Group 2002).

In 2002, a participation workshop was held within the Mitchells Plain community, and one of the outcomes was the identified need for an on-site reserve manager with whom the people could communicate and interact regarding the reserve (Business Presentation Group 2002).

Since this workshop, through the efforts of CFN and the City of Cape Town, a reserve manager has been employed, first through external funding via the Table Mountain Fund and SANBI, and later through permanent employment by the City of Cape Town. Annual events and activities were initiated and implemented with CFN support and funding. These

events are still continued today. CFN was instrumental in the relationships that were built with community partners; they supported the reserve manager in working with community partners, and facilitated capacity building of both the reserve manager and community partners.

2.5.2 Socio-economic context

Wolfgat Nature Reserve is found in the jurisdiction of, and therefore managed by, the City of Cape Town. The current situation within the municipal area is as follows:

- A population of 3,4 million people (as in 2007), with a housing backlog of 400 000 houses (as per 2008 data)
- High immigration figures into Cape Town from the rest of the country
- A development rate of 1 232 ha per year, which is leading to uncontrolled urban sprawl and relatively low-density suburban residential development
- Current methods of developing low-cost housing hamper healthy, vibrant communities

The community that borders Wolfgat Nature Reserve is Mitchells Plain, comprising Tafelsig, Lost City and Silver City. These neighbourhoods are low to poor-income communities. The backyards of the houses on the border face the reserve. Many of these households are unaware that they are bordering on a nature reserve, and their only interaction with the reserve is to walk through it to get to the coastal section for recreational purposes.

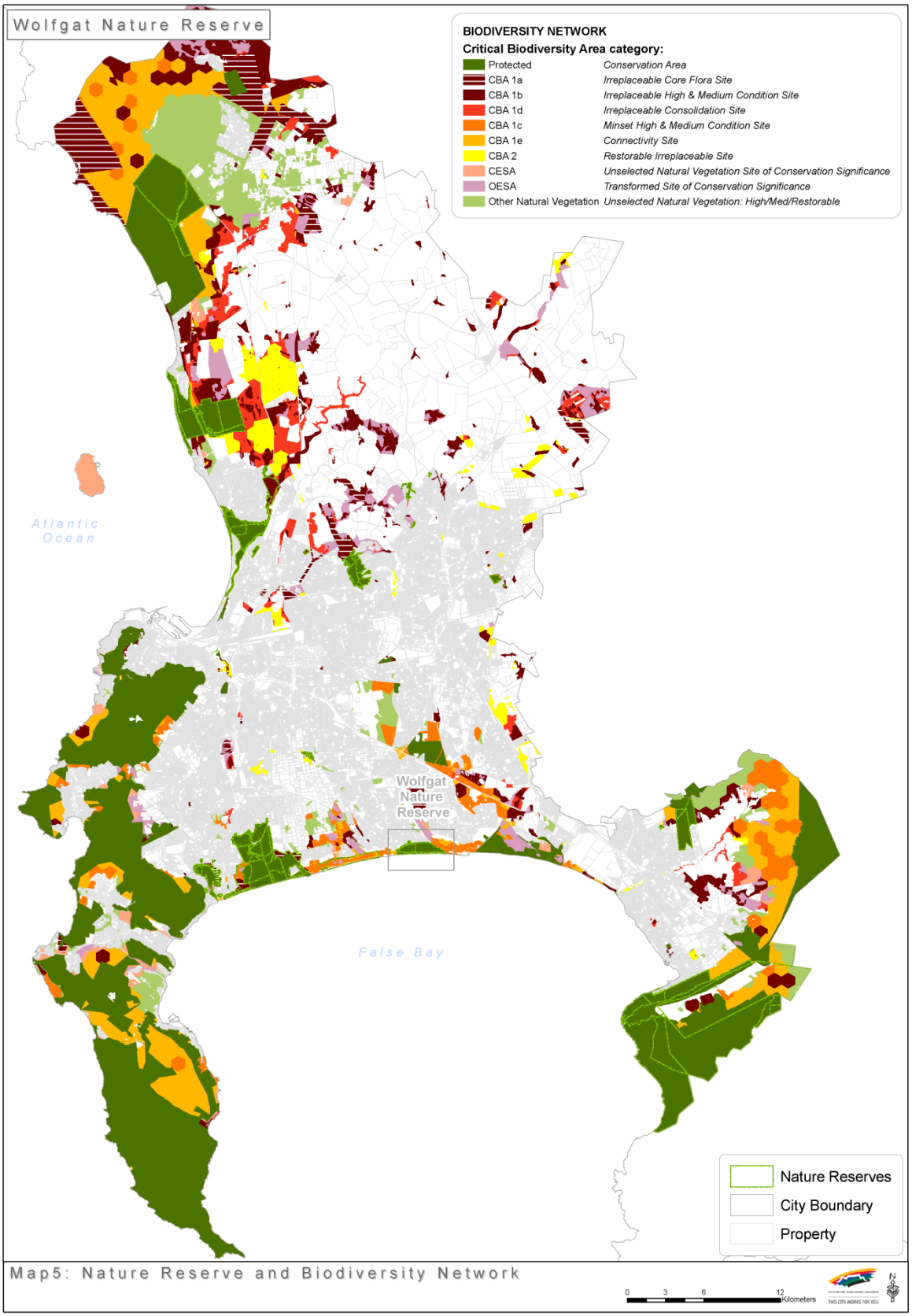
Wolfgat Nature Reserve is used for a variety of activities by local residents, the broader community of Cape Town, and visitors to the area. Area usage includes walking, sightseeing, birdwatching and fishing. Baden Powell Drive (which bisects the reserve) is used as a scenic route and a filming location for local and international companies. At the base of the calcrete-capped cliffs are excellent fishing sites. There are various informal parking areas on the seaward side of Baden Powell Drive, from where people and cars access the beach.

Undesirable activities in Wolfgat Nature Reserve include off-road vehicles, poaching of game, removal of Kelp Gull eggs, dumping, vandalism (of the cliffs and infrastructure), informal settlements, illegal wood cutting, and erosion caused by the informal network of tracks and the removal of sand and limestone. The impact from the collection of traditional plants and flowers is still unknown, and, at present, these activities are not permitted.

2.6 Protected-area expansion

Future plans for the protected area are to expand east and west, incorporating the following areas (see map 5 and 6):

- The Monwabisi coastal natural area
- The Macassar dunes conservation area
- The Macassar Denel/Somchem area, which is planned to be set aside for conservation
- The Helderberg marine protected area
- False Bay Nature Reserve to the west



Map5: Nature Reserve and Biodiversity Network


Wolfgat Nature Reserve
Map 6: Reserve Expansion Plan
Nature Reserve
Maccassar Dunes Conservation Area
Conservation expansion areas
Biodiversity Network
Coastline
Marine Protected Areas
Roads
Property
SWARTKLIP ROAD
BADEN POWELL DRIVE
COAST ROAD
Wolfgat Nature Reserve
CA849-0
22-42342
22-42891
Monwabisi Coastal Area
37-25029
37-37261
37-18332
CA544-0
Macassar Dunes Conservation Area
CA544-2
False Bay
Helderberg MPA
Strand Closed Area
ST789-0-1
ST792-0
ST790-0
ST791-4
ST793-0
59-635
0
1.25
2.5
5
Kilometers

3. PURPOSE, VISION/MISSION, SIGNIFICANCE/VALUE

3.1 Purpose of the protected area

Wolfgat Nature Reserve is located in the CFR – an area of global biodiversity significance. The reserve conserves a unique combination of habitats, ecosystems and species, many of which are either rare or endemic to the area.

The primary purpose of the reserve is “the conservation of this unique biodiversity and associated ecosystem features and functions”.

In conserving the unique biodiversity found in Wolfgat Nature Reserve, the secondary objectives will include:

- identifying, enhancing and maximising the socio-economic benefits and opportunities;
- promoting sound environmental education principles;
- conserving and protecting the endangered Strandveld vegetation, a landscape of unique beauty, and cultural heritage resources; and
- providing visitor facilities and an environmental education centre.

The primary criteria stipulated by the National Environmental Management: Protected Areas Act apply to the area.

The purposes of the declaration of protected areas are:

- to protect ecologically viable areas that represent South Africa’s biological diversity, natural landscapes and seascapes in a system of 30 protected areas;
- to protect the ecological integrity of those areas;
- to conserve biodiversity in those areas;
- to protect areas representative of all ecosystems, habitats and species naturally;
- to protect South Africa’s threatened or rare species;
- to protect an area that is vulnerable or ecologically sensitive;
- to assist in ensuring the sustained supply of environmental goods and services;
- to provide for the sustainable use of natural and biological resources;
- to create or augment destinations for nature-based tourism; and
- to manage the interrelationship between the natural environment and people.

3.2 **Vision and mission**

3.2.1 Goals of the Biodiversity Management Branch

Biodiversity in the jurisdiction of the City of Cape Town is conserved and restored where appropriate. This process has resulted in significant involvement of, as well as delivered many benefits to, Cape Town's present and future citizens in a way that is endorsed by the municipality.

3.2.2 Objectives of the Biodiversity Management Branch

Strategic objective 1: Develop, implement and maintain relevant policies and strategies to ensure legal compliance and alignment with relevant international, national, provincial and City of Cape Town legislation, policies and strategies

Strategic objective 2: Secure formal conservation status, and manage and maintain identified and existing terrestrial and wetland priority sites

Strategic objective 3: Identify, enhance and maximise socio-economic benefits and opportunities

Strategic objective 4: Significantly reduce the threat that invasive species pose to the City of Cape Town's natural, economic and social assets by developing and implementing an invasive-species strategy

Strategic objective 5: Improve awareness raising and environmental education, and enhance the Branch's profile

Strategic objective 6: Build the Branch's capacity to manage, maintain, monitor and evaluate the implementation of the biodiversity strategy

3.2.3 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 of Cape Town 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 Kingdom, and share its full ecological, social and economic benefits now and in the future.

Environmental Resource Management Department vision

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, and vision for biodiversity in Cape Town

Accepted by Council in June 2009

To be a City that leads by example in the protection and enhancement of biodiversity; a City within which biodiversity plays an important role, and 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.

Wolfgat Nature Reserve vision

To conserve a representative and functioning Cape Flats Dune Strandveld system and coastline, and to provide the surrounding communities with a sound environmental education, eco-tourism experience and an accessible recreational venue

3.2.4 Mission

Biodiversity Management Branch mission

- To manage biodiversity proactively and effectively

- To ensure an integrated approach to biodiversity between City of Cape Town line functions and departments, and actively pursue external partnerships
- To adopt a long-term approach to biodiversity
- To ensure sustainability of our rich biodiversity
- To adopt a holistic and multifaceted approach to biodiversity
- To continue to measure and monitor the City of Cape Town's performance in the protection and enhancement of biodiversity
- To continue to measure and monitor the state of biodiversity in Wolfgat Nature Reserve

Wolfgat Nature Reserve mission

To restore and maintain the natural environment and its associated ecological processes and services through the implementation of the management objectives of Wolfgat Nature Reserve

3.3 Significance of property (biodiversity, heritage and social)

- The natural area of the property contains Cape Flats Dune Strandveld, classified as endangered by the South African National Vegetation Conservation Assessment of 2004. This vegetation type is confined (endemic) to Cape Town *(*Rebelo *et al*. 2006; also see Low & Pond 2004*).*
- The property also contains Endangered vegetation types that are in excellent condition, which contributes to national vegetation targets.
- Over 150 plant species have been recorded on the site. These include healthy populations of the threatened species *Euphorbia marlothiana, Hermannia trifoliata, Satyrium carneum* and *Tetraria branchyphylla,* as stated in the Wolfgat Nature Reserve Draft Environmental Management Programme of September 2000.
- The reserve has the significant feature of limestone cliffs – the only ones on the False Bay coastline.
- Wolfgat Nature Reserve supports important, locally indigenous fauna, including a Kelp Gull colony and a pair of Peregrine Falcons that nest on the limestone cliffs.
- Parts of the property consist of dune slack seasonal wetlands.
- The property adjoins other properties with unfragmented endangered vegetation. The conservation of this property will therefore facilitate the ecological management of the greater protected area.

- There is a pre-World War coastal road from the Swartklip parking area, east and west into the reserve.
- Local communities make extensive use of the area for education, and also fish along the coastline.
- The area offers immense socio-economic opportunities, which could be unlocked in the future.

PART 2

MANAGEMENT POLICY FRAMEWORK

4. ADMINISTRATIVE AND LEGAL FRAMEWORK FOR THE MANAGEMENT AUTHORITY

4.1 Legal framework

Table 1: Legal framework

The following is a list of legislation applicable to the management of the City of Cape Town's Biodiversity Management Branch. Repealed legislation has been included in greyed-out text for information purposes only.

Legislation: **Acts, ordinances, bylaws**	**Relevance:** **Description**	**Amendment:** **Latest amendment date**	**Comment:** **Other notes**
Constitution of the Republic of South Africa, Act 108 of 1996	Lists South African citizens' environmental rights	N/A	Chapter 2: Bill of Rights assigns citizens with particular rights
ENVIRONMENTAL LEGISLATION			
National legislation			
National Environmental Management Act (NEMA), Act 107 of 1998	One of the most important environmental laws relating to most aspects of the environment, including environmental impact assessments (EIAs), environmental information and legal standing, etc.	• Amendment Act 56 of 2002 • Amended by GN 26018, Vol 464 of 13 February 2004	Provides for cooperative environmental governance
National Environmental Management: Biodiversity Act, Act 10 of 2004	The objectives of the Act are to provide for: • the management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act, 1998; • the protection of species and ecosystems that warrant national protection; • the sustainable use of indigenous biological resources; • the fair and equitable sharing of benefits arising from bio-prospecting involving indigenous biological resources; and • the establishment and functions of a South African National Biodiversity Institute.	N/A	The development of the IRMP will assist in ensuring that the objectives of this Act are achieved in the reserve.

	In essence, the Act was put in place to safeguard the important biodiversity attributes in the country, while allowing people to benefit equally from the natural resources. In order to achieve these goals, the Act made provision for the South African National Biodiversity Institute (SANBI), which has been designated certain functions and afforded powers and duties in respect of this Act.		
National Environmental Management: Protected Areas Act, Act 57 of 2003	To provide for: • the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and natural landscapes and seascapes; • the establishment of a national register of all national, provincial and local protected areas; • the management of those areas in accordance with national norms and standards; • intergovernmental cooperation and public consultation on matters concerning protected areas; and • matters in connection therewith.	• Amendment Act 62 of 2008 • Amendment Act 15 of 2009	Regulations Notice 1029 of 2009 lists specific regulations for reserves proclaimed by the Member of the Executive Council (MEC) (draft August 2009).
Conservation of Agricultural Resources Act (CARA), Act 43 of 1983	The CARA regulations contain a list of alien invasive vegetation categorised according to their legal status. The Act regulates the sale, position and use of listed species.	• Amended by GN R 2687 of 6 December 1985 and GN R 280 of 30 March 2001	Alien invasive plant legislation to be included under the Biodiversity Act in future
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	N/A	A detailed fire management plan will be developed.
Marine Living Resources Act, Act 18 of 1998	Regulates conservation of the marine ecosystem and the long term sustainable utilisation of marine living resources		
Environment Conservation Act, Act 73 of 1989	The Environment Conservation Act is the other law that relates specifically to the environment. Although most of this Act has been replaced by NEMA, some important sections still remain in operation. These sections relate to: • protected natural environments; • littering; • special nature reserves; • waste management;	• Environment Conservation Amendment Act 98 of 1991 • Environment Conservation Amendment Act 79 of 1992 • Environment Conservation Second Amendment Act 115 of 1992 • Environment Conservation	

	• limited-development areas; • regulations on noise, vibration and shock; and • EIAs.	Amendment Act 94 of 1993 • Environment Conservation Second Amendment Act 52 of 1994 • Proclamation R27 of 1995 • Proclamation R43 of 1996 • National Environment Management Act 107 of 1998	
National Water Act, Act 36 of 1998	Relates to all use of water and the management of all water resources in South Africa	•	
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. The South African Air Quality Information System 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 Matters Amendment Act, Act 42 of 1993	
Animal Diseases Act, Act 35 of 1985	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		Administered under the Western Cape Nature Conservation Board Act, Act 15 of 1998
National Heritage Resources Act 25 of 1999	Provides for the protection of heritage resources		N/A
World Heritage Conservation Act 49 of 1999	Incorporates the World Heritage Convention into South African law		N/A
Problem Animal Control Ordinance, Ordinance 26 of 1957	Regulates problem animals		Administered under the Western Cape Nature Conservation Board Act, Act 15 of 1998
Mineral and Petroleum Resources Development Act, Act 28 of 2002	Provides for equitable access to, and sustainable development of, mineral and petroleum resources		
Atmospheric Pollution Prevention Act, Act 45		Entire Act repealed on 1 April	

of 1965		2010 in favour of the National Environmental Management: Air Quality Act, Act 39 of 2004	
Provincial legislation			
Land Use Planning Ordinance, Ordinance 15 of 1985	The purpose of the Ordinance is to regulate land use and to provide for incidental matters related to land use.	• Assented to on 22 November 1985 • Western Cape Land Use Planning Ordinance, 1985, Amendment Act, 2004	Although it might not have a direct application in the management of nature reserves, it does affect the surrounding properties, and could possibly be used to control activities/developments around the reserves to minimise negative effects, for example in applying zoning restrictions.
Cape Nature and Environmental Conservation Ordinance, Ordinance 19 of 1974	The purpose of this Ordinance is to regulate wild animals and plants, and the establishment of nature reserves.	Publication date 1 September 1975	Administered under the Western Cape Nature Conservation Board Act, Act 15 of 1998
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 to generate income		Biodiversity agreements are signed under this Act.
Municipal legislation			
Integrated Metropolitan Environmental Policy (IMEP), 2001	Envisages a set of Citywide aligned strategies dealing with all aspects of the environment.		Influenced the Biodiversity Strategy, 2003
Biodiversity Strategy, 2003	To be a city that leads by example in the protection and enhancement of biodiversity	• Draft amendment for 2009–2019	Influenced the development of the IRMP
City of Cape Town Bylaw relating to Stormwater Management, LA 31420	To provide for the regulation of stormwater management in the area of the City of Cape Town, and to regulate activities that may have a detrimental effect on the development, operation or maintenance of the stormwater system	• Publication date 23 September 2005	Communication strategy and action plan will take effect to address the issues with the relevant departments
City of Cape Town Air Pollution Control Bylaw, LA 12649	The purpose of this bylaw is to give effect to the right contained in section 24 of the Constitution of the Republic of South Africa Act (Act 108 of 1996) by controlling air pollution within the area of the Council's	• Publication date 4 February 2003	

	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 municipality's area of jurisdiction, and to provide for procedures, methods and practices to regulate fire safety within the municipal area.	• Publication date 28 February 2002	A fire management plan to be designed
City of Cape Town Draft Animal Bylaw, 2009	The purpose of the Bylaw is to formulate a new single bylaw, including ten different municipal dog bylaws and the Animal Protection Act of 1962. The Bylaw includes chapters on dogs, cats, poultry and working equines.	• Draft, 2009	
HUMAN RESOURCES/ADMINISTRATION LEGISLATION			
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; 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.	Occupational Health and Safety Amendment Act, No 181 of 1993	
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 Act aims to promote economic development, social justice, labour peace and democracy in the workplace.	• Labour Relations Amendment Act, 42 of 1996 • Afrikaans Labour Relations Amendment Act, 1998 • Labour Relations Amendment Act, 127 of 1998 • Labour Relations Amendment Act, 2000	

		• Amendment Act 12 of 2002	
Local Government Municipal Systems Act, Act 32 of 2000	Establishes core principles, processes 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, Act 51 of 1977	Makes provision for procedures and related matters in criminal proceedings	• Criminal Procedure Amendment Act, Act 65 of 2008	
Firearms Control Act, Act 60 of 2000	To establish a comprehensive and an effective system of firearms control and, to provide for matters connected therewith		
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 that 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 use 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		A tourism strategy is envisaged.
Public Resorts Ordinance, Ordinance 20 of 1971	Regulates nuisance and pollution control		
Municipal Ordinance, Ordinance 20 of 1974	Regulates pollution and waste management		
South African National Road Agency Limited and National Roads Act, Act 7 of 1998			

Aviation Act, Act 74 of 1962	Provides for the control, regulation and encouragement of aviation activities in the Republic of South Africa	• Repealed in favour of the Civil Aviation Act, Act 13 of 2009	
Provincial legislation			
Western Cape Land Administration Act, Act 6 of 1998	Regulates land and land use		
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, LA30441	The purpose of the Bylaw is to regulate and facilitate filming in Cape Town.	• Provincial Gazette 6277, 24 June 2005	
City of Cape Town Bylaw relating to Streets, Public Places and the Prevention of Noise Nuisances, 2007	The purpose of the Bylaw is to regulate activities in streets and public places, and to prevent excessive noise nuisance	• Promulgated 28 September 2007, PG 6469; LA 44559	
City of Cape Town Bylaw relating to signage		•	

4.2 Administrative framework

The management authority is responsible for conducting an annual audit of Wolfgat Nature Reserve, and for updating the IRMP every five years.

The reserve is managed by the Biodiversity Management Branch in the Environmental Resource Management Department of the City of Cape Town's Strategy and Planning Directorate. Wolfgat Nature Reserve is located within the eastern region, and falls under the oversight of the regional manager. The reserve is the management responsibility of the area manager, assisted by eight operational staff members. The operational management of Wolfgat Nature Reserve is supported by various other City of Cape Town departments, including, but not limited to, Law Enforcement, Environment and Heritage, Water and Sanitation, Wastewater Treatment Works, Roads and Stormwater, Cleansing, City Parks, Human Resources and Finance.

Table 2: Current staffing complement

Designation	Workweek	Hours	Overtime	Supervisor
Area manager x 1	40 hours, Mondays–Fridays	07:30–16:00	As required	Regional manager
Clerk x 2	40 hours, Mondays–Fridays	07:30–16:00	As required	Area manager
Office assistant x 1	40 hours, Mondays–Fridays	07:30–16:00	As required	Area manager
Reserve manager x 2	40 hours, Mondays–Fridays	07:30–16:00	As required	Area manager
People and conservation officer x 1	40 hours, Mondays–Fridays	07:30–16:00	As required	Area manager
Senior field ranger x 1	40 hours, Mondays–Fridays	07:30–16:00	As required	Area manager
Field ranger x 2	40 hours, Mondays–Fridays	07:30–16:00	As required	Area manager
Experiential training student x 2	40 hours, Mondays–Fridays	07:30–16:00	As required	Area manager
Intern x 1	40 hours, Mondays–Fridays	07:30–16:00	As required	Area manager

5. PROTECTED-AREA POLICY FRAMEWORK & GUIDING MANAGEMENT PRINCIPLES

5.1 Management objectives

Table 3: Management objectives

High-level objective	*Objective*	*Sub-objective*	*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 Wolfgat 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 Wolfgat Nature Reserve boundaries (3) Incorporate untransformed Strandveld areas (4) Establish corridors linking Wolfgat Nature Reserve to the Macassar dunes conservation area; Macassar dunes conservation area, Denel and Helderberg marine protected area to the east and north to the Denel corridor	Wolfgat Nature Reserve expansion plan
		Fire management Apply appropriate fire regime 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	(1) Maintain viable populations of rare/threatened plant and animal species (identify, locate and monitor populations of priority species)	Threatened biota plan within the flora management plan

		conventions		
		Monitoring plan Implement and maintain an approved monitoring plan for Wolfgat Nature Reserve	(1) Implement and maintain a biological monitoring programme for Wolfgat Nature Reserve	Monitoring plan
		Vegetation Re-establish physical, chemical and biological processes in degraded vegetation areas	(1) Rehabilitate all old, degraded sites	Vegetation rehabilitation plan within the flora management plan
	Rehabilitation Rehabilitate degraded areas, including the re-establishment of natural biodiversity patterns, and the restoration of key processes that support the long-term persistence of biodiversity	**Invasive plants and other invasive biota** Control and, where possible, eliminate alien biota to facilitate re-establishment of natural biodiversity patterns and process in invaded areas	(1) Establish the distribution and density of invasive species (2) Prioritise areas for alien removal, focusing on biodiversity restoration (3) Implement removal programmes for priority species and areas	Invasive-plant management plan; invasive-animal management plan
		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) Wolfgat Nature Reserve zoning (2) Develop and implement Conservation Development Framework (CDF) (3) Developments in accordance with environmental impact assessment process (National Environmental Management Act) and corporate policies (4) Establish visitor carrying capacities (5) Implement green standards and environmental best practice based on	(1) CDF (2) Infrastructure maintenance plan (3) Erosion plan within the risk management plan

			corporate policy	
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 Wolfgat Nature Reserve objectives** To ensure that non-biodiversity management aspects of Wolfgat Nature Reserve operations (revenue generation, including visitor, resource use, developments, management activities, etc.) are informed and constrained by biodiversity conservation objectives, and that the impacts of these activities on biodiversity are minimised	**Internal activities** Minimise the impacts associated with visitor and Wolfgat Nature Reserve management activities, and ensure that such activities do not compromise biodiversity objectives	(1) Wolfgat Nature Reserve zoning (2) Develop and implement CDF (3) Developments in accordance with environmental impact assessment process (National Environmental Management Act) and corporate policies (4) Establish visitor carrying capacities (5) Implement green standards and environmental best practice based on corporate policy	(1) CDF (2) Infrastructure maintenance plan (3) Erosion plan within the risk management plan Sustainable resource use management plan (not within the next five years)
		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	
		External developments Minimise the impacts associated with inappropriate developments outside Wolfgat Nature Reserve	(1) Engage regional land management authorities, including IDPs and Spatial Development Frameworks at local and regional level (2) Alignment 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 process for external development that may compromise Wolfgat Nature Reserve and biodiversity network objectives	(Cooperative governance and communication plan)

			(4) Negotiate to ensure that external developments are not visually obtrusive or out of character with the reserve	
	Reconciling biodiversity with external threats To reduce external threats and pressures, and limit impacts of surrounding land and resource use on biodiversity conservation within Wolfgat Nature Reserve	**External activities** Negotiate to ensure that external resource and land use do not detrimentally affect ecological processes within Wolfgat Nature Reserve	(1) Negotiate to 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	(1) Risk management 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 Wolfgat Nature Reserve	(1) Lobby for appropriate catchment categorisation (currently general authorisation) (2) Encourage enforcement of legislation applicable to the management and protection of aquatic resources (4) Facilitate regular assessments of river health (5) Address the issue of sewage and other point-source pollution of aquatic systems	
		Illegal harvesting of resources Prevent the illegal collection, removal and destruction of physical and biological resources	(1) Public liaison (2) Law enforcement	Wolfgat Nature Reserve safety and security Plan

			(1) Wolfgat Nature Reserve zoning (2) Develop CDF and sensitivity-value analysis	(1) CDF (which should include the infrastructure plan for high-intensity use zones and should be viewed in the context of False Bay Nature Reserve) (2) Wolfgat Nature Reserve expansion plan (3) Invasive-plant management plan (4) Branch community strategy and action plan (5) Branch education strategy and action plan; Wolfgat Nature Reserve environmental education and community involvement strategy (6) Visitor facilities plan
WILDNESS/REMOTENESS To maintain and restore wildness/remoteness in Wolfgat Nature Reserve so that the spiritual and experiential qualities of wildness are maintained, enhanced or, where necessary,	**Range of experiences** Provide a range of visitor experiences		(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 Wolfgat Nature Reserve	(1) CDF (which should include infrastructure plan for high-intensity use zone) (2) Wolfgat Nature Reserve expansion plan

restored	**Sense of place** Maintain or restore appropriate sense of place	N/A	(1) Develop a database of all tangible and intangible cultural assets, including inventory, maps and relevant documentation (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 Wolfgat Nature Reserve	(3) Invasive-plant management plan (4) Branch community strategy and action plan (5) Branch education strategy and action plan; Wolfgat Nature Reserve environmental education and community involvement strategy (6) Visitor facilities plan Cultural heritage management plan
CULTURAL HERITAGE MANAGEMENT To investigate and manage all cultural assets	Conserve and manage cultural heritage assets			

Table 4: Socio-economic objectives

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	To create community involvement and interaction with conservation.	(1) Pre-engagement workshops with community focus areas (Mitchells Plain, Macassar and Khayelitsha) (2) Inspire visitors and communities to consider the environment as an interrelated and interdependent system, of which they are an integral part	(1) Provide support to Working on Fire (WoF) and Expanded Public Works Programme (EPWP) on focus areas. (2) Identify and facilitate the creation of business opportunities in association with the reserve (3) Creation of Eco-Tourism ventures and Project that enhances the natural resources and benefits to the local and international market (4) Encourage Youth to be involved in Wilderness Youth Development. (5) Provide support to greening projects in the community	The socio-economic development plan to be developed in a way that accommodates poor, middle and high class in the focus areas namely Mitchells Plain, Khayelitsha and Macassar.
	To provide Environmental Education programmes to the communities and schools of Mitchells Plain, Khayelitsha and Macassar	To encourage local communities and tourists to value the environment that they benefit from it.	(1) Provide conservation, environmental education and recreation. (2) Public, teachers and learners to be supported with resources and information resources. (3) Implementation of Environmental Education and youth development programmes well-matched to the needs of each focus group	Environmental Education development plan to be reviewed and evaluated for Wolfgat Nature Reserve and Macassar Dunes Conservation Area.
Become the nature-based visitor destination of choice in the region	Reserve domestic visitor profile to be developed in order to be the representative to the demographic regionally	To encourage International, National and local community members to value the environment as they benefit from it.	(1) Encourage residents of communities along the reserve to make use of the reserve while protecting it. (2) Support community-based Initiatives	Advertising Plan

To strengthen and enhance institutions, policies, law cooperative governance and community participation	Sustain a very good Wolfgat Nature Reserve relationship with public and Stakeholders within the focus areas.		(1) Relevant stakeholders to be appointed in order to partake in recommended forums (2) Responsible (representative, operative) communication mechanism to be established	(1) To maintain stakeholders relationship and conservation plan within the focus areas of East. (2) Communication strategy and action plan for both communities of Mitchells Plain and Khayelitsha
To Increase the reputation of City of Cape Town	Promote nature reserve reputation.	Inspire partaking in conservation initiatives	(1)) Implementation and development of communication plan to enhance reserve events and programmes	Communication strategy and action plan at a branch level
Develop community members profile to be representative of South African society	Nurture the domestic tourist profile of the reserve to be representative to demographics regional	Events and programmes that will advertise the reserve to in place.	(1) Responsible (representative, operative) communication mechanism to be established (2) Encourage learners, educators and community member to take action when it comes to environment.	Wolfgat Nature Reserve/ Macassar Dunes Conservation Area Advertising plan
Proper financial management	Ensure sound financial management practices are applied to and reinforce the reserve	Ensure transparency on all cost.	Develop a Wolfgat Nature Reserve and Macassar Dunes Conservation Area funding proposal	Programmes that will be financial sustainable
Improvement on strategic human resource	To ensure good human resource management		(1) Implement and support learnerships and volunteer programmes (2) Ensure that all staff have access to training initiatives as per the Workplace Skills Plan.	Staff capacity-building programme/institutional development and staff capacity-building programme (to be developed, City of Cape Town-wide process)

management			(3) (3) Ensure adherence to all corporate human resource policies	
Achieve good corporate governance management	Very effective profile risk management	N/A	Continuous assessments to be conducted	Risk management programme from the point to be in place

5.2 SWOT analysis

The following points highlight some of the threats specific to the protected area that are not dealt with in the management programme and are beyond the landowner's control.

Strengths

- Local knowledge and expertise of areas under its jurisdiction
- Proclaimed as a local authority nature reserve
- Staff buy-in, and positive attitude of neighbouring landowners
- Strong community involvement
- Active community partner groups
- Management's commitment to compiling and implementing management and biodiversity action plans
- Legislative support: municipal bylaws, Nature Conservation Ordinance and National Environmental Management Act
- Constitutional support
- All staff and management have experience and knowledge in managing protected areas
- Existing corporate support services
- Access to specialist services and databases
- Staff determination and will to succeed
- Existing, fully functional ecosystems

Weaknesses

- Insufficient appropriately trained staff, such as basic field ranger and law enforcement, to ensure that all biodiversity objectives are met
- Limited knowledge of security threats within Wolfgat Nature Reserve
- Few patrols during the day and none after hours
- Operational budget needs review
- Law enforcement tends to be reactive instead of proactive
- Lack of operationally mandated staff to utilise environmental legislation adequately
- Public's ignorance of applicable environmental legislation

Opportunities

- Aesthetic beauty of Wolfgat Nature Reserve

- Creating buy-in among key stakeholders and role players
- Community constituency building
- Increased sense of community ownership
- Job creation, and career succession and planning
- Accessing funds for Expanded Public Works/Sustainable Livelihoods programmes to assist in job creation as well as Wolfgat Nature Reserve infrastructure maintenance and development
- Proactively engaging and recognising the needs of communities bordering Wolfgat Nature Reserve
- Continuous liaison with, and support for, community partner groups
- Linking up with surrounding landowners, sharing knowledge and resources in order to manage the biodiversity network effectively
- Promoting Wolfgat Nature Reserve as a destination for outdoor eco-activities
- Potential of obtaining or accessing invasive alien species funding from various government sources, such as the City of Cape Town and Working for Water (National Government)

<u>Threats</u>

- Unemployment in surrounding community leads to rising crime levels
- Inappropriate/unauthorised development, which could affect the protected area through the edge effect, and reduce the area's viability through further habitat fragmentation
- Threats and intimidation of conservation staff when enforcing legislation
- Unauthorised access poses the risk of criminal activity; fire risks; neighbouring cattle; off-road vehicles (4x4s and quad bikes); pollution/dumping
- Uncontrolled man-made fires
- Overutilisation of natural resources outside the protected area that may affect Wolfgat Nature Reserve, such as overabstraction of water
- Sand-mining – threat of potential prospecting and mining applications
- Climate change – potential climate change impacts on the environment, such as fire risk and extreme changes in climate
- Management authority's capacity and funding to implement the management plan
- Law enforcement – difficulties with enforcement; lack of enforcement capacity in relevant government departments; personnel safety and security
- Lack of coordination and cooperation between government departments

- Lack of collaborative mechanisms for natural resource management and decision making
- Lack of awareness and mainstreaming of biodiversity best practice at sector level
- Lack of capacity in relevant government departments
- Lack of adequate visitor facilities that can provide services to local/community users
- Alien invasive flora and fauna
- Lack of commitment from stakeholders
- Lack of appropriate training
- Personal safety of staff
- Growing external communities, with increasing needs
- Increased incidents of crime and other illegal activities
- Lack of sustained funding for students and interns
- Lack of sustainable operational funding
- Biodiversity losses due to inappropriate fire, invasive alien species, illegal activities and bad land use practices
- Change in local government political structures

5.3 Protected-area management policy framework and guiding principles

For the implementation of the management plan, and to achieve the management objectives (see section 5.1 and table 3), the following aspects are essential:

- Planning
- Budgeting
- Funding
- Auditing
- Capacity building

5.3.1 Community participation

Wolfgat Nature Reserve works with volunteers, community partners and stakeholders. These persons assist with environmental education, awareness programmes and activities that the reserve is involved in or initiates. These community partners also initiate and fund programmes that Wolfgat Nature Reserve staff may support and assist for the benefit of the reserve.

Community individuals, organisations, stakeholders and partners are very important to the well-being of the reserve. Without their support and efforts to fight for the existence of the reserve, Wolfgat Nature Reserve could already have been lost to development.

An IRMP stakeholders workshop was held to obtain input from the Wolfgat Nature Reserve community partners (representing the Mitchells Plain, Khayelitsha and Macassar communities).

5.3.2 Safety and security

Wolfgat Nature Reserve and the Macassar dunes conservation area have a high threat level due to violent crime. This can be primarily ascribed to these areas' location and social challenges according to the comprehensive security audit conducted by the Biodiversity Management Branch of the City of Cape Town (Plan-It & Thorn-Ex 2010) (see appendix 14).

Understaffing and poor or non-existing boundaries were found to be the primary causes of compromised Wolfgat Nature Reserve security. The provision of 'feet on the ground', or a management presence, is therefore viewed as the first step towards improving the current situation (Plan-It & Thorn-Ex 2010).

Fencing is not always the preferred solution for safeguarding and demarcating an urban reserve. However, it is suggested that failure to demarcate the boundaries of Wolfgat Nature Reserve compromises the authority's ability to manage a designated area, and severely limits the authority in prosecuting transgressors. Simple, inexpensive measures such as signage and markers will greatly aid in addressing these matters (Plan-It & Thorn-Ex 2010).

5.3.3 Culture-historical, archaeological and paleontological management

The effective management and conservation of the culture-historical, archaeological and paleontological heritage are essential to conserve the historical character and characteristics of the area for future generations, and will be done through mapping, evaluating and establishing guiding principles for area usage.

Records from the Department of Archaeology of the Iziko South African Museum indicate that, in the 1950s, amateur archaeologists recorded early Stone Age tools in an area referred to as the Cape Flats, but the precise locations of these sites are unknown. The collections database indicates that some of this material is currently housed at the museum. These include a range of stone tools, bored stones, spearheads and fragments of pottery.

In the late 1960s, archaeologists recorded the presence of isolated and ephemeral scatters of stone artefacts and shell middens (ancient rubbish dumps) on the beaches at Strandfontein, Swartklip and Macassar. However, due to recreational and infrastructure development such as road construction (Baden Powell Drive for example), and activities such as off-road vehicles and illegal sand mining in the Strandfontein and Macassar area, these sites have most likely been destroyed (Environmental Evaluation Unit 2006).

According to a retired building contractor living in Riebeek West, several Bushmen burials were uncovered during excavations and bulk earthworks for the Strandfontein Pavilion, but these were illegally reburied in soft sands in the surrounding area (Environmental Evaluation Unit 2006).

A 2003 study reported that mid-Stone Age tools had been found on old buried surfaces (or palaeosurfaces) at the Olympic sand mine on the north-eastern boundary of the study area, while additional studies describe such tools embedded in the weathered and degraded calcrete/limestone cliffs at Swartklip and Wolfgat on the False Bay coastline. Fossil (or palaeontological) remains have been found on the Anglo Alpha limestone mine near Zandvliet, north-east of the study area, while the significant fossil-bearing deposits on the False Bay coastline have also been widely reported (Pether 2005).

Several Bushmen burials were also uncovered in bulk earthworks and excavations during construction of the Strandfontein Pavilion. The remains and ruins of several buildings related to a military shooting range occur on the lower slopes of the high dunes, but these ‘modern’ buildings are not considered to be of any heritage value. A similar modern cement structure occurs on the beach midway between Monwabisi Beach and the Macassar beach resort.

The results of the desktop study show that surface archaeological heritage remains have been recorded in the general study area, but that competing land uses are largely responsible for their destruction and damage (Pether 2005). The paucity of archaeological sites along the long sandy beach in the study area appears to confirm a pre-colonial hunter-gatherer settlement pattern, which is well represented along the South African coastline.

A phase 1 palaeontological assessment was undertaken in 2006 for the Macassar dunes conservation area. This area is known to have considerable fossil potential, being in the immediate vicinity of significant fossil occurrences.

Fossils are the remains of past life that are found within sediments that have accumulated in the past. The most common fossils found in the dune sands and older aeolianites are the shells of land snails. Fossil bones are more interesting but more sparse, and may include the remains of animals such as tortoises, lizards, moles, rabbits, rodents, birds and, sometimes, buck and ostriches. Fossils may occur on the sand surface where wind erosion has steadily blown away previously deposited sand, producing scoop like 'blowouts', on the bottoms of which the once buried objects are concentrated (Environmental Evaluation Unit 2006).

Most of the fossils from the surrounding area have been found along the Monwabisi-Wolfgat-Mnandi cliff/beach exposures. If the cliff exposures are to be a guide, the uppermost part of the Wolfgat aeolinite has considerable fossil and archaeological potential. This is because the uppermost calcrete has been naturally degraded, resulting in a potholed surface on the calcrete, into which things can fall, including old bones.

No finds from the specific area are recorded at the South African Museum. However, a fossil rhinoceros skull was found in one of the Macassar dunes conservation area's adjacent sand quarries. Many fossils in the collections come from the nearby Monwabisi-Wolfgat-Mnandi cliff/beach exposures. Interpretive material can link this site with the MonwabisiWolfgat area (Environmental Evaluation Unit 2006).

The site is mostly covered by dune scrub and thicket, resulting in low visibility of the surface. No fossil occurrences were found in the site investigations in 2006.

The surficial sediments are loose, windblown sands that have accumulated in the recent geological past (Witzand formation). Underlying the surficial sands are variously cemented older dunes (aeolianites), with interbedded vlei deposits, calcretes and other soils. 'Raised beach' deposits relating to a period of high sea-level some 125 thousand years ago also occur in the vicinity (Environmental Evaluation Unit 2006).

Currently, the cliffed 'raised beach' deposits at Monwabisi are the main exposures of fossils in the area. Sand quarries to the immediate north of the site certainly also have exposed fossils, but currently there seems to be no environmental management procedures in place to mitigate their loss. Section 38 of the National Heritage Resources Act, Act 25 of 1999, lists a number of activities for which a notice of intent has to be submitted to Heritage Western Cape (Environmental Evaluation Unit 2006).

The palaeontologist indicated that the probability of significant surface fossil finds is low. This probability increases when excavations are made (Environmental Evaluation Unit 2006).

Management must be mindful of the possibility of fossil finds within Wolfgat Nature Reserve. No fossils have however been found since the hyena fossil was discovered in the reserve.

5.3.4 Tourism development and management

Deriving income from the effective management of tourism and responsible development is one of the most important reasons why landowners should follow a holistic approach to the sustainable management of natural resources through access control and marketing. Wolfgat Nature Reserve has tourism potential, and guided tour groups stop along Baden Powell Drive for the view. The public has open access to the reserve.

Wolfgat Nature Reserve is currently considering the development of the future Wolfgat Environmental Education Centre. This, together with the re-alignment of Baden Powell Drive, will enable the reserve to create an entry access point into Wolfgat Nature Reserve for guided tour groups, and will provide a recreational area for day visitors. At present, the reserve staff accompany groups on guided walks through the reserve for educational purposes, or at the request of tour groups or the public.

5.3.5 Infrastructure management

In the conservation area, infrastructure is essential for effective reserve management as well as for use by visitors. It is essential to manage the infrastructure in such a manner that it has no negative impact on the environment or on visitors' experience, through regular maintenance of roads, routes, parking areas and the like.

The operational centre is located off-site in Mitchells Plain along Weltevreden Road at the Council depot. The centre is known as Weltevreden Nature Conservation Depot, and comprises a building with seven offices, one kitchen and mess room, one meeting room, one store room and two toilets (one male and one female). It also has a yard storage space, with three garages converted into storage rooms (for tools and equipment), a carport for vehicles, and one large side store for materials. The yard space is currently being considered for redesign to enable better efficiency and utilisation of space.

Wolfgat Nature Reserve has three boom gates; two management roads of 2,39 km in total (with stormwater pipes running along the roads); a total fencing northern boundary of 3,37 km, of which 0,155 km is covered by concrete palisade fencing along the northern boundary of the reserve, and footpaths extending over 5,15 km.

Anglers and Swartklip parking areas are public parking lots located along Baden Powell Drive. The Swartklip parking area was upgraded in 2007/8 and refuse collection from the area is the responsibility of the City of Cape Town's Amenities Department. A section of Anglers parking area has been cordoned off and the surface needs to be re-tarred. The rehabilitation of the area towards the beach will be incorporated into the maintenance plan.

The boom gates will be upgraded as required, together with signage. Signage and boom gates will be standardised in the Biodiversity Management Branch. Roads are monitored for erosion, and repaired annually before the winter rains.

Angling for recreational purposes is the main visitor activity in Wolfgat Nature Reserve, and takes place throughout the year. Also, paragliders launch from a particular site along the cliffs, mostly during summer, from November to February.

5.3.6 Biodiversity conservation management

In the management and control of the conservation area, the indigenous biodiversity of the site will be conserved in order to ensure that its character is retained and that it can function optimally as an ecosystem. In order to do this, floral and faunal management plans are required to manage the contents of Wolfgat Nature Reserve effectively.

5.3.6.1 Community-based natural resource management

The harvesting of natural resources in Wolfgat Nature Reserve is not permitted. Research on the amount of illegal harvesting and the species harvested across the city is currently under way. Although some investigations on the type and extent of harvesting in the reserve have been conducted, there is no detailed or conclusive information as yet to determine where such activities are sustainable and/or what potential threats are foreseen should they persist.

5.3.6.2 Fire management

Fire plays an essential ecological role in the life cycle of strandveld species. Fire is crucial to the long-term conservation of species within Wolfgat Nature Reserve, and is therefore considered an important component of reserve management. Fire management involves varying 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.

If vegetation is allowed to burn too frequently (as is the case in Wolfgat Nature Reserve, where uncontrolled fires occur frequently due to human negligence or arson), the area becomes degraded, and alien species, especially grasses, invade. Grasses maintain a shorter fire cycle and permanently change the area's vegetation structure and biodiversity value. The fire cycle of strandveld is about 40 years, and the frequency of uncontrolled wildfires within the reserve should be lowered.

The fire management programme for Wolfgat Nature Reserve involves the monitoring of large wildfires as well as smaller fires, either natural or unnatural. Historic records of fire events in the reserve area as well as post-fire monitoring records assist in the documentation of veld ages, which in turn influence fire management. Minimal interference takes place in the case of naturally ignited fires (except where these fires occur in young veld).

In the case of human-induced fires that would simulate a natural fire, the same management responses would apply. Natural fires are limited in spread within the constraints of ecological, property and public safety requirements. All possible actions are taken to prevent the spread of fire onto the adjacent properties. All unnatural fires that threaten Wolfgat Nature 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 where there is a risk of species loss. The use of prescribed burning practices assists in maintaining a vegetation mosaic that promotes plant and animal diversity. Accurate fire records and post-fire monitoring data will require the initiation of prescribed burns in the core area of 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.

The nature of the area's terrain, property boundaries and extensive areas of natural veld increase the chances of fire spreading both into and out of Wolfgat Nature Reserve. Reasonable pre-fire protection measures are necessary, as well as a plan of action in the event of wildfire. Interaction with various City of Cape Town departments and independent stakeholders as well as continuous public/private landowner involvement are essential. The development of fire protection and response plans is an important component of Wolfgat Nature Reserve's fire management approach.

Fire management implementation in Wolfgat Nature Reserve involves:

- the application of guidelines on seasonal burning intervals and species requirements acquired from relevant documentation and biophysical specialists;
- accurate record keeping of all fires, including details and maps;
- the use of fire data and the geographic information system for recording and mapping;
- the application of post-fire monitoring programmes;
- the application of fire data to determine prescribed burning needs; and
- the development and implementation of a fire protection and response plan that includes affected stakeholders, such as additional City of Cape Town departments and private landowners neighbouring the reserve.

5.3.6.3 Soil erosion and control

In Wolfgat Nature Reserve, natural erosion processes are allowed to take their course without interference, except where necessary. In the case of human-induced and natural areas that are aggravated, appropriate management action will be taken.

Potential human impacts should be avoided through correct planning and maintenance of infrastructure. Areas that had previously been degraded by human activities and are no longer in use will be restored as close as possible to their natural state. Disturbed areas and areas affected by unnatural accelerated erosion will be controlled by means of appropriate methods. The cause and management of problem erosion sites will also be considered.

Soil management implementation in Wolfgat Nature Reserve includes:

- the identification and recording of all soil erosion areas, including the assessment and development of restoration plans, where required;
- the use of soil erosion data and the geographic information system for recording and mapping;

- the application of fixed-point monitoring programmes at identified soil erosion sites; and
- accurate documentation of management actions applied to restoration sites, including results from areas responding to these actions.

5.3.6.4 Invasive-species management

The management of invasive species is a priority in Wolfgat Nature Reserve. Invasive biota need to be controlled and, where possible, eradicated 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 alien species strategy and in coordination with various government-funded initiatives, including the Expanded Public Works Programme (Work for Water and Work for Wetlands). Invasive alien plant species could spread rapidly should management fail to continue implementing a properly planned and coordinated programme.

Until recently, invasive-species management focused on woody alien plant species, such as *Acacia saligna* (Port Jackson), *Acacia cyclops* (rooikrans) and *Myoporumserratum* (manatoka). Herbaceous weeds were largely ignored. Recent monitoring and the development of an extensive herbaceous weed and grass species list for Wolfgat Nature Reserve have however shown that some herbaceous species already pose a risk to biodiversity in the area, while others have the potential to become a risk.

In order to protect indigenous vegetation from invasive species, the following is required:

- Prioritisation of areas for alien removal, 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 as well as a management plan for alien fauna

Invasive alien faunal species have not yet been eradicated in Wolfgat Nature Reserve. Formal plans outlining the monitoring of the removal of identified species are required.

A negative consequence of the extensive and persistent dumping of rubble, refuse and other waste matter in the reserve is the presence of the introduced House Mouse (*Mus musculus)* in the rubble piles, as well as, undoubtedly, the presence of *Rattus spp.*

5.3.6.5 Species introductions

Prior to the re-introduction of any species, a full proposal is required. Investigation into the availability of suitable habitat for the species with reference to the public utilisation of areas is required, as is a full investigation into the historical occurrence and status of the species. The effect of re-introducing species to the area must also be researched. Re-introduction of potentially dangerous or problematic species may also require a public participation process. An investigation of suitable sources is also needed.

All proposed re-introductions need to be recommended and approved before implementation by the Fauna Management Committee as well as provincial authorities. The implementation of any re-introduction programmes must be specified in a plan of action, and must be documented accurately.

5.3.6.6 Strategic research

Research will be permitted by way of formal agreement. Research projects that contribute to the overall objectives of Wolfgat Nature Reserve will be encouraged. In essence, 'pure' research will be permitted, provided that it is considered to be of sufficient merit and not in conflict with the objectives of the reserve. Partnerships with local academic institutions need to be further developed.

Firstly, the collection of baseline data is essential for determining the presence of species, and to determine the extent to which management actions should take place. Secondly, monitoring is important to determine the success of management actions, as well as to provide an indication of long-term change. Thirdly, research on the property is needed to build the environmental knowledge base.

Research subjects that are beneficial to the management of Wolfgat Nature Reserve need to be identified. These could then be prioritised and pursued.

Currently, research is being undertaken, supported by Wolfgat Nature Reserve management. However, many of the projects are conducted by outside student researchers and organisations, and are not informed by the reserve's needs. An effort needs to be made to obtain copies of data resulting from research projects conducted within the reserve's boundaries.

5.4 Sensitivity analysis of Wolfgat Nature Reserve

Wolfgat Nature Reserve is a considerable asset to the City of Cape Town, and significantly contributes to national vegetation targets of threatened vegetation types as listed in the National Spatial Biodiversity Assessment (Driver *et al.* 2005), as well as provides a service and facilities to local residents and schools.

The development of the sensitivity and zoning plan is one of the steps towards compiling a CDF for Wolfgat Nature Reserve. 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 enables defensible and transparent decision making (Purves 2010) (see appendix 13).

5.5 Zoning plan of Wolfgat Nature Reserve

The zoning informants are an indication of the values based on which broad tourism use zones are identified. It is important to remember that the landscape/biodiversity analysis is just one of the informants in the zoning process.

Although every attempt is made to place high sensitivity-value sites into more protected zones wherever possible, the zoning process is essentially a compromise between environment and development. Direct links between the biodiversity layers and the spatial management of Wolfgat Nature Reserve are made during the identification of special management areas(Purves 2010) (appendix 1 and 13).

6. DEVELOPMENT PLAN

Table 5: Management action for development

	Management action – development
Action	All development needs to be done according to the principles of the National Environmental Management Act, and must follow the applicable legislation and procedures of all relevant stakeholders.
Responsible party	The landowner will ensure that all legal requirements are met.
Time frame	Throughout the process
Means	According to guidelines

6.1 Recommendations from the Wolfgat Nature Reserve sensitivity and zoning report

- The rerouting of Baden Powell Drive will be in the long-term interest of Wolfgat Nature Reserve.

- The development footprint must be kept to an absolute minimum.
- The provision of facilities (environmental education centres, etc.) should be accommodated outside Wolfgat Nature Reserve, where the community could easily access them, while still enjoying easy access to the reserve as well.
- All unnecessary roads and tracks should be closed off and rehabilitated.
- Wolfgat Nature Reserve zoning also needs to be considered in the greater False Bay coastline context (see appendix 13).

6.2 Infrastructure development for Wolfgat Nature Reserve

The construction of Wolfgat Environmental Education Centre is envisaged as part of the Wolfgat Nature Reserve infrastructure development plan. The centre is to cater for the communities of Mitchells Plain, Khayelitsha and Macassar, and should provide environmental and tourism education. It is planned to be the entry point into the broader nature conservation area towards Macassar in the east and towards Strandfontein in the west (appendix 16). The property on which the centre is to be built is erf 42891. Also on this property, connected to the centre, would be a network of footpaths that would cater for everyday visitors to the centre as well as the surrounding communities. The approximate costing to date is R25 milion.

7. COSTING PLAN

The purpose of a costing plan is to match resources to activities, with clear time frames and responsibilities. The objective of the costing plan is to define the budget requirements clearly, in order to implement the management plan.

Wolfgat Nature Reserve is of economic importance, as it provides a number of ecosystem services to Cape Town, particularly to the communities of Mitchells Plain and Khayelitsha. These services include provisioning, regulation, cultural and support services as well as human well-being and the creation of socio-economic opportunities (see table 5 for five-year costing framework).

Table 6: Costing framework for Wolfgat Nature Reserve

	Funding source	2011/12	2012/13	2013/14	2014/15	2015/16
Invasive alien plants	Grant	R40 000,00	R42 000,00	R44 000,00	R46 000,00	R48 000,00
Fire management	Operating	R25 000,00	R26 250,00	R27 562,50	R28 940,63	R30 387,66
Road and trail maintenance	Operating	R220 000,00	R 150 000,00			
Human resources	Operating	R2 000 000,00	R 2 160 000,00	R2 332 800,00	R2 519 424,00	R2 720 977,92
Infrastructure development	Capital expenditure/ grant	R250 000,00	R262 500,00	R275 625,00		
Fencing	Operating/capital expenditure		R900 000,00			R1 000 000,00
General expenses	Operating	R300 000,00	R315 000,00	R330 750,00	R347 287,50	R364 651,88
Environmental education	Operating	R44 000,00	R46 200,00	R48 510,00	R50 935,50	R53 482,28
Special projects	Grant/capital expenditure	R200 000,00				
Human resources are escalated at 8%.						
Operating expenditure is escalated at 5%.						
Invasive aliens as per management unit clearing plan						

PART 3

MONITORING & AUDITING

8. MONITORING & AUDITING

8.1 Annual audit procedure

8.1.1 METT-SA – Management Effectiveness Tracking Tool South Africa

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

It begins with understanding the **context** of existing values and threats (where are we now?), then progress through **planning** (where do we want to be?), followed by allocation of resources (**inputs**) (what do we need?). As a result of management actions (**processes**) (how do we go about it?), it eventually produces products and services (**outputs**) (what were the results?), which result in impacts or **outcomes** (what did we achieve?).

This version has been compiled so that it can be applied to the full range of protected areas managed by all C.A.P.E partners. It also applies to protected areas in other regions, and, with minor adaptations, could be applied outside of South Africa as well. It may also be used for marine protected areas (MPAs) and islands, but, in the long run, it may become necessary to amend the system to be more specific to these areas. In addition, a system for off-reserve conservation areas, such as conservancies or stewardships, may need to be developed.

When applying METT-SA, it is important for the following to be kept in mind:

- The METT-SA is intended to report on the reserve's progress. Thus, the score is the baseline against which future assessments are made to see if there has been an improvement.
- It is site-specific and must therefore not be used to compare scores between different protected areas.
- It is a useful tool to give indications of management trends. In this version, the six elements of the management process, as defined in the original version, are scored as subsets of the total. This gives an indication of where management should strive for improvement.
- It is not intended to replace more detailed assessments as part of adaptive management systems.
- The METT-SA has limitations in the quantitative measurement of outcomes, and these should be measured by more objective and quantitative systems.
- This version adjusts the total score where questions are irrelevant.

- Often, low scores on some questions could be a reflection on the organisation as a whole, and do not necessarily point to issues over which the protected-area manager has control. **The performance of managers should therefore under no circumstances be measured against the METT-SA results.**

Tracking the trends of management effectiveness is a long-term process, and instant improvements are unlikely. Generally, the METT-SA is applied at three-year intervals, but an annual application is acceptable if it is understood that changes may only be slight. The METT-SA for Wolfgat Nature Reserve was undertaken in 2007, and the results are presented in appendix 15. The METT-SA will be repeated in approximately September 2011.

8.1.2 Protected-area review (PAR)

The PAR is an internal review conducted annually to assist managers in reviewing their sites, and to allow for adaptive management actions where required (and within managers' control).

8.2 Management plan review

This IRMP should be reviewed every five years, and adjusted where necessary. To achieve this, the following questions among others should be addressed:

- Did this management plan make a meaningful contribution to the management of Helderberg Nature Reserve?
- Were individual management 'prescripts' realistic and achievable? Were they written unambiguously, or was there room for misunderstanding?
- Were budgets for each management activity realistic? Were the allocated budgets too much or too little?
- Were enough, adequately qualified staff members allocated to each management activity?

There will be some overlap between the review and the audit, and they should therefore be done on the same day, by the same team.

8.3 Biodiversity monitoring

Many scientific monitoring activities require too much effort and are simply too costly in relation to the benefits that they offer. The issue of monitoring will therefore have to be dealt with on a case-by-case basis, with the proviso that the simplest, least expensive and most practical method of monitoring should be implemented for each important

biodiversity asset in question, providing that the monitoring method used is scientifically and statistically rigorous and defensible. Some commonly used methods are listed below, but care must be taken not to launch into a monitoring programme that is too complex, time-consuming and expensive to keep going (see appendix 17 for the City of Cape Town's vegetation monitoring protocol).

The Biodiversity Management Branch has developed an electronic biodiversity database, onto which all species recordings, management infrastructure and research projects should be loaded for record purposes. The database is also a means for the Branch and reserve management to ascertain what is still required for the reserve, and to initiate research projects or monitoring programmes to collect relevant data (see www.biodiversity.co.za).

Table 7: Activities to be monitored

Action	Responsible party	Means of verification	Frequency
Vegetation monitoring Invasive alien species Aspects to be monitored include the effectiveness of the operation, the effectiveness of the follow-up, methods used, compliance with the alien clearing schedule, and environmental damage such as herbicide spillage	Wolfgat Nature Reserve staff Wolfgat Nature Reserve manager, students and interns	Weekly inspections Final inspections Field verification sheets	Weekly Once-off – completion of contract Annually – to determine management unit clearing plan
Fire mapping All veld fires must be accurately mapped and recorded to build up a useful record that will assist with veld interpretation. These records will take the guesswork out of the effects of fire when it occurs on the property. A simple map indicating the extent of the burn as well as the date of the fire is the minimum requirement.	Wolfgat Nature Reserve staff Wolfgat Nature Reserve manager, students and interns	Veld age map, fire map	Post-fire
Post-fire recruitment	Wolfgat Nature Reserve staff Wolfgat Nature Reserve manager, students and interns	Stratified sampling plots	Post-fire Six months 12 months Annually for three years
Abundance, density and structure	Wolfgat Nature Reserve staff Wolfgat Nature Reserve manager, students and interns	Fixed-point photography Presence, abundance, density See appendix 17 for vegetation monitoring protocol, with a field sheet for vegetation monitoring in Cape Town.	Annually
Threatened species	Wolfgat Nature Reserve staff Wolfgat Nature Reserve manager, students and interns	Field observation sheet	Seasonally

Impact of tourism The impact of a commercial tourism venture has to be monitored within Wolfgat Nature Reserve. Impacts to be monitored include trampling of vegetation at often frequented viewing sites, stopping points and vehicle turning points, the possible impact on the roads, and resulting erosion. If it is found that tourism activities affect areas where rare and endangered species occur, these rare and endangered species need to be monitored.	Wolfgat Nature Reserve staff Wolfgat Nature Reserve manager, students and interns	Field observation	Quarterly
Rainfall measurement Rainfall figures are to be collected from the Weather Bureau and from the rain meter based at the Weltevreden nature conservation office.	Wolfgat Nature Reserve manager	Information from Weather Bureau	Monthly (Weather Bureau) Daily at the Weltevreden office after each rain event

PART 4

REFERENCES

9. REFERENCES

Anon, 2003[1]. The Integrated Metropolitan Environmental Policy. Unpublished report, City of Cape Town.

Anon, 2003[2]. The Biodiversity Strategy. Unpublished report, City of Cape Town.

Anon, 2009[1]. Local Biodiversity Strategy and Action Plan 2009 – 2019. Unpublished report, City of Cape Town.

Anon, 2010. City of Cape Town, Five-year Plan for Cape Town, Integrated Development Plan (IDP) 2007 – 2012, 2010 – 2011 Review. Unpublished report, City of Cape Town.

Bowie, D.K., 1966. The marine geology of False Bay. Unpublished MSC thesis, Geology Department, University of Cape Town.

Business Presentation Group, 2002. Participlan Summary Report: Cape Flats Nature Wolfgat Workshop

C.A.P.E Project Team, 2000. Cape Action Plan for the Environment: Strategy. Unpublished report, WWF (South Africa).

CSIR, 1995. Cape Flats Aquifer: Current Status

Driver, A., Maze, K., Rouget, M., Lombard, A.T., Nel, J., Turpie, J.K., Cowling, R.M., Desmet, P., Goodman, P., Harris, J., Jonas, Z., Reyers, B., Sink, K. & Strauss, T. 2005. National Spatial Biodiversity Assessment 2004: Priorities for biodiversity conservation in South Africa. Strelitzia 17. SANBI, Pretoria.

Environmental Evaluation Unit, University of Cape Town 2006. Scoping Report for Macassar Dunes Eco-Trails Project. EEU Report No. 2/06/271. Prepared for City of Cape Town.

Environmental Management Branch, City of Cape Town 2000. Wolfgat Nature Wolfgat Nature Reserve, Draft Environmental Management Programme. Unpublished report, City of Cape Town.

Holmes, P., 2008. Summarized Descriptions of National Vegetation Types Occuring in the City of Cape Town. Prepared for the Biodiversity Management Branch, City of Cape Town.

Holmes, P., Wood, J., Dorse, C. 2008. City of Cape Town Biodiversity Report. Unpublished report, City of Cape Town.

Low, A.B., 1991. Environmental Survey and Management Guidelines for the Wolfgat Nature Wolfgat Nature Reserve. Report prepared for the City Engineering Department, City of Cape Town.

Low, A.B. & Pond, U., 2004. Mapping of coastal dunes within the City of Cape Town metropolitan area. Coastec, Rondebosch.

Low, A.B. & Rebelo, 1998. The vegetation of South Africa, Lesotho and Swaziland. Department of Environmental Affairs and Tourism, Pretoria.

Myers, N., Mittermeyer, R.A.C.G., Fonseca, G.A., Kent, J. 2000. Biodiversity hotspots for conservation priorities. Nature 403:853–858.

Plan-It & Thorn-Ex 2010. Comprehensive Security Audit of the Biodiversity Management Branch of the City of Cape Town. Prepared by Plan-It and Thornhill consultants for the Biodiversity Management Branch, City of Cape Town.

Pether, J. 2005. Macassar Dunes Eco-Trails Project. Palaentological assessment of the Macassar Dunes. General information document. Report prepared for the Environmental Evaluation Unit.

Purves, A. 2010. Sensitivity Value analysis and zonation process: Wolfgat.

Rebelo, A.G., Boucher, C., Helme, N.A., Mucina, L., Rutherford, M.C., et al., 2006. Fynbos biome. In: Mucina, L., Rutherford, M.C. (Eds), The Vegetation of South Africa, Lesotho and Swaziland: Strelitzia, 19, pp. 52-219.

Rogers, J. 1980. First report on the Cenozoic sediments between Cape Town and Eland's Bay. Report Geological Survey South Africa (Open File), 1980-165: 1-64.

Rogers, J., Thamm, A.G., Hartnady, D.J.H. 1990. Cape Peninsula Excursion. Geocongress 1990 – Excursion guide. Geology Society of South Africa.

Theron, J.N. 1984. The Geology of Cape Town and Environs. Explanation for sheet maps (1:50 000) 3318 CD and DC, 3418 AB, AD and BA. Geological Survey, Bellville.

PART 5

10. APPENDICES

A. Tables

Appendix 1: Zoning and Zone Descriptions

Table: City of Cape Town Nature Reserves and Conservation Areas: Land Use Zoning - Desired State* & Experiential Qualities

Experience	Zone	Desired State*	Conservation objectives	Secondary objective	Experiential Qualities	Activities	Interaction between users	Frequency of use	Group size	Sophistication and type of facilities	Primary user movement within the zone	Roads & footpaths	Equivalent Provincial zone
Close To Nature **Activities tend to be at landscape level**	**Primary conservation**	Natural or near-natural areas (or areas that can be rehabilitated to this state) that are managed primarily for biodiversity conservation. The experience is one of relative solitude and wildness. The nature of the experience is dependant on the quality of the natural environment. The main accent of management is biodiversity conservation and "Pack it in Pack it out" principles are applied to all activities including management. There may be some signs of infrastructure mainly of a heritage nature. In the longer term, unused utility infrastructure (e.g. reservoirs) should be phased out and the site rehabilitated.	Natural areas should be kept intact in order to protect habitat required to meet biodiversity targets for various vegetation types and to provide undisturbed habitat for a range of species. Where possible degraded areas should be rehabilitated.	Managed to provide visitor experiences in a way that does not impact on the biodiversity objective. Where appropriate heritage values are managed as required	Relative sense of isolation	Controlled access** Research and monitoring. Accompanied small groups. The size and frequency of groups to be specified for each reserve.	None or very low	None -Very low	Small	No new facilities. Existing structures should be phased out where appropriate. Heritage assets are managed where appropriate	Pedestrian access in accompanied small groups Motorised for essential management only.	Absolutely essential management tracks and footpaths in accordance with the foot path and road management plan Ongoing restoration of old paths/roads to be prioritized and monitored.	Quiet
	Conservation	Natural or near-natural areas (or areas that can be rehabilitated to this state) that are managed for biodiversity conservation. This zone provides experiences of a relative sense of relaxation in an environment that is openly exposed to the sights and sounds of the city. Although it is a place of quietness and naturalness, there will be more interaction between users than in the Primary Conservation Zone. The quality of the experience is less dependant on the quality of the natural environment.	Natural areas should be kept intact in order to protect habitat required to meet biodiversity targets for various vegetation types and to provide undisturbed habitat for a range of species. Where possible degraded areas should be rehabilitated.	Managed to provide visitor experiences in a way that does not impact on the biodiversity objective.	Relaxation	Self guided hiking, non-motorised access "", bird watching, etc. In reserves where access to water bodies is allowed, this area is limited to non-motorized vessels only in accordance with the Vlei By-Laws.	Moderate	Moderate	Small	Low impact, eco-friendly facilities that facilitate ecologically sustainable activities and visitor experiences may be permitted under certain circumstances. These are strictly for achieving the social and development objectives of the reserve where appropriate and are subject to a stringent internal approval process and must be inline with an approved reserve management plan.	Pedestrian Non motorised Motorised access for management only.	Management tracks/roads and footpaths. Minimal footpath construction to prevent ecological damage. Boardwalks may be permitted where appropriate to protect sensitive areas. The footpath system should be designed so as to control access into the Primary Conservation zone. Off road wheelchair access may be provided where appropriate.	
Outdoor Natural Experience **Activities tend to be at precinct level**	**Low Intensity leisure**	Natural, near-natural or managed landscapes which are primarily managed to promote recreational and educational objectives. The main accent is on recreational activities which are more reliant on the quality of the facilities provided than in a Conservation Zone. By their nature these zones are placed in more transformed landscapes. Interaction and socialisation are an integral part of the experience.	Although some areas will be impacted by a range of activities and limited infrastructure, most areas should be kept largely intact and ecological processes should remain functioning. Where possible degraded areas should be rehabilitated.	Recreation and education Managed to provide a largely natural outdoor area to support the recreational and education objectives of the reserve.	Socialisation	Walking, non-motorised access, bird watching. In reserves where access to water bodies is allowed, motorized vessels are only allowed under strict control (e.g. no waterskiing, low speed limits and wake-free zones) in accordance with the Vlei By-Laws.	Frequent	Moderate -high	Small-moderate	Low-Medium impact, eco-friendly facilities that facilitate ecologically sustainable activities and visitor experiences. E.g. Benches, bird hides, informative signage, lookouts. Parking for access to this and other zones.	Pedestrian Non motorised Motorised access for management only	Appropriate foot paths with directional signage Boardwalks should facilitate access and protect sensitive areas. Normal wheelchair access where appropriate Parking with no facilities for access to this and other zones	Low intensity leisure
	High Intensity Use	High use landscapes, which are often largely transformed, which are managed largely to support visitor activities more dependent on facilities, education and	The activities and infrastructure in these areas should be managed to minimize impacts on	Facilities are managed to facilitate and promote appropriate visitor activities and educational use of the	Entertainment	Events, self guided walks, wheelchair accessible trails, parking, picnicking. In reserves where access to	Very frequent	Very high	Small - Large	Picnic areas, parking areas, restaurants, information centers, ablutions, environmental education facilities, nurseries etc.	Motorised Access People movers &	Access roads and associated parking. Footpaths constructed to a higher standard for the comfort	High Intensity Leisure

		administrative functions of reserves. High intensity visitor facilities with modern commercialised amenities with very concentrated, activities. The quality of the visitor experience is heavily dependant of the quality of the facilities which enable the visitor to experience the environment with a minimum of effort. Due to the high impacts these are concentrated at specific nodes. These nodes are generally situated at existing facilities including historic buildings and precincts. The main focus of management is to ensure a high quality visitor experience whilst ensuring that the activities have a minimal impact on the surrounding environment and that heritage resources are respected and celebrated.	biodiversity and visitor experience in other zones. Where feasible, non-crucial infrastructure should over time be removed from the reserve and the sites rehabilitated.	reserve. Administration; provides appropriate management infrastructure to facilitate other objectives of the reserve.		water bodies is allowed, this area is appropriate for high intensity uses such as power boating and waterskiing in accordance with the Vlei By-Laws.				Provides parking from which pedestrian access is gained to other zones.	Pedestrian access	of the user. Design standards to be set in the footpath and road management plan Wheelchair access encouraged in this zone.	
Site Specific Level	**Utility zone**	Area used for utility functions such as bulk water provision, landfill sites within the protected /conservation areas etc.	The activities and infrastructure in these areas should be managed to minimize impacts on biodiversity and visitor experience in other zones. Where feasible, non-crucial infrastructure should over time be removed from the reserve and the sites rehabilitated.	Administration Conservation where appropriate	Utility	Determined at site	Determined at site	Determined at site	Determined at site	Determined at site	Determined at site level	Access roads and associated parking as required by the Utility Function	

* Note. The "Desired State" is the long term objective of the zone and these desired conditions may not actually exist at the time of zoning. Achieving the" Desired State" will be informed by many factors and may only be reached after many years.

** Accompanied access refers to controlled access. The level and type of control is determined at reserve level.

*** Non-motorised access refers to mountain bikes, horses, paragliding etc. These activities are reserve specific and reference must be made to the reserve management plan for a list of acceptable activities per reserve.

Appendix 2: Gazette for Wolfgat Nature Reserve Proclamation

APPENDIX 6 PROCLAMATION DETAILS OF WOLFGAT NATURE RESERVE

...244/1986 25 April 1986

...TOWN MUNICIPALITY: ESTABLISHMENT OF A LOCAL NATURE RESERVE

...tice is hereby given in terms of section 7(5) of the Nature and Environmental Conservation Ordinance, 1974 (Ordinance 19 of 1974), that ...Administrator has granted an application for approval of the establishment of a local nature reserve by the Cape Town Municipality in the area of jurisdiction of the said Municipality on land vested in such Municipality, which will be known as the "Wolfgat Nature Reserve" and the boundaries whereof are as indicated on a diagram filed in the office of the Director Nature and Environmental Conservation, Provincial Building, Wale Street, Cape Town, and the office of the Town Clerk, Cape Town Municipality, Civic Centre, Cape Town.

...243/1986 25 April 1986

DIRECTION

...ILS RIVER MUNICIPALITY: CLOSURE OF UNUSED CEMETERY

...Administrator has, in terms of section 167(1) of the Municipal ...ance, 1974 (Ordinance 20 of 1974) directed the Kuils River Municipality to close the unused private cemetery, situated on portion 2 and 3 of ...938 and a portion of farm 1019 Kuils River, Kuils River extension ... from the publication of this direction.

...ued at Cape Town this 25th day of April 1986.

...VAN DER VYVER
...cial Secretary
...cial Building
...Street
...TOWN

...247/1986 25 April 1986

...INITION OF BOUNDARIES OF BLACK RESIDENTIAL AREAS: REPEAL OF PROVINCIAL NOTICE

...Provincial Notice 15/1986 dated 10 January 1986 as amended by P.N. ...6 dated 24 January 1986 is hereby repealed.

...251/1986 25 April 1986

PINELANDS MUNICIPALITY: REMOVAL OF RESTRICTIONS

...Under section 2(1) of the Removal of Restrictions Act, 1967 (Act 84 of ...as amended, and on application by the owner of Erf 1261, Pinelands Township Extension 1, Pinelands, the Administrator hereby removes conditions B.1 and 14 and C.(A)(2) in Deed of Transfer 34350 of ... as well as the condition set out in the Schedule with the exception of the words underlined.

SCHEDULE

...of Transfer 34350 of 1973

The plot sold shall not be sub-divided and not more than one dwelling ...se with the necessary outbuildings and accessories shall be erected ...each plot as shown on the General Plan of the Garden City unless ...nsent of Garden Cities in writing be first had and obtained. Unless otherwise agreed to in writing by Garden Cities if more than one ... is sold to any one buyer such buyer shall be bound to erect one ...ing on each plot.

...252/1986 25 April 1986

SEDGEFIELD MUNICIPALITY: REMOVAL OF RESTRICTIONS

...Under section 2(1) of the Removal of Restrictions Act, 1967 (Act 84 of ...as amended, and on application by the owner of Erf 217, Sedgefield, the Administrator hereby removes conditions (C) 5, 7 to 10 in Deed ...fer 5353 of 1983

P.K. 244/1986 25 April 1986

MUNISIPALITEIT KAAPSTAD: STIGTING VAN 'N PLAASLIKE NATUURRESERVAAT

Kennis geskied hiermee ingevolge artikel 7(5) van die Ordonnansie op Natuur- en Omgewingsbewaring, 1974 (Ordonnansie 19 van 1974), dat die Administrateur 'n aansoek toegestaan het om die goedkeuring vir die stigting van 'n plaaslike natuurreservaat deur die Munisipaliteit Kaapstad in die regsgebied van genoemde Munisipaliteit op grond wat by sodanige Munisipaliteit berus, wat bekend sal staan as die "Wolfgat-Natuurreservaat" en waarvan die grense is soos aangedui op 'n kaart gehaasteer in die kantoor van die direkteur: Natuur- en Omgewingsbewaring, Provinsiale Gebou, Waalstraat, Kaapstad, en die kantoor van die Stadsklerk, Munisipaliteit Kaapstad, Burgersentrum, Kaapstad.

P.K. 243/1986 25 April 1986

LASGEWING

MUNISIPALITEIT KUILSRIVIER: SLUITING VAN ONGEBRUIKTE BEGRAAFPLAAS

Die Administrateur het ingevolge artikel 167(1) van die Munisipale Ordonnansie, 1974 (Ordonnansie 20 van 1974) die Munisipaliteit van Kuilsrivier gelas om die ongebruikte privaat begraafplaas gelee op gedeelte 2 en 3 van die plaas 938 en 'n gedeelte van plaas 1019 Kuilsrivier, Kuilsrivier uitbreiding 52, vanaf die datum van publikasie van hierdie lasgewing, te sluit.

Gedateer te Kaapstad op hede die 25ste dag van April 1986.

B. A. VAN DER VYVER
Provinsiale Sekretaris

Provinsiale Gebou
Waalstraat
KAAPSTAD

P.K. 247/1986 25 April 1986

OMSKRYWING VAN GRENSE VAN SWART DORPSGEBIEDE: HERROEPING VAN PROVINSIALE KENNISGEWING

Provinsiale Kennisgewing 15/1986 van 10 Januarie 1986 soos gewysig deur P.K. 47/1986 van 24 Januarie 1986 word hierby herroep.

P.K. 251/1986 25 April 1986

MUNISIPALITEIT PINELANDS: OPHEFFING VAN BEPERKINGS

Kragtens artikel 2(1) van die Wet op Opheffing van Beperkings, 1967 (Wet 84 van 1967), soos gewysig, en op aansoek van die eienaar van Erf 1261, Pinelandsdorpsuitbreiding 1, Pinelands, word voorwaardes B.1 en 14 en C.(A)(2) in Transportakte 34350 van 1973 hiermee deur die Administrateur opgehef sowel as die voorwaarde in die Bylae uiteengesit met uitsondering van die woorde wat onderstreep is.

BYLAE

Transportakte 34350 van 1973

B.1 The plot sold shall not be sub-divided and not more than one dwelling house with the necessary outbuildings and accessories shall be erected on each plot as shown on the General Plan of the Garden City unless the consent of Garden Cities in writing be first had and obtained. Unless otherwise agreed to in writing by Garden Cities if more than one plot is sold to any one buyer such buyer shall be bound to erect one dwelling on each plot.

P.K. 252/1986 25 April 1986

MUNISIPALITEIT SEDGEFIELD: OPHEFFING VAN BEPERKINGS

Kragtens artikel 2(1) van die Wet op Opheffing van Beperkings, 1967 (Wet 84 van 1967), soos gewysig, en op aansoek van die eienaar van Erf 217, Sedgefield, word voorwaardes (C) 5, 7 tot 10 in Transportakte 5353 van 1983 hiermee deur die Administrateur opgehef.

APPENDIX 6 PROCLAMATION DETAILS OF WOLFGAT NATURE RESERVE

P.K./1986 25 April 1986

TOWN MUNICIPALITY: ESTABLISHMENT OF A LOCAL NATURE RESERVE

ice is hereby given in terms of section 7(5) of the Nature and En- mental Conservation Ordinance, 1974 (Ordinance 19 of 1974), that Administrator has granted an application for approval of the estab- nt of a local nature reserve by the Cape Town Municipality in the of jurisdiction of the said Municipality on land vested in such Mu- ity, which will be known as the "Wolfgat Nature Reserve" and the aries whereof are as indicated on a diagram filed in the office of the r, Nature and Environmental Conservation, Provincial Building, Street, Cape Town, and the office of the Town Clerk, Cape Town pality, Civic Centre, Cape Town.

P.K./1986 25 April 1986

DIRECTION

UILS RIVER MUNICIPALITY: CLOSURE OF UNUSED CEMETERY

Administrator has, in terms of section 167(1) of the Municipal ce, 1974 (Ordinance 20 of 1974) directed the Kuils River Munici- to close the unused private cemetery, situated on portion 2 and 3 of 938 and a portion of farm 1019 Kuils River, Kuils River extention from the publication of this direction.

ed at Cape Town this 25th day of April 1986.

VAN DER VYVER
ial Secretary

cial Building
Street
TOWN

P.K./1986 25 April 1986

NITION OF BOUNDARIES OF BLACK RESIDENTIAL AREAS: REPEAL OF PROVINCIAL NOTICE

incial Notice 15/1986 dated 10 January 1986 as amended by P.N. dated 24 January 1986 is hereby repealed.

P.K./1986 25 April 1986

PINELANDS MUNICIPALITY: REMOVAL OF RESTRICTIONS

er section 2(1) of the Removal of Restrictions Act, 1967 (Act 84 of as amended, and on application by the owner of Erf 1261, Pine- Township Extension 1, Pinelands, the Administrator hereby re- conditions B.1 and 14 and C.1.A.(12) in Deed of Transfer 34350 of as well as the condition set out in the Schedule with the exception of ds underlined.

SCHEDULE

of Transfer 34350 of 1973

The plot sold shall not be sub-divided and not more than one dwelling with the necessary outbuildings and accessories shall be erected each plot as shown on the General Plan of the Garden City unless nsent of Garden Cities in writing be first had and obtained. Un- otherwise agreed to in writing by Garden Cities if more than one is sold to any one buyer such buyer shall be bound to erect one ing on each plot.

P.K./1986 25 April 1986

SEDGEFIELD MUNICIPALITY: REMOVAL OF RESTRICTIONS

er section 2(1) of the Removal of Restrictions Act, 1967 (Act 84 of as amended, and on application by the owner of Erf 217, Sedge- the Administrator hereby removes conditions (C) 5, 7 to 10 in Deed fer 5353 of 1983

P.K. 244/1986 25 April 1986

MUNISIPALITEIT KAAPSTAD: STIGTING VAN 'N PLAASLIKE NATUURRESERVAAT

Kennis geskied hiermee ingevolge artikel 7(5) van die Ordonnansie op Natuur- en Omgewingsbewaring, 1974 (Ordonnansie 19 van 1974), dat die Administrateur 'n aansoek toegestaan het om die goedkeuring vir die stigting van 'n plaaslike natuurreservaat deur die Munisipaliteit Kaapstad in die regsgebied van genoemde Munisipaliteit op grond wat by sodanige Munisipaliteit berus, wat bekend sal staan as die "Wolfgat-Natuurreservaat" en waarvan die grense is soos aangedui op 'n kaart geliasseer in die kantoor van die direkteur: Natuur- en Omgewingsbewaring, Provinsiale Gebou, Waulstraat, Kaapstad, en die kantoor van die Stadsklerk, Munisipaliteit Kaapstad, Burgersentrum, Kaapstad.

P.K. 243/1986 25 April 1986

LASGEWING

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Die Administrateur het ingevolge artikel 167(1) van die Munisipale Ordonnansie, 1974 (Ordonnansie 20 van 1974) die Munisipaliteit van Kuilsrivier gelas om die ongebruikte privaat begraafplaas gelee op gedeelte 2 en 3 van die plaas 938 en 'n gedeelte van plaas 1019 Kuilsrivier, Kuilsrivier uitbreiding 52, vanaf die datum van publikasie van hierdie lasgewing, te sluit.

Geduteer te Kaapstad op hede die 25ste dag van April 1986.

B. A. VAN DER VYVER
Provinsiale Sekretaris

Provinsiale Gebou
Waulstraat
KAAPSTAD

P.K. 247/1986 25 April 1986

OMSKRYWING VAN GRENSE VAN SWART DORPSGEBIEDE: HERROEPING VAN PROVINSIALE/KENNISGEWING

Provinsiale Kennisgewing 15/1986 van 10 Januarie 1986 soos gewysig deur P.K. 47/1986 van 24 Januarie 1986 word hierby herroep.

P.K. 251/1986 25 April 1986

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Kragtens artikel 2(1) van die Wet op Opheffing van Beperkings, 1967 (Wet 84 van 1967), soos gewysig, en op aansoek van die eienaar van Erf 1261, Pinelands-dorpsuitbreiding 1, Pinelands, word voorwaardes B.1 en 14 en C.1.A.(12) in Transportakte 34350 van 1973 hiermee deur die Administrateur opgehef sowel as die voorwaarde in die Bylae uiteengesit met uitsondering van die woorde wat onderstreep is.

BYLAE

Transportakte 34350 van 1973

B.1 The plot sold shall not be sub-divided and not more than one dwelling house with the necessary outbuildings and accessories shall be erected on each plot as shown on the General Plan of the Garden City unless the consent of Garden Cities in writing be first had and obtained. Unless otherwise agreed to in writing by Garden Cities if more than one plot is sold to any one buyer such buyer shall be bound to erect one dwelling on each plot.

P.K. 252/1986 25 April 1986

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Kragtens artikel 2(1) van die Wet op Opheffing van Beperkings, 1967 (Wet 84 van 1967), soos gewysig, en op aansoek van die eienaar van Erf 217, Sedgefield, word voorwaardes (C) 5, 7 tot 10 in Transportakte 5353 van 1983 hiermee deur die Administrateur opgehef.

APPENDIX 6 PROCLAMATION DETAILS OF WOLFGAT NATURE RESERVE

244/1986 25 April 1986

TOWN MUNICIPALITY: ESTABLISHMENT OF A LOCAL NATURE RESERVE

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243/1986 25 April 1986

DIRECTION

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Administrator has, in terms of section 167(1) of the Municipal nce, 1974 (Ordinance 20 of 1974) directed the Kuils River Municito close the unused private cemetery, situated on portion 2 and 3 of 938 and a portion of farm 1019 Kuils River, Kuils River extention from the publication of this direction.

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VAN DER VYVER
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247/1986 25 April 1986

INITION OF BOUNDARIES OF BLACK RESIDENTIAL AREAS: REPEAL OF PROVINCIAL NOTICE

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251/1986 25 April 1986

PINELANDS MUNICIPALITY: REMOVAL OF RESTRICTIONS

ter section 2(1) of the Removal of Restrictions Act, 1967 (Act 84 of as amended, and on application by the owner of Erf 1261, Pinelands Township Extension 1, Pinelands, the Administrator hereby reconditions B.1 and 14 and C.(A)(2) in Deed of Transfer 34350 of as well as the condition set out in the Schedule with the exception of words underlined.

SCHEDULE

of Transfer 34350 of 1973

The plot sold shall not be sub-divided and not more than one dwelling with the necessary outbuildings and accessories shall be erected each plot as shown on the General Plan of the Garden City unless consent of Garden Cities in writing be first had and obtained. Unotherwise agreed to in writing by Garden Cities if more than one sold to any one buyer such buyer shall be bound to erect one ing on each plot.

252/1986 25 April 1986

SEDGEFIELD MUNICIPALITY: REMOVAL OF RESTRICTIONS

ter section 2(1) of the Removal of Restrictions Act, 1967 (Act 84 of as amended, and on application by the owner of Erf 217, Sedgefield, the Administrator hereby removes conditions (C) 5, 7 to 10 in Deed fer 5353 of 1983

P.K. 244/1986 25 April 1986

MUNISIPALITEIT KAAPSTAD: STIGTING VAN 'N PLAASLIKE NATUURRESERVAAT

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P.K. 243/1986 25 April 1986

LASGEWING

MUNISIPALITEIT KUILSRIVIER: SLUITING VAN ONGEBRUIKTE BEGRAAFPLAAS

Die Administrateur het ingevolge artikel 167(1) van die Munisipale Ordonnansie, 1974 (Ordonnansie 20 van 1974) die Munisipaliteit van Kuilsrivier gelas om die ongebruikte privaat begraafplaas gelee op gedeelte 2 en 3 van die plaas 938 en 'n gedeelte van plaas 1019 Kuilsrivier, Kuilsrivier uitbreiding 52, vanaf die datum van publikasie van hierdie lasgewing, te sluit.

Gedateer te Kaapstad op hede die 25ste dag van April 1986.

B. A. VAN DER VYVER
Provinsiale Sekretaris

Provinsiale Gebou
Waalstraat
KAAPSTAD

P.K. 247/1986 25 April 1986

OMSKRYWING VAN GRENSE VAN SWART DORPSGEBIEDE: HERROEPING VAN PROVINSIALE KENNISGEWING

Provinsiale Kennisgewing 15/1986 van 10 Januarie 1986 soos gewysig deur P.K. 47/1986 van 24 Januarie 1986 word hierby herroep.

P.K. 251/1986 25 April 1986

MUNISIPALITEIT PINELANDS: OPHEFFING VAN BEPERKINGS

Kragtens artikel 2(1) van die Wet op Opheffing van Beperkings, 1967 (Wet 84 van 1967), soos gewysig, en op aansoek van die eienaar van Erf 1261, Pinelands-dorpsuitbreiding 1, Pinelands, word voorwaardes B.1 en 14 en C.(A)(2) in Transportakte 34350 van 1973 hiermee deur die Administrateur opgehef sowel as die voorwaarde in die Bylae uiteengesit met uitsondering van die woorde wat onderstreep is.

BYLAE

Transportakte 34350 van 1973

B.1 The plot sold shall not be sub-divided and not more than one dwelling house with the necessary outbuildings and accessories shall be erected on each plot as shown on the General Plan of the Garden City unless the consent of Garden Cities in writing be first had and obtained. Unless otherwise agreed to in writing by Garden Cities if more than one plot is sold to any one buyer such buyer shall be bound to erect one dwelling on each plot.

P.K. 252/1986 25 April 1986

MUNISIPALITEIT SEDGEFIELD: OPHEFFING VAN BEPERKINGS

Kragtens artikel 2(1) van die Wet op Opheffing van Beperkings, 1967 (Wet 84 van 1967), soos gewysig, en op aansoek van die eienaar van Erf 217, Sedgefield, word voorwaardes (C) 5, 7 tot 10 in Transportakte 5353 van 1983 hiermee deur die Administrateur opgehef.

Appendix 3: Surveyors General Diagrams (Cliff to add)

C. Species Checklists

Appendix 4: Plants

List of Plant Species		
Family	**Species Name**	**Common Name**
Euphorbiaceae	*Adenocline pauciflora*	
Rutaceae	*Agathosma ciliata*	
Rutaceae	*Agathosma sp.1*	
Hyacinthaceae	*Albuca maxima*	
Asteraceae	*Amellus asteroides~*	
Rubiaceae	*Anthospermum aethiopicum*	
Rubiaceae	*Anthospermum prostratum*	
Rubiaceae	*Anthospermum sp.1*	
Fabaceae	*Aspalathus hispida~*	
Fabaceae	*Aspalathus sp.1*	
Fabaceae	*Aspalathus sp.2*	
ASPARAGACEAE	*Asparagus capensis*	
Iridaceae	*Babiana tubulosa*	
AMARYLLIDACEAE	*Brunsvigia orientalis*	Candelabera Flower
Restionaceae	*Calopsis fruticosa*	
Mesembryanthemaceae	*Carpobrotus acinaciformis*	
Mesembryanthemaceae	*Carpobrotus edulis*	
Lauraceae	*Cassytha ciliolata*	
Poaceae	*Catapodium rigidum*	
Scrophulariaceae	*Chaenostoma hispidum*	
Iridaceae	*Chasmanthe aethiopica*	Suurkanol
Gentianaceae	*Chironia baccifera*	
Asteraceae	*Chrysanthemoides monilifera*	Bitoubos
Asteraceae	*Chrysocoma coma-aurea*	
Asteraceae	*Cineraria geifolia*	
MENISPERMACEAE	*Cissampelos capensis*	
Rosaceae	*Cliffortia falcata*	
Rosaceae	*Cliffortia odorata*	
Asteraceae	*Cotula turbinata*	
Crassulaceae	*Crassula dichotoma*	
Crassulaceae	*Crassula glomerata*	
Crassulaceae	*Crassula macowaniana*	
Crassulaceae	*Crassula sp.1*	
Asteraceae	*Cullumia setosa~*	
Asteraceae	*Cullumia squarrosa*	
Convolvulaceae	*Cuscuta sp.1*	
Apocynaceae	*Cynanchum africanum*	
FUMARIACEAE	*Cysticapnos vesicaria*	
Apiaceae	*Dasispermum suffruticosum*	
CARYOPHYLLACEAE	*Dianthus albens*	
Scrophulariaceae	*Dischisma ciliatum~*	
Asteraceae	*Disparago anomala*	
Mesembryanthemaceae	*Drosanthemum candens*	
Poaceae	*Ehrharta calycina*	
Restionaceae	*Elegia tectorum*	
Ericaceae	*Erica coarctata~*	
Asteraceae	*Eriocephalus racemosus~*	
Ebenaceae	*Euclea racemosa*	
Euphorbiaceae	*Euphorbia marlothiana*	
Iridaceae	*Ferraria sp.1*	
Cyperaceae	*Ficinia lateralis*	
Cyperaceae	*Ficinia ramosissima*	
Rubiaceae	*Galium tomentosum*	
Geraniaceae	*Geranium dissectum*	
AMARYLLIDACEAE	*Haemanthus coccineus*	
AMARYLLIDACEAE	*Haemanthus pubescens pubescens*	
Scrophulariaceae	*Hebenstretia repens*	
Asteraceae	*Helichrysum crispum*	
Asteraceae	*Helichrysum cylindriflorum*	
Asteraceae	*Helichrysum dasyanthum*	
Asteraceae	*Helichrysum indicum*	
Asteraceae	*Helichrysum litorale*	
Asteraceae	*Helichrysum niveum*	
Asteraceae	*Helichrysum patulum*	
Asteraceae	*Helichrysum retortum*	
Asteraceae	*Helichrysum sp.1*	
Cyperaceae	*Hellmuthia membranacea*	
Malvaceae	*Hermannia sp.1*	
Malvaceae	*Hermannia trifoliata*	
Orobanchaceae	*Hyobanche sanguinea*	
Fabaceae	*Indigofera brachystachya*	
Restionaceae	*Ischyrolepis eleocharis*	
Cyperaceae	*Isolepis antarctica*	

Cyperaceae	*Isolepis striata*	
Mesembryanthemaceae	*Jordaaniella dubia*	
CUCURBITACEAE	*Kedrostis nana~*	
Ranunculaceae	*Knowltonia capensis*	
Poaceae	*Koeleria capensis*	
Hyacinthaceae	*Lachenalia rubida*	
Fabaceae	*Lessertia capensis*	
Apiaceae	*Lichtensteinia sp.1*	
LINACEAE	*Linum africanum*	
Scrophulariaceae	*Lyperia tristis*	
Scrophulariaceae	*Manulea tomentosa*	
Mesembryanthemaceae	*Mesembryanthemum sp.1*	
Asteraceae	*Metalasia muricata*	
Myricaceae	*Morella quercifolia*	
Polygalaceae	*Muraltia ciliaris*	
Polygalaceae	*Muraltia satureioides*	
Polygalaceae	*Muraltia sp.1*	
Scrophulariaceae	*Nemesia affinis*	
Asteraceae	*Nidorella foetida*	
Polygalaceae	*Nylandtia spinosa*	Skilpadbessie Bos, Tortoise Berry Bush
ONAGRACEAE	*Oenothera sp.1*	
OLEACEAE	*Olea exasperata*	
Asteraceae	*Oncosiphon suffruticosum*	
Santalaceae	*Osyris compressa*	
Fabaceae	*Otholobium bracteolatum*	
Fabaceae	*Otholobium fruticans*	
Asteraceae	*Othonna coronopifolia*	
Oxalidaceae	*Oxalis sp.1*	
Thymelaeaceae	*Passerina ericoides*	
Thymelaeaceae	*Passerina paleacea*	
Thymelaeaceae	*Passerina rigida*	
Geraniaceae	*Pelargonium betulinum*	
Geraniaceae	*Pelargonium capitatum*	
Geraniaceae	*Pelargonium gibbosum*	
Poaceae	*Pentaschistis pallida*	
Poaceae	*Pentaschistis sp.1*	
Molluginaceae	*Pharnaceum sp.1*	
Rhamnaceae	*Phylica ericoides~*	
Mesembryanthemaceae	*Phyllobolus canaliculatus*	
Plantaginaceae	*Plantago crassifolia~*	
Fabaceae	*Psoralea repens*	
Celastraceae	*Pterocelastrus tricuspidatus*	
Anacardiaceae	*Rhus crenata*	Blink Taaibos, Turkeyberry
Anacardiaceae	*Rhus glauca*	Blou Taaibos
Anacardiaceae	*Rhus laevigata*	
Anacardiaceae	*Rhus lucida~*	
Celastraceae	*Robsonodendron maritimum*	
Mesembryanthemaceae	*Ruschia macowanii*	
Mesembryanthemaceae	*Ruschia sp.1*	
Lamiaceae	*Salvia africana-lutea*	
Orchidaceae	*Satyrium carneum*	
Orchidaceae	*Satyrium sp.1*	
Gentianaceae	*Sebaea exacoides*	
Asteraceae	*Senecio arenarius*	
Asteraceae	*Senecio arniciflorus*	
Asteraceae	*Senecio burchellii*	
Asteraceae	*Senecio elegans*	
Asteraceae	*Senecio maritimus*	
Asteraceae	Senecio	*Senecio sp.1*
Solanaceae	Solanum	*Solanum africanum*
Poaceae	Sporobolus	*Sporobolus virginicus*
Asteraceae	Stoebe	*Stoebe sp.1*
Thymelaeaceae	Struthiola	*Struthiola ciliata*
Thymelaeaceae	Struthiola	*Struthiola sp.1*
Fabaceae	Sutherlandia	*Sutherlandia frutescens*
Asteraceae	Syncarpha	*Syncarpha argyropsis*
Aizoaceae	Tetragonia	*Tetragonia decumbens*
Aizoaceae	Tetragonia	*Tetragonia fruticosa*
Cyperaceae	Tetraria	*Tetraria brachyphylla*
Restionaceae	Thamnochortus	*Thamnochortus spicigerus*
Santalaceae	Thesidium	*Thesidium fragile*
Santalaceae	Thesium	*Thesium aggregatum*
Santalaceae	Thesium	*Thesium fragile*
Santalaceae	Thesium	*Thesium spicatum*
Asphodelaceae	Trachyandra	*Trachyandra brachypoda*
Asphodelaceae	Trachyandra	*Trachyandra divaricata*
Poaceae	Tribolium	*Tribolium hispidum*
Asteraceae	Trichogyne	*Trichogyne ambigua*

Asteraceae	Trichogyne	*Trichogyne repens*
VISCACEAE	Viscum	*Viscum capense*
HAEMODORACEAE	Wachendorfia	*Wachendorfia paniculata*
HAEMODORACEAE	Wachendorfia	*Wachendorfia sp.1*
Campanulaceae	Wahlenbergia	*Wahlenbergia tenella var. tenella*
Restionaceae	Willdenowia	*Willdenowia teres*
Scrophulariaceae	Zaluzianskya	*Zaluzianskya villosa*
Araceae	Zantedeschia	*Zantedeschia aethiopica*
Zygophyllaceae	Zygophyllum	*Zygophyllum flexuosum*

Appendix 5: Invasive Plants

Family	Species Name	Common Name
Fabaceae	*Acacia cyclops*	Rooikrans
Fabaceae	*Acacia saligna*	Port Jackson
Poaceae	*Pennisetum clandestinum*	Kikuyu grass
MYOPORACEAE	*Myoporum serratum*	Manotoka
Poaceae	*Ammophila arenaria*	
	Datura stramonium	Common Thorn Apple
POLYGONACEAE	*Polygonum aviculare*	
	Scleropoa ridiga	
	Senecio pterophora	
	Silene clandestina	
	Echium candicans	
	Vicia spp	
MYOPORACEAE	*Myoporum tetrandrum*	Manotoka

Appendix 6: Marine Plants

Family	Species Name
RHODOPHYCOTA (Red Algae)	*Aeodes orbitosa*
	Acrosorium sp.
	aristothamnium cellabens
	Ceramium planum
	Ceramium sp.
	Champia compressa
	Champia lumbricalis
	Chilocladia capensis
	Chondria capensis
	Chylocladia capensis
	Gelidium pristoides
	Gigartina radula
	Gigartina pistillata
	Gigartina stiriata
	Grateloupia filicina
	Gymnogongrus sp.
	Hypnaea spicifers
	Plocamium corallorhiza
	Porphyra capensis
	Pterosiphonia cloiophylla
CHOLOROPHYCOTA (Green Algae)	*Cladophora radiosa*
	Ulva capensis
	Enteromorpha sp.
PHAEOPHYCOTA (Brown Algae)	*Ecotcapus sp.*
	Chordariopsis capensis
	Splachnidium rugosum

Appendix 7: Mammals

List of Mammals

Family	Species Name	Common Name	Threatened Status	Alien
Chrysochloridae	*Amblysomus hottentotus*	Hottentot Golden Mole		No
Otariidae	*Arctocephalus pusillus*	Cape Fur Seal	Least Concern (LC)	No
Bathyergidae	*Bathyergus suillus*	Cape Dune Molerat	Least Concern (LC)	No
Canidae	*Canis lupus familiaris*	Domestic dog		Yes
Chrysochloridae	*Chlorotalpa duthieae*	Duthie's Golden Mole		No
Chrysochloridae	*Cryptochloris asiatica*	Cape Golden Mole	Data Deficient (DDD)	No
Bathyergidae	*Cryptomys hottentotus*	Common Molerat	Least Concern (LC)	No
Chrysochloridae	*Eremitalpa granti*	Grant's Golden Mole	Vulnerable (VU)	No
Viverridae	*Galerella pulverulenta*	Small Grey Mongoose	Least Concern (LC)	No
Viverridae	*Genetta tigrina*	Large-spotted Genet	Least Concern (LC)	No
Batherygidae	*Georychus capensis*	Cape Molerat	Least Concern (LC)	No
Muridae	*Gerbillurus paeba*	Hairyfooted Gerbil	Least Concern (LC)	No
Hystricidae	*Hystrix africaeaustralis*	Porcupine	Least Concern (LC)	No
Mustelidae	*Ictonyx striatus*	Striped Polecat	Least Concern (LC)	No
Physeteridae	*Kogia simus*	Dwarf Sperm Whale		No
Leporidae	*Lepus capensis*	Cape Hare	Least Concern (LC)	No
Phocidae	*Mirounga leonina*	Southern Elephant Seal	Endangered (EN)	No
Bovidae	*Raphicerus campestris*	Steenbok	Least Concern (LC)	No
Bovidae	*Raphicerus melanotis*	Cape Grysbok	Least Concern (LC)	No
Muridae	*Rhabdomys pumilio*	Striped Mouse, Striped Field Mouse	Least Concern (LC)	No
Muridae	*Tatera afra*	Cape Gerbil	Least Concern (LC)	No

Appendix 8: Birds

Family	Species Name	Common Name	Threatend Status
Otididae	*Afrotis afra*	Southern Black Korhaan	
Anatidae	*Alopochen aegyptiacus*	Egyptian Goose, Kolgans	
Pycnonotidae	*Andropadus importunus*	Sombre Greenbul	
MOTACILLINAE	*Anthus cinnamomeus*	African Pipit	
Cisticolidae	*Apalis thoracica*	Bar-throated Apalis	
Apodidae	*Apus barbatus*	African Black Swift	
Apodidae	*Apus caffer*	White-rumped Swift	
Ardeidae	*Ardea melanocephala*	Black-headed Heron	
Scolopacidae	*Arenaria interpres*	Ruddy Turnstone	
Monarchidae	*Batis capensis*	Cape Batis	
Strigidae	*Bubo africanus*	Spotted Eagle-Owl	
Chionidae	*Burhinus capensis*	Spotted Thick-knee, Spotted Dikkop	
Accipitridae	*Buteo trizonatus*	Forest Buzzard	
Accipitridae	*Buteo vulpinus*	Steppe Buzzard	
Scolopacidae	*Calidris alba*	Sanderling	
Campephagidae	*Campephaga flava*	Black Cuckooshrike	
Centropodidae	*Centropus burchellii*	Burchell's Coucal	
Muscicapidae	*Cercomela familiaris*	Familiar Chat	
Muscicapidae	*Cercotrichas coryphoeus*	Karoo Scrub-Robin	
Charadriidae	*Charadrius marginatus*	White-fronted Plover	
NECTARINIIDAE	*Cinnyris chalybeus*	Southern Double-collared Sunbird	
Accipitridae	*Circus ranivorus*	African Marsh-Harrier	Vulnerable (VU)
Cisticolidae	*Cisticola fulvicapilla*	Neddicky	
Cisticolidae	*Cisticola juncidis*	Zitting Cisticola	
Cisticolidae	*Cisticola subruficapilla*	Grey-backed Cisticola	
Coliidae	*Colius colius*	White-backed Mousebird	
Coliidae	*Colius striatus*	Speckled Mousebird	
COLUMBIDAE	*Columba guinea*	Speckled Pigeon	
COLUMBIDAE	*Columba livia*	Feral Pigeon, Rock Dove	
Corvidae	*Corvus albicollis*	White-necked Raven	
Corvidae	*Corvus albus*	Pied Crow	
Corvidae	*Corvus splendens*	Indian House Crow	
Muscicapidae	*Cossypha caffra*	Cape Robin-Chat	
STURNIDAE	*Creatophora cinerea*	Wattled Starling	
Fringillidae	*Crithagra albogularis*	White-throated Canary	
Fringillidae	*Crithagra flaviventris*	Yellow Canary	
Fringillidae	*Crithagra gularis*	Streaky-headed Seedeater	
Fringillidae	*Crithagra sulphuratus*	Brimstone Canary	
Picidae	*Dendropicos griseocephalus*	Olive Woodpecker	
Dicruridae	*Dicrurus adsimilis*	Fork-tailed Drongo	
Accipitridae	*Elanus caeruleus*	Black-shouldered Kite	
Fringillidae	*Emberiza capensis*	Cape Bunting	
Ploceidae	*Euplectes orix*	Southern Red Bishop	
Falconidae	*Falco peregrinus*	Peregrine Falcon	Near Threatened (NT)
Falconidae	*Falco rupicolus*	Rock Kestrel	
Alaudidae	*Galerida magnirostris*	Large-billed Lark	
Haematopodidae	*Haematopus moquini*	African Black Oystercatcher	Near Threatened (NT)
DACELONIDAE	*Halcyon albiventris*	Brown-hooded Kingfisher	
Hirundinidae	*Hirundo albigularis*	White-throated Swallow	
Hirundinidae	*Hirundo dimidiata*	Pearl-breasted Swallow	
Hirundinidae	*Hirundo fuligula*	Rock Martin	
Hirundinidae	*Hirundo rustica*	Barn Swallow	
Monarchidae	*Laniarius ferrugineus*	Southern Boubou	
Laniidae	*Lanius collaris*	Common Fiscal, Fiscal Shrike	
Laridae	*Larus dominicanus*	Kelp Gull	
Laridae	*Larus hartlaubii*	Hartlaub's Gull	
MOTACILLINAE	*Macronyx capensis*	Cape Longclaw	
Cerylidae	*Megaceryle maximus*	Giant Kingfisher	
Meropidae	*Merops apiaster*	European Bee-eater	
Sulidae	*Morus capensis*	Cape Gannet	Vulnerable (VU)
MOTACILLINAE	*Motacilla capensis*	Cape Wagtail	
Phasianidae	*Numida meleagris*	Helmeted Guineafowl	
COLUMBIDAE	*Oena capensis*	Namaqua Dove	
Muscicapidae	*Oenanthe pileata*	Capped Wheatear	
STURNIDAE	*Onychognathus morio*	Red-winged Starling	
Sylviidae	*Parisoma subcaeruleum*	Chestnut-vented Tit-Babbler	
Passeridae	*Passer domesticus*	House Sparrow	
Passeridae	*Passer melanurus*	Cape Sparrow	
Phalacrocoracidae	*Phalacrocorax africanus*	Reed Cormorant	
Phalacrocoracidae	*Phalacrocorax capensis*	Cape Cormorant	

			Threatened (NT)
Phalacrocoracidae	*Phalacrocorax coronatus*	Crowned Cormorant	Near Threatened (NT)
Phalacrocoracidae	*Phalacrocorax lucidus*	White-breasted Cormorant	
Ploceidae	*Ploceus capensis*	Cape Weaver	
Cisticolidae	*Prinia maculosa*	Karoo Prinia	
Phasianidae	*Pternistis capensis*	Cape Spurfowl	
Procellariidae	*Puffinus griseus*	Sooty Shearwater	
Pycnonotidae	*Pycnonotus capensis*	Cape Bulbul	
Hirundinidae	*Riparia paludicola*	Brown-throated Martin	
Muscicapidae	*Saxicola torquatus*	African Stonechat	
Fringillidae	*Serinus canicollis*	Cape Canary	
Muscicapidae	*Sigelus silens*	Fiscal Flycatcher	
Spheniscidae	*Spheniscus demersus*	African Penguin	Vulnerable (VU)
Sylviidae	*Sphenoeacus afer*	Cape Grassbird	
STURNIDAE	*Spreo bicolor*	Pied Starling	
Laridae	*Sterna bergii*	Swift Tern	
Laridae	*Sterna hirundo*	Common Tern	
COLUMBIDAE	*Streptopelia capicola*	Cape Turtle-Dove	
COLUMBIDAE	*Streptopelia senegalensis*	Lag Duifie, Laughing Dove	
STURNIDAE	*Sturnus vulgaris*	Common Starling, European Starling	
Sylviidae	*Sylvietta rufescens*	Long-billed Crombec	
Apodidae	*Tachymarptis melba*	Alpine Swift	
Monarchidae	*Tchagra tchagra*	Southern Tchagra	
Monarchidae	*Telophorus zeylonus*	Bokmakierie	
Threskiornithidae	*Threskiornis aethiopicus*	African Sacred Ibis	
Tytonidae	*Tyto alba*	Barn Owl	
Upupidae	*Upupa africana*	African Hoopoe	
Charadriidae	*Vanellus coronatus*	Crowned Lapwing	
Zosteropidae	*Zosterops virens*	Cape White-eye	

Appendix 9: Reptiles

Family	Species Name	Common Name	Threatened Status
Scincidae	*Acontias meleagris meleagris*	Cape Legless Skink	
Testudinidae	*Chersina angulata*	Angulate Tortoise	
Elapidae	*Naja nivea*	Cape Cobra	
Psammophinae	*Psammophylax rhombeatus*	Rhombic Skaapsteker	
Colubridae	*Pseudaspis cana*	Mole Snake	

Appendix 10: Amphibians

Family	Species Name	Common Name	Threatened Status
Breviceptinae	*Breviceps rosei*	Sand Rain Frog	
Raninae	*Strongylopus grayii*	Clicking Stream Frog	
Raninae	*Tomopterna delalandii*	Cape Sand Frog	

Appendix 11: Fish

Family	Species Name	Common Name
Perciformes	*Argyrosomus inodorus*	Kabeljou
Chirocentridae	*Chirocentrus dorab*	Barela
Dichistiidae	*Dichistius capensis*	Galjoen
Lithognathus	*Lithognathus olivieri*	Steenbras
Sparidae	*Rhabdosargus globiceps*	Stumpnose
Carangidae	*Selar crumenophthalmus*	Steenbrass
Sciaenidae	*Umbrina canariensis*	Belman

Appendix 12: Insects and Spiders

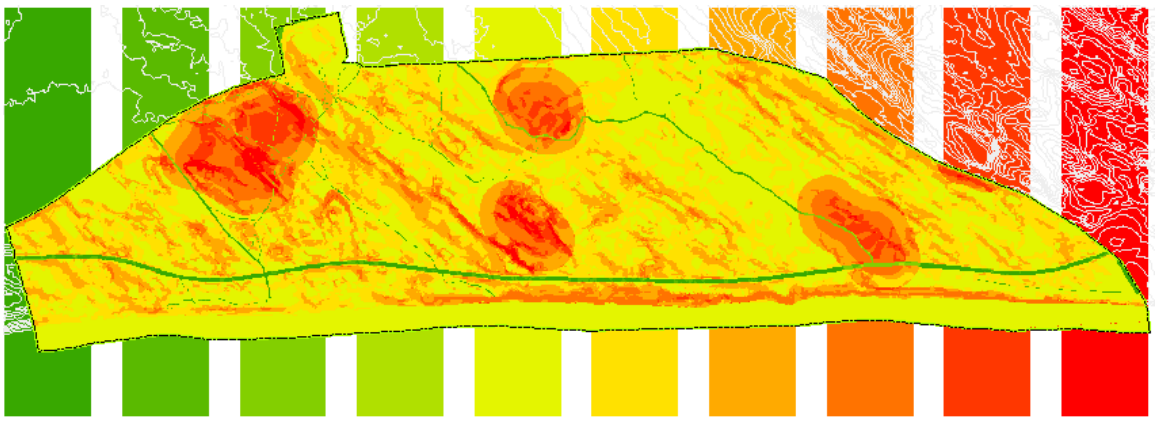
Order/Family	Species Name	Common Name	Threatened Status
Order Odonata	*Anax imperator*	Dragonfly	
Order Hymenoptera	*Anoplolepis steingroeveri*	Pugnacious ant	
Campodeidae	*Camponotus baynei*		
Campodeidae	*Camponotus cf similans*		
Subfamily: Myrmidinae	*Cardiocondyla shuckardi*		
Formicidae	*Crematogaster peringueyi*	Cocktail ant	
Formicidae	*Crematogaster spp*		
Tenebrionidae	*Cryptochile assimilis*	Streaked ground beetle	
Nymphalidae	*Cynthia cardui*	Painted lady	
Scarabaeidae	*Dichelus sp.*	Monkey beetle	
Tephritidae		Fruit Fly	
Ixodiae		Tick	
Meloidae		Blister beetles	
Acrididae		Grasshopper	
Theraphosidae	*Harpactira sp.*	Baboon Spider	
Scarabaeidae	*Heliocopris sp.*	Dung bettle	
Sarcophagidae	*Haematpota sp.*	Horse fly	
Coccinellidae	*Henosepilachna elaterii*	Ladybird	
Acrididae	*Heterodes pupus*	Koringkriek/Corn Cricket	
Lepismatidae	*Lepisiota sp.*		
Hymenoptera	*Monomorium havilandi*		
Hymenoptera	*Monomorium sp.*		
Hymenoptera	*Monomorium xanthognathum*		
Asilidae	*Neolophonotus sp.*	Robber fly	
Formicidae	*Ocymyrmex barbiger*		
Mantidae	*Mantids sp.*	Praying mantis	
Formicidae	*Pachycondyla cavernosa*		
Sparassidae	*Palystes sp.*	Rain spider	
Subfamily: Myrmicinate	*Pheidola sp.*		
Cerambycidae	*Promeces longipes*		
Formicidae	*Solenospis punctaventris*	Fire Ant	
Lycaenidae	*Tarucus thespis*		
Dolichoderinae	*Technomyrmex pallipes*		
Formicidae	*Tetramorium quadrispinosum*		

D. Other Documents as required:

Appendix 13: Wolfgat Sensitivity-Value Analysis

SENSITIVITY- VALUE ANALYSIS AND ZONATION PROCESS:

WOLFGAT NATURE RESERVE



Prepared for the Biodiversity Branch and Environmental Management Systems Branch

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1. Introduction and Scope of Report

Wolfgat Nature Reserve is situated along the False Bay coastline. It was proclaimed in 1986 and protects the only limestone sea cliffs in Cape Town.

The dominant vegetation type is Cape Flats Dune Strandveld: False Bay form. In this area along the coast it occurs on both a sandstone and limestone substrate.

This vegetation type is listed as endangered under National Environmental Management: Biodiversity Act (Act 10 of 2004), DEAT (in press) and it is poorly conserved in formal protected areas.

1.1 Context

The development of the Sensitivity and Zonation 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 to delineate visitor user zones and the positioning and nature of new infrastructure, access points, roads and facilities.

The CDF process has grown in response to the requirements of the NEMBA (2004) and is a strategy to comply with the spatial planning requirements of these acts. The CDFs will ensure that best practice and sustainable development principles are integrated into spatial planning within protected areas.

The Sensitivity-Value analysis is the landscape analysis portion of the broader Conservation Development Framework. It is a multi-criteria decision-support tool for spatial planning that is designed to integrate the best available information into a format that allows for defensible and transparent decisions to be made. The Sensitivity-Value 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 (either from biodiversity, heritage, aesthetic or a combination of values) and its sensitivity or vulnerability to a variety of types of disturbance (Holness *et al*, 2005).

- The Sensitivity-Value analysis, the CDF and the associated zonation plan should form part of an adaptive management system. They will grow and change over time as the understanding of the landscapes and ecosystems improve; and
- It does not replace the need for detailed site and precinct planning and EIA compliance at site level.

2. Background and Brief

The Sensitivity-Value analysis was undertaken by the EMS Branch's natural resource specialist. The small size of the City's nature reserve also did not require an extensive analysis, with the subsequent zonation process being fairly straight forward. The methodology used for both the Sensitivity-Value analysis and the zonation process was adapted from Holness (2008) and SRK Consulting (2008).

All geographical information work was carried out in ESRI's ArcMap version 9.3.1 GIS (Geographical Information System) using the ArcInfo license level with Spatial Analyst and 3D Analyst extensions.

3. Sensitivity-Value Analysis

Sensitivity-Value Analysis and Zoning Process methodology

Stage 1: Data synthesis and compilation

Compilation of required data for the analysis

- Spatially define the planning domain or study area.
- Evaluate available and required datasets for the Sensitivity-Value model.
- Spatial data is collected or created for each element of the Sensitivity-Value model.

Stage 2: Layer interpretation

Layer interpretation is an important component of the Sensitivity-Value process that requires a combination of spatial data interpretation and expert knowledge.

- Using the assembled data, areas are assigned a score on a common scale for each element of the model; and
- The scores achieved for each element of the model are represented as separate input layers on a GIS.

Stage 3: Sensitivity-Value Analysis

The Sensitivity-Value analysis stage involves an iterative exploration of the input layers.

- The scores achieved for each element of the model are weighted and aggregated to obtain an overall Sensitivity-Value ranking.
- Different weightings and aggregation procedures and combinations of input layers can be explored; and
- The robustness of the Sensitivity-Value analysis is examined.

The resultant Sensitivity-Value output maps should provide an initial understanding of the spatial distribution of the important and sensitive biodiversity, landscape and heritage features.

Stage 4: Development of a draft zonation plan

The outputs of the Sensitivity-Value process are used as the foundation for the development of a draft zonation plan. The Sensitivity-Value outputs and draft zonation plan are workshopped with relevant stakeholders.

Stage 5: Refinement of the draft zonation and the identification of special management overlays

Special management areas/overlays are identified using the information derived from the Sensitivity-Value analysis. Recommendations are made regarding the management of the land-use zones and special management areas.

The draft is then presented for comment to the City and stakeholder groups to obtain broad public input into the plan prior to finalisation,

Stage 6: Final Zonation and Conservation Development Framework.

The comments and input from the public participation process are integrated into the final zonation plan. The plan is passed through Council for approval and adoption.

3.1 Input Layers

The study area for the CDF was defined as the current management boundary of the Wolfgat Nature Reserve. Where appropriate a 1km buffer around the management boundaries was used to ensure that the reserve sensitivities are considered within the context of the surrounding urban and rural landscape.

3.1.1 Biodiversity

3.1.1a Habitat Value

The habitat unit as defined by a particular vegetation community is used as the broad proxy for biodiversity. The vegetation communities are good surrogates for habitat value as it uses readily available information that clearly delineates the distribution of distinct subsets of biodiversity across the landscape.

The South African National Vegetation Map (Rebelo et al, 2006) was used to broadly define the habitat units. The NSBA (Driver *et al*, 2005) values were used to inform current ecosystem status and level of protection of vegetation types within the study area.

The following factors were also incorporated in the habitat value calculation

- The value assigned to a habitat unit should reflect the contribution that vegetation type makes to the local, provincial and national conservation estate.
- This value should reflect the rarity of the habitat, the level of transformation that occurred within the habitat type, species richness and diversity, habitat heterogeneity, and contribution to local conservation targets as identified in the City's Biodiversity Network (Benn, 2008).
- The habitat value also takes into account a gap analysis (how much is in reserves), whereby habitat types that exists largely outside of protected areas receive a higher value.

Broad habitat value is a poor indication of the value of a particular site if a reserve has a history of significant transformation or degradation. Where a reserve includes transformed and/or degraded areas these need to inform the adjustment of the broad habitat value to reflect:

- The level and type of transformation that has occurred at a particular site.

- The rehabilitation/restoration potential of a site. Areas that are likely to revert, with a minimum of management intervention, to a natural or near natural state should be allocated a higher value than areas where extensive management intervention is required.
- Degraded or developed areas were considered to have lower habitat values. The habitat values were adjusted downwards according to the level and type of degradation or habitat loss that has occurred.

Data Inputs (GIS methods and sources)

Base habitat map:

The Cape Town Vegetation remnant map was used to delineate habitat units according to their national vegetation type. The values used to adjust the base habitat scores are the listed in Table 2. This is necessary in order that critically endangered ecosystems are accurately reflected in the scoring in terms of protection status and, % transformation of the vegetation types.

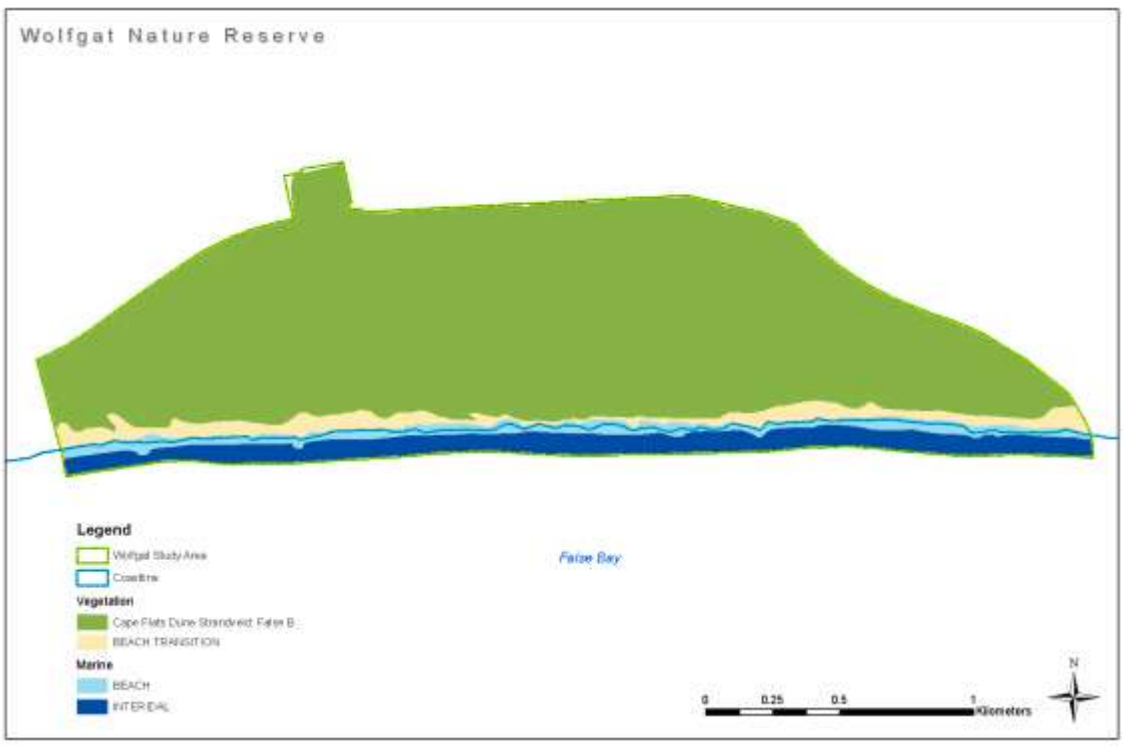


Figure 1: Wolfgat Nature Reserve National Vegetation Types

3.1.1b: Transformation # Degradation Map:

Habitat transformation and degradation was mapped from recent aerial photography (2005, 2007 and 2008). Habitat modifiers are listed in Table 1 and Figure 2 shows their types and spatial extent.

Table 1: Habitat Modifiers

Type	Category	Description
Transformed	Facilities	Facilities for use by public within the reserve (Ablutions, displays, benches etc.)
	Housing	Formal and informal housing
	Quarries	Open excavation or burrow pits.
	Road & paths	The road (management and access roads), trail and boardwalk network
	Dams	Artificial water impoundments and Bulk water infrastructure
	Recreational Open Space	Primarily areas where lawns are maintained for public recreation. Often associated with non-indigenous tree planting for shade etc.
Degraded Heavy, moderate or Low	Firebreaks/fencing	Strips of cleared land maintained for fire management. Including the boundary fencing which usually incorporates a firebreak.
	Invasive Alien vegetation	These areas include sites that have an Invasive Alien Plant infestation density of more than 75%. Sites need to be assessed in terms of their restoration potential. This would also include plantation (Forestry) sites.

	Disturbed	Areas where the natural habitat is not in a near-natural state, but is also not irreversibly transformed. These areas still perform important habitat and ecosystem functions. Old capped landfill sites

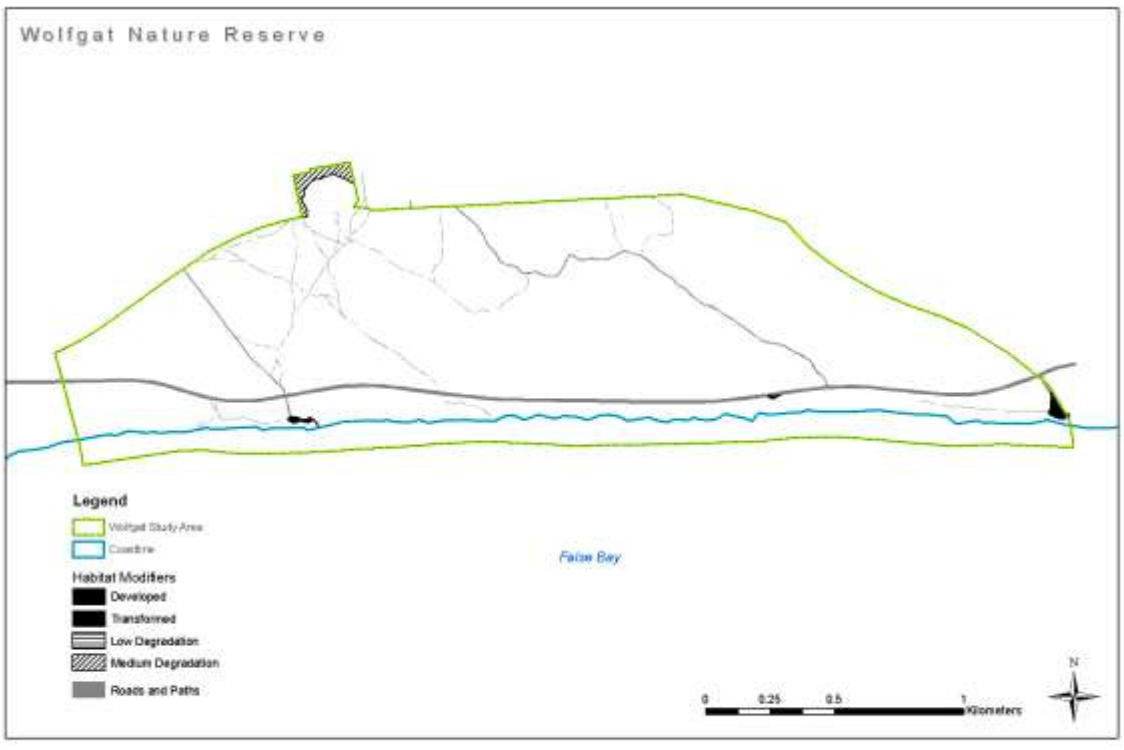


Figure 2: Habitat Modifiers

Scoring, Logic and rationale

The scoring method derived was as follows:

1. Base values were assigned to the study area according to the ecosystem status of the vegetation types (Table 2).
2. The Base values were adjusted on the basis of habitats that are likely to receive an adjusted conservation status under the "Criterion D" listing of threatened ecosystems in terms of NEMBA (2004). This reflects vegetation types with high numbers of rare and endangered plant species. This value replaced the NSBA Conservation Status where higher and was not used in addition to them (Table 2).
3. Base values were adjusted according to the protection status of the vegetation type (Gap Analysis) as determined in the fine scale conservation plan for the City (see Appendices, Table 9).
4. Base values were adjusted according to the % Transformation that has occurred within each vegetation type within the City (see Appendices, Table 10).
5. The values of all degraded sites were reduced according to the type of habitat degradation (Table 3); and
6. The values of all transformed areas were reduced to zero
7. Once these values were determined, the values were converted to a 0-10 range using a linear conversion method in ArcGIS.

Table 2: Habitat Value summary for each vegetation type before local adjustment for transformation/degradation

Vegetation Type	NSBA Conservation Status Score	Criterion D Score*	SANBI Conservation Status	% Transformed Score	Unmodified Score
Atlantis Sand Fynbos	6	10	5	3	18
Boland Granite Fynbos	8	6	3	3	14
Cape Estuarine Salt Marshes	4	0	-1	3	6
Cape Flats Dune Strandveld: False bay	8	8	3	10	21
Cape Flats Dune Strandveld: West Coast	4	8	3	2	13
Cape Flats Sand Fynbos	10	10	4	10	24
Cape Lowland Freshwater Wetlands	4	0	-1	2	5
Cape Winelands Shale Fynbos	8	0	3	6	17
Elgin Shale Fynbos	10	0	4	6	20
Hangklip Sand Fynbos	6	6	-1	4	9
Kogelberg Sandstone Fynbos	4	10	2	0	12
Lourensford Alluvium Fynbos	10	10	3	10	23
North Peninsula Granite Fynbos	4	0	-1	2	5
Peninsula Sandstone Fynbos	4	8	-1	0	7
Peninsula Shale Fynbos	6	0	-1	4	9
Peninsula Shale Renosterveld	10	0	3	10	23
South Peninsula Granite Fynbos	8	0	2	6	16
Southern Afrotemperate Forest	4	0	-1	0	3
Swartland Alluvium Fynbos	10	0	5	10	25

Swartland Granite Renosterveld	10	10	4	10	24
Swartland Shale Renosterveld	10	10	4	10	24
Swartland Silcrete Renosterveld	10	0	-1	10	19
Western Shaleband Vegetation	4	0	3	0	7
**This value only replaces NSBA Conservation Status Value when it's a higher value*					

Table 3: Habitat Value Summary table

Type	Source	Category	Value	Notes
Base Values	NSBA Conservation Status	Critically Endangered Endangered Vulnerable Least Threatened	10 8 6 4	
	Criterion D Status	Critically Endangered Endangered Vulnerable Least Threatened	10 8 6 4	Criterion D Status overrides NSBA where the value is higher
Broad adjustors	Vegetation remnants % Transformed	0-14% 15-29% 30-39% 40-49% 50-59% 60-69% 70-100%	0 3 6 7 8 9 10	This criterion highlights the critically endangered vegetation types within the City without considering protection status.
	Ecosystem protection Status (Gap Analysis)	Not Protected Hardly Protected Poorly Protected Moderately Protected Well Protected	5 4 3 2 -1	Currently not represented in formal reserves >5% of target in reserves 5->50% of target in reserves 50->100% of target in reserves 100% + of target conserved in formal protected areas
Modifiers				
Local adjustors	Overriding values for transformed sites	Artificial water bodies Quarries/roads Developed Recreational Open Space (ROS)	0 0 0 0	Value reduced to 0 Value reduced to 0 Value reduced to 0 Value reduced to 0
	Adjusting values for degraded sites	Heavily degraded Moderately degraded Low degraded	-6 -2 -1	High density aliens – depleted seed bank with low restoration potential Previously ploughed old fields Old capped landfill sites High density aliens – intact seed bank with high restoration potential Forestry (Pine, Gum) plantations High density non-locally indigenous species Area is recovering from historic disturbance, to a near natural state. Cleared fire belt areas Modified wetlands with NB habitat value

GIS Procedure:

Habitat Value Unmodified Score

1. Export vegetation data to separate shapefile
2. Delete all fields except the "SANBI_VEG" field
3. Dissolve on field "SANBI_VEG"
4. Add fields, NSBA Conservation Status Score (NSBA_SCR), Criterion D Score (Crit_D), SANBI Conservation Status (SANBI_Cons), % Transformed (PERC_TRANS), Unmodified Score (UNMod_SCR). Use Short Integer field type.
5. Populate the attribute table with the relevant scores
6. Calculate the Unmodified Habitat Value Score. Note: The Criterion D score will override the NSBA score if the latter is a higher value.

Habitat Transformation

1. All roads, trails and boardwalks are buffered by FIELD containing the buffer distance.
2. All transformation types were digitised from aerial photography at a scale of 1:700.
3. All transformation layers were unioned.
4. Values were assigned as per the table. Type in field "TRANSCLASS" and the score in the field "VALUE"

Habitat Value Modified Score

1. Union the above two layers
2. Clip the union layer to the study area
3. Delete all unnecessary fields.
4. Add field “MOD_SCR”
5. Calculate the value for “MOD_SCR”. Remember to reduce the over-riding transformation values to 0
6. Covert to a 1-10 range using equal intervals and label 1-10.
7. Export to shapefile and label WOLF_HabitatValue.shp
8. Create map for report and export

Outputs See Figure 3

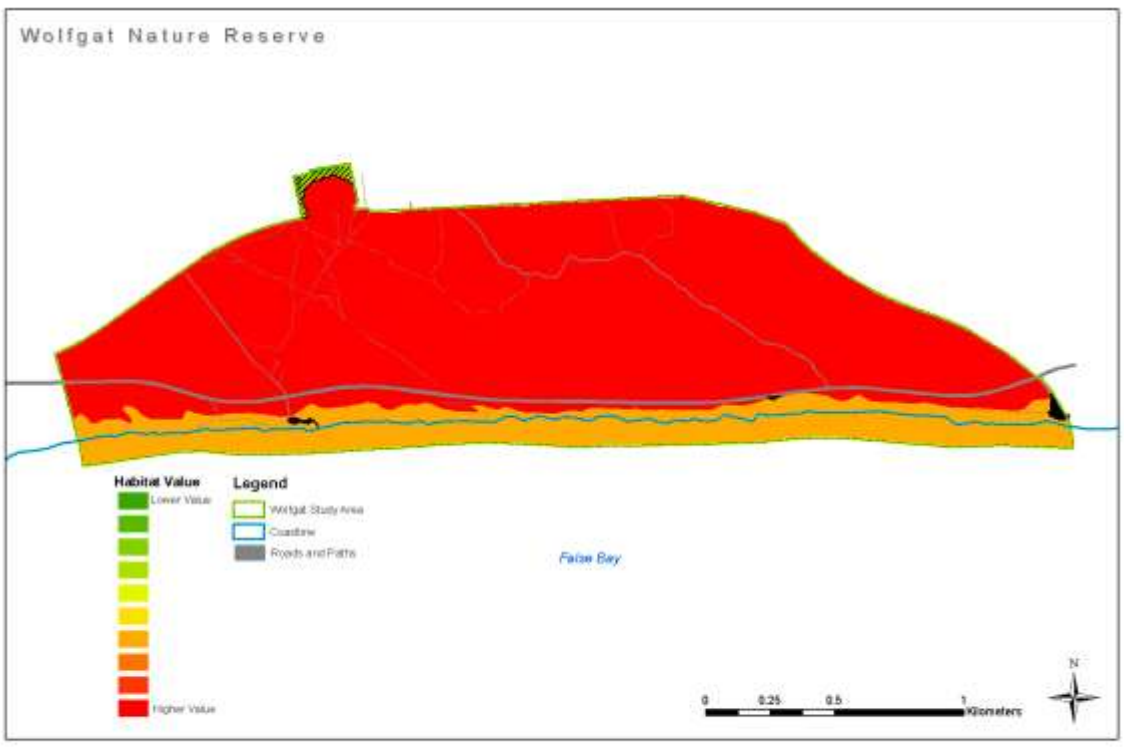


Figure 3: Habitat Value (Modified)

Interpretation in a local context

Endangered, Cape Flats Dune Strandveld is the predominant vegetation type occurring in the reserve. The transition vegetation between the CFDS and the beach (referred to as Cape Seashore vegetation) is almost completely bisected by Baden Powell drive. Other notable features are the longitudinal dune ridges and the dune slack wetlands that occur between them. The coastal sea cliffs are a unique sensitive feature and these cliffs are home to a Kelp Gull breeding colony.

Showstoppers#fatal flaws and special management area informants

Development of Greenfield sites within any critically endangered or endangered vegetation type or ecosystem should be approached with extreme caution, as by definition one cannot afford further biodiversity loss in these areas within the City.

In Wolfgat Nature Reserve, Baden Powell drive is a major driver of negative environmental impacts. It has allowed easy, uncontrolled access to sensitive coastal features. It has also created a security problem in the reserve. The future plan is to reroute the road along the northern border of the reserve. This plan has been incorporated into the reserve zonation as it has only been delayed to the cost factor.

3.1.1b Special Habitat Value[1]

The value of some areas of a reserve to the biodiversity estate may not be fully reflected by the habitat proxy (vegetation units). It is critical that these areas are identified and included. However, care must be taken not to allow flawed data, selective data availability, perceptions and species/taxa bias to skew the biodiversity value of one site over another.

Key aspects that should be taken into account in this layer:

- Habitats important for supporting populations of special species.
  - Care must be taken to ensure that this input fairly reflects the distribution of special species across the reserve.
  - Where detailed and comprehensive data are available this can be based on actual distributions, but in all likelihood this will be based on expert assessment of likely habitat requirements for identified species.

[1] Not used in the Wolfgat Sensitivity-Value Analysis

- Areas containing significant biodiversity assets such as Leopard, Black eagles, Leopard toads etc. that are not specifically linked to entire habitats.
- Other habitats that have significant biodiversity value that have been omitted from the broad conservation value layer as a result of scale issues.

Data Inputs (GIS methods and sources)

The modified remnant vegetation layer (Habitat value map) is deemed adequate to serve as a habitat proxy for both fauna and flora.

3.1.2 Topographic Sensitivity

This layer is used to identify areas with steep slopes or with sensitive geological or geomorphologic features. Significant impacts (such as accelerated soil erosion or landslides) may occur during construction in, or with improper management.

Sensitivity to erosion was not considered in this report. The steepness and habitat values provide a good enough proxy for sensitivity to erosion.

Data Inputs (GIS methods and sources)

This layer is derived from a triangular irregular network (TIN) created in ArcView 9.3.1 using the 3D Analyst extension and ArcInfo licence level. The 2m Contour layer for the City was used to calculate the base heights for the TIN. Slope angles were calculated using the 3D Analyst extension.

Scoring, logic and rationale

Slope angles were split into categories that relate to potential impacts and the limits of construction without significant cut and fill.

Procedure:

- Buffer study area by 1000m
- Clip the 2m contour layer with the buffered boundary layer
- Calculate Slope angles
- Reclassify according to Table 4 using 3D Analyst - reclassify
- Convert raster layer to vector shapefile and clip to the reserve boundary
- Create new field “VALUE”
- Assign values according to attribute field “GRIDCODE” to shapefile field “VALUE”
- Create and export map
- Final Topographic Sensitivity layer: WOLF_topo_sensitivity.shp

Table 4: Topographic sensitivity

Source	Category	Value	Note
Slope angles calculated from 2m contour layer	45° - <90°	10	Very high potential for erosion and slope instability
	30° - <45°	9	Strong potential for erosion and slope instability
	15° - <30°	8	High risk of erosion following disturbance
	10° - <15°	6	Moderate risk of erosion following disturbance
	5° - <10°	2	Low sensitivity
	0° - <5°	0	No special topographical sensitivity

Outputs

See Figure 4

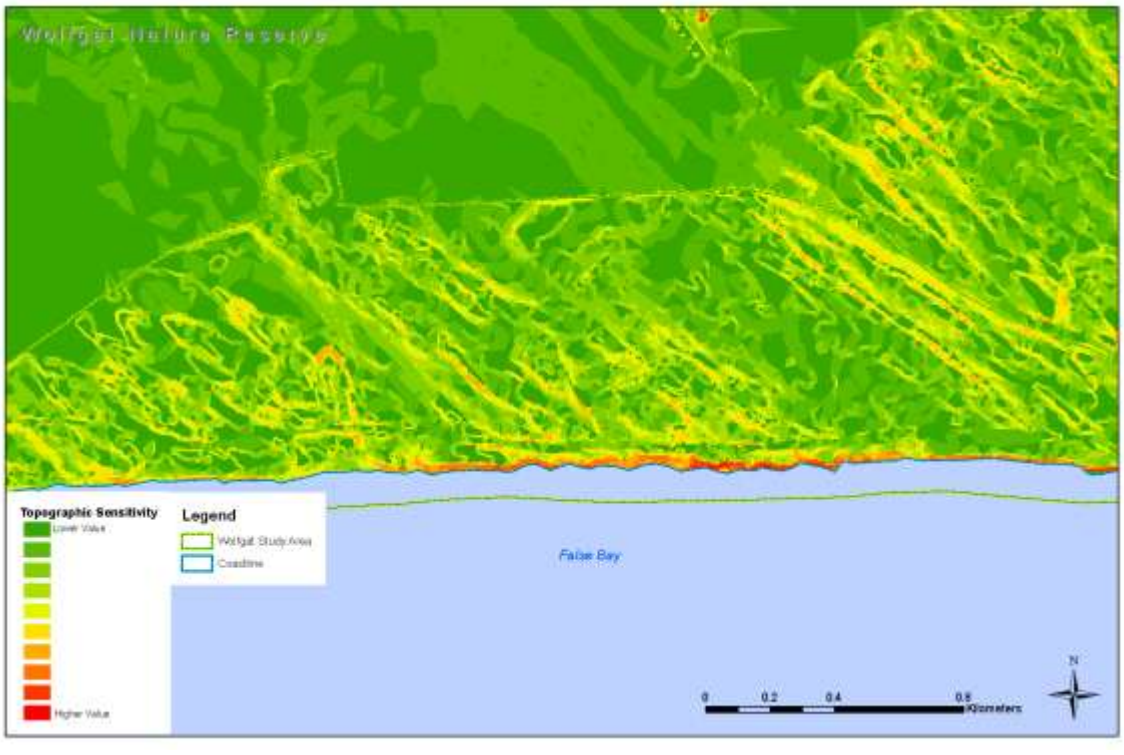


Figure 4: Topographic sensitivity map

Interpretation in local context

Wolfgat Nature Reserve is characterised by vegetated longitudinal dunes and steep eroded limestone sea cliffs.

3.1.3 Hydrological Sensitivity

The hydrological sensitivity layer has two purposes: to identify areas important for maintaining hydrological processes and to identify areas where infrastructure could be damaged by flooding.

Data inputs (GIS methods and sources)

The footprint within which the hydrological sensitivity is determined is defined by buffering river and wetlands by pre-determined distances.

River data was extracted from the City's rivers layer.

Wetlands data was extracted from the City's wetland layer.

Scoring, logic and rationale

These layers were reclassified as artificial or natural wetlands. Both the rivers and wetlands were buffered and scored as detailed in Table 5.

Procedure

- Clip the rivers and wetlands layer to the buffered boundary layer
- Create separate shapefiles for Natural/Semi-natural wetlands and Artificial/Modified wetlands
- Buffer natural and semi-natural wetlands by 50m (ensure use dissolve all)
- Buffer natural and semi-natural wetlands by 100m (ensure use dissolve all)
- Union the three wetlands shapefiles, create a new field "BUFFER", populate with the buffer distance value
- On the output shapefile create a field "WETNAT_VAL" and populate according to the value in Table 4.
- Delete all unnecessary fields.
- Repeat these steps for the artificial/modified wetlands and rivers, using the values and buffer distances specified in Table 4.
- Merge the new wetlands and rivers shapefiles and dissolve adjacent features with the same value.
- Clip the shapefile to the reserve boundary
- Create and export map
- Final Hydrological sensitivity layer: WOLF_hydro_sensitivity.shp

Table 5: Hydrological sensitivity

Source	Category	Value	Note
City Wetland	Natural wetlands, seeps and pans - Actual core wetland area	10	Actual wetland area - potential for direct disturbance

	Natural wetlands, seeps and pans - 50m Buffer	8	High sensitivity to disruption of hydrological and sediment transfer processes
	Wetlands, seeps and pans - 100m buffer	5	Buffer to accommodate spatial extent of potential water level fluctuations.

Outputs - See Figure 5

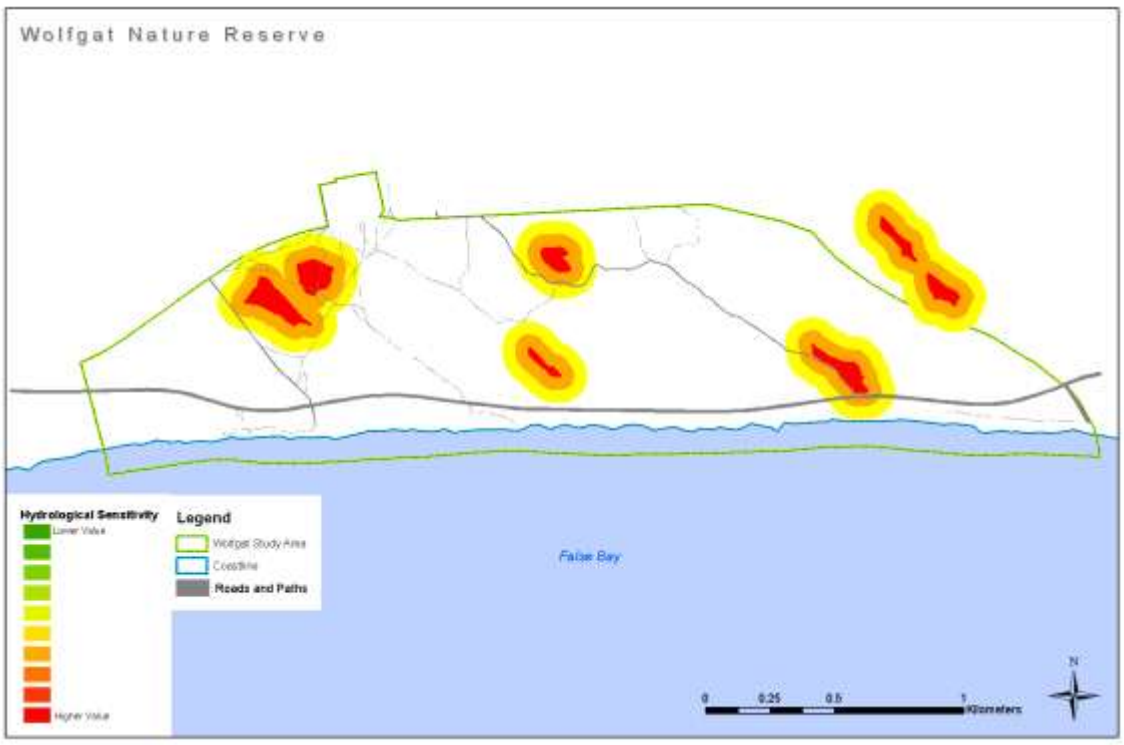


Figure 5: Hydrological Sensitivity

Interpretation in local context

The buffers applied in the analysis are generous and should be refined at a local, site level if required.

3.1.4 Visual Sensitivity

This layer examines the value of the study area from a visually aesthetic perspective. Visually intrusive development should not occur in areas with a high visual aesthetic value.

The visual sensitivity layer examines how visually intrusive a development will be in a landscape.

Data inputs (GIS methods and sources)

A viewshed analysis was run on the TIN created for the study area, using ArcMap 9.3.1 and the 3D Analyst extension.

Scoring, logic and rationale

The visual analysis examined how visually intrusive a development or structure would be at a particular point. Three separate variables were calculated (see Table 6).

- Slope steepness was calculated based on the TIN for the study area. Slope angles were divided into 10 equal width categories (the range was 0°-40°). These were scored in the range 1-10.
- An analysis of the visibility of each site from every other site in the reserve + a 1km buffer was undertaken. A 100m grid of points including the reserve and a 1000m buffer was used to define 810 viewpoints with a Z value of 1.8m (the grid was created using the "Special Raster Tools" in Hawth's Tools extension for ArcMap 9.3). The viewshed examines (on a proportional basis) which sites are most visible. Similar to slope steepness, these values were divided into 10 equal width categories and scored on a 0-10 basis.
- A viewshed analysis from all roads, paths and trails was undertaken. The analysis parameters used were the same as above except for the viewpoints used.
- These 3 values were added together and reclassified into the range 0-10 equal width categories to ensure compatibility with other layers.

Table 6: Visual Sensitivity Procedure

Source	Category	Value	Note
1. Slope Steepness			
❑ Slopes modeled in ArcGIS using Spatial Analyst		0-10	Slope angles calculated TIN created from 2m Contours

❑ Slopes reclassified	10 equal width categories		
	Scored 1 to 10		Values converted into ten integer based classes, with the maximum value equivalent to slopes of over 45°
2. Grid visibility			
❑ 100m grid of reserve + 1km buffer area used as viewpoints 810 Viewpoints		0-10	Analysis based on the TIN
❑ Reclassified	10 equal width categories		Values converted into ten integer based classes, with the maximum value equivalent to visibility from 2.5% of park viewpoints.
3. Tourist viewpoint and public road visibility			
❑ All Roads, paths and trails used as viewpoints (100m interval; 62 points)		0-10	Analysis based on the TIN
❑ Reclassified	10 equal width categories		Values converted into ten integer based classes, with the maximum value equivalent to visibility from 5% of park viewpoints.

Procedure:

Visual Sensitivity

- Create a 100m point grid covering the buffered (1km buffer applied) reserve boundary layer. Hawths tools have an easy tool for this.
- Create a point shapefile using the roads and paths shapefile. Hawths tools have an easy tool for this
- Run the viewshed analysis using the two shapefiles above as the view points. Use a Z factor of 1.8m.
- Reclassify into 10 equal width categories and export the raster to feature class.
- Clip to the reserve boundary
- Intersect the 3 shapefiles and delete all unnecessary fields. Add field “VISUAL_VAL” .Add up the 3 “VALUE” fields using the field calculator and populate the “VISUAL_VAL” field
- Reclassify into 10 equal class categories
- Create and export map
- Final Visual Sensitivity layer: WOLF_visual_sensitivity.shp

Outputs See Figure 6

Figure 6: Wolfgat Visual sensitivity

Interpretation in local context

A 1km buffer was applied to the study area for the visual sensitivity analysis. The small size of the reserve means that visual impacts could occur both inside and outside of the reserve. Visually intrusive structures or developments should be avoided. Visually intrusive developments within the 1km buffer of the reserve could have a negative affect on the reserve.

Although the visibility of the reserve from the sea side has not been considered in the analysis, this aspect must not be overlooked.

The False Bay coastline has been identified as an important coastal scenic route.

Showstoppers/Fatal flaws and Special Management Area Informants

The viewshed analysis determines the visibility of areas from predefined observation points. However, the visibility of a development is only one of the components that determine its visual impact. Other factors, such as the development's design, construction and layout also contribute to the overall impact on the aesthetic character of its environment. Special consideration should be given to developments that are proposed in highly visible areas or along important scenic routes.

3.1.5 Heritage Sensitivity

This layer summarises the value or significance of a heritage site. The significance of a site will to a large extent determine the level of protection and management measures required for a site, and hence should be taken into account when undertaking spatial planning.

The heritage value of this site is still to be determined, as there is a significant historical context to this site. However, the spatial nature of the heritage value would more than likely cover the entire reserve. This is still to be determined and will be captured in a special management overlay if necessary.

4. Sensitivity-Value Analysis process (including weightings) and summary layers

The sensitivity-value analysis process has two key parts:

- The preparation of the input layers in a consistent and easy to analyze format (as outlined in the previous sections)
- The preparation of a summary layer which allows all the input layers to be easily accessed, interrogated, combined in a range of weightings (if necessary), and then used as a decision support tool in a workshop situation.

Data inputs (GIS methods and sources)

The GIS process is geared to keeping the dataset flexible enough for use in a workshop situation. All input and summary data need to be available within a single vector shapefile. The GIS method is as follows:

- Clip all input summary datasets to the spatial footprint of the smallest layer. This should correspond to the extent of the study area boundary. It is critical that all the clipped layers have the spatial extent, even though not all the area within the layer may be included within a polygon. Areas outside the polygons receive a 0 value in the union process so it is critical that these represent true 0 values and not gaps in the dataset.
- Union all datasets. This produces a composite vector shapefile containing all the data from the underlying summary layers.
- Delete all unnecessary attribute fields from the union shapefile.

- Summary information is calculated for each of the fragmented polygons using simple field calculations. A new attribute field is added for each summary weighting. Values are calculated using the field calculator. Complex calculations can be saved as expressions.
- Details of the summary calculations are given in Table 7.

Table 7: Sensitivity-Value Weightings*

Name	Field Name	Composition	Notes
Linear summary	LINEAR	Habitat Value + Special Habitat Value + Topographic Sensitivity + Hydrological Sensitivity + Visual sensitivity + Heritage Value	Equal weighted summary of all layers
Biodiversity Value	BIODIV_VAL	Habitat Value + Special Habitat Value	Equal weighted summary of biodiversity value layers
Biodiversity sensitivity value	BIODIVSEN	2x(Habitat Value) + 2x(Special Habitat Value) + Hydrological Sensitivity + Visual sensitivity	Equal weighted summary of biodiversity value and sensitivity layers
Biodiversity Value driven summary	BIOVALHEAV	4x(Habitat Value) + 4x(Special Habitat Value) + Hydrological Sensitivity + Visual sensitivity + Heritage sensitivity	Layer which emphasizes the biodiversity value of a site, and hence is strongly influenced by the distribution of rare and threatened habitats and species, as well as by patterns of transformation across the landscape.
Balanced summary	BALANCED	2x(Habitat Value) + 2x(Special Habitat Value) + Topographic Sensitivity + Hydrological Sensitivity + Visual sensitivity + Heritage Sensitivity	This is the favoured layer which emphasizes biodiversity value and aesthetic considerations, and de-emphasizes biodiversity sensitivities

*Not all layers may be required as in the table

Outputs

See Figure 7

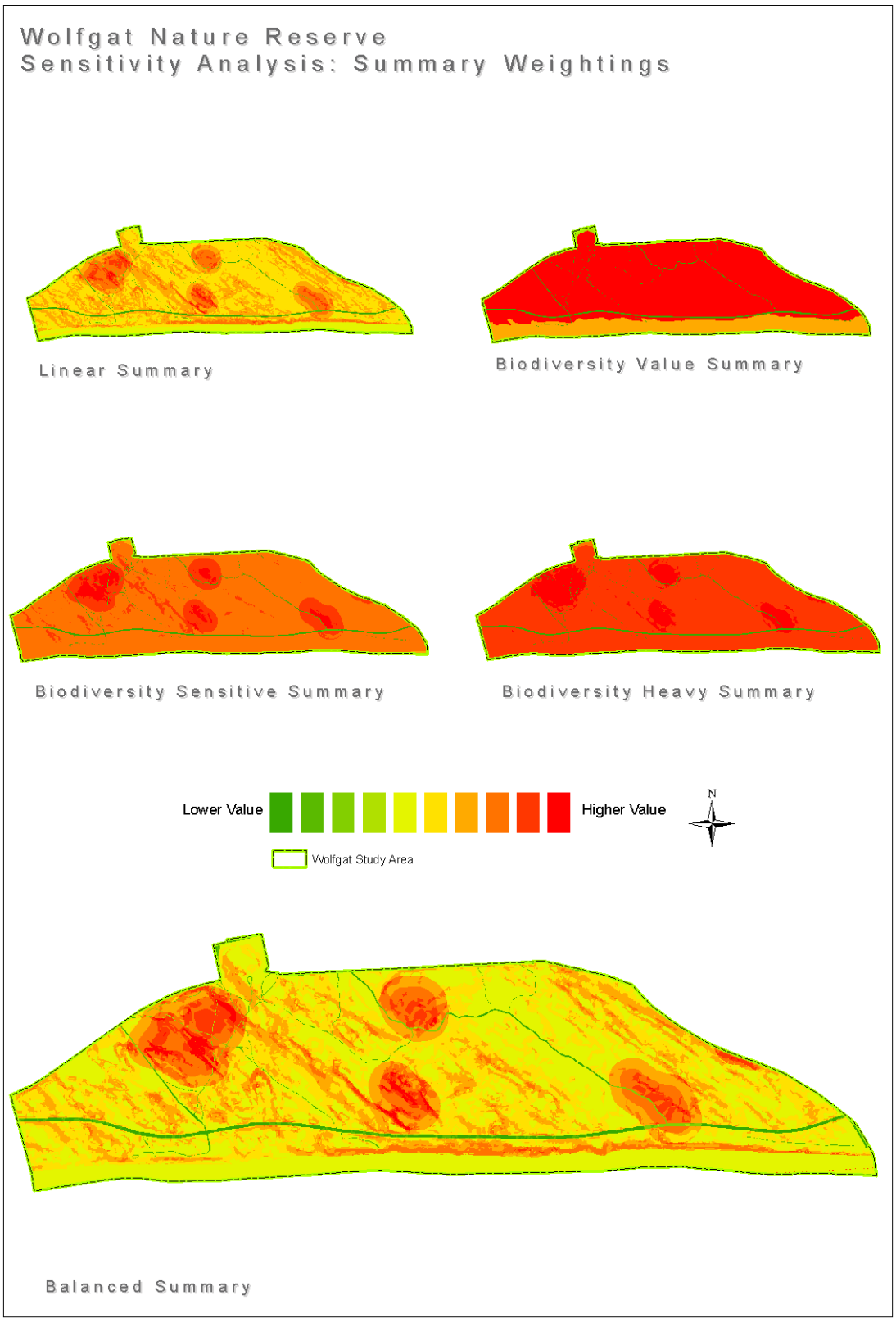


Figure 7: Examples from the outputs from the sensitivity –value analysis process using different weightings (See Table 6)

Interpretation in local context

The combined range of weightings presented in Table 6 and Figure 7 indicate no significant difference in outcome of the summary layers. The overriding importance of the habitat value is evident in the various weightings.

Showstoppers/fatal flaws and Special Management Area Informants

- The re-routing of Baden Powell drive is in the best interests of the long term vision for the reserve.

5. Zoning Process

5.1 Zoning Informants

This section briefly outlines the values underlying the identification of broad tourism use zones. It is important to remember that the landscape/biodiversity analysis is just one of the informants in the zonation process. Although the biodiversity analysis is intrinsically a relatively objective scientific process, other informants to the zoning process are not. Although every attempt is made to place high sensitivity-value sites into more protected zones where possible, the zoning process is in its essence a compromise between environment and development. In particular, often the identified high value sites are the key biodiversity assets that need to be made available in an appropriate manner to the ecotourism market. Direct links between the biodiversity layers and the spatial management of the reserve are made during the identification of special management areas (Where applicable). Even within broad high tourist use zones, there are likely to be areas subject to very tight conservation controls (potentially including complete exclusion of human impacts from an area).

Underlying decision making rules used in the zonation process:

- The zonation process is aimed a 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.
    - This is based on the underlying principle that all else being equal, an existing transformed site is preferable to a greenfields site from a biodiversity perspective.
    - 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 is 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, then the broad use zoning aims to keep the development footprint as small as is realistically 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 of the conservation area.

Two key points need to be emphasized:

- 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 within that use zone. Detailed site level planning is still required, and many sites may prove to be unsuitable at a site/precinct/EIA level of planning.
- Special Management Areas/Overlays need to be formalized and the links made to the management plans.

(Adapted from Holness, 2008)

5.2 Draft Zoning Outputs

Figure 8 shows the draft zonation for Wolfgat and figure 9 shows the zonation in context with the False Bay Ecology Park zonation. This is important as the coastline should be viewed in its entirety. The percentage area for each zonation category is shown in Table 9.

Table 9: Breakdown (in HAs and % of Area) of the 4 Zonation Categories in the reserve

ZONATION Category	***AREA HA***	***% of Area***
Conservation	239.6326	88.00
High Intensity Use	1.5276	1.00
Low Intensity Use	10.6189	4.00
Utility	17.7515	7.00

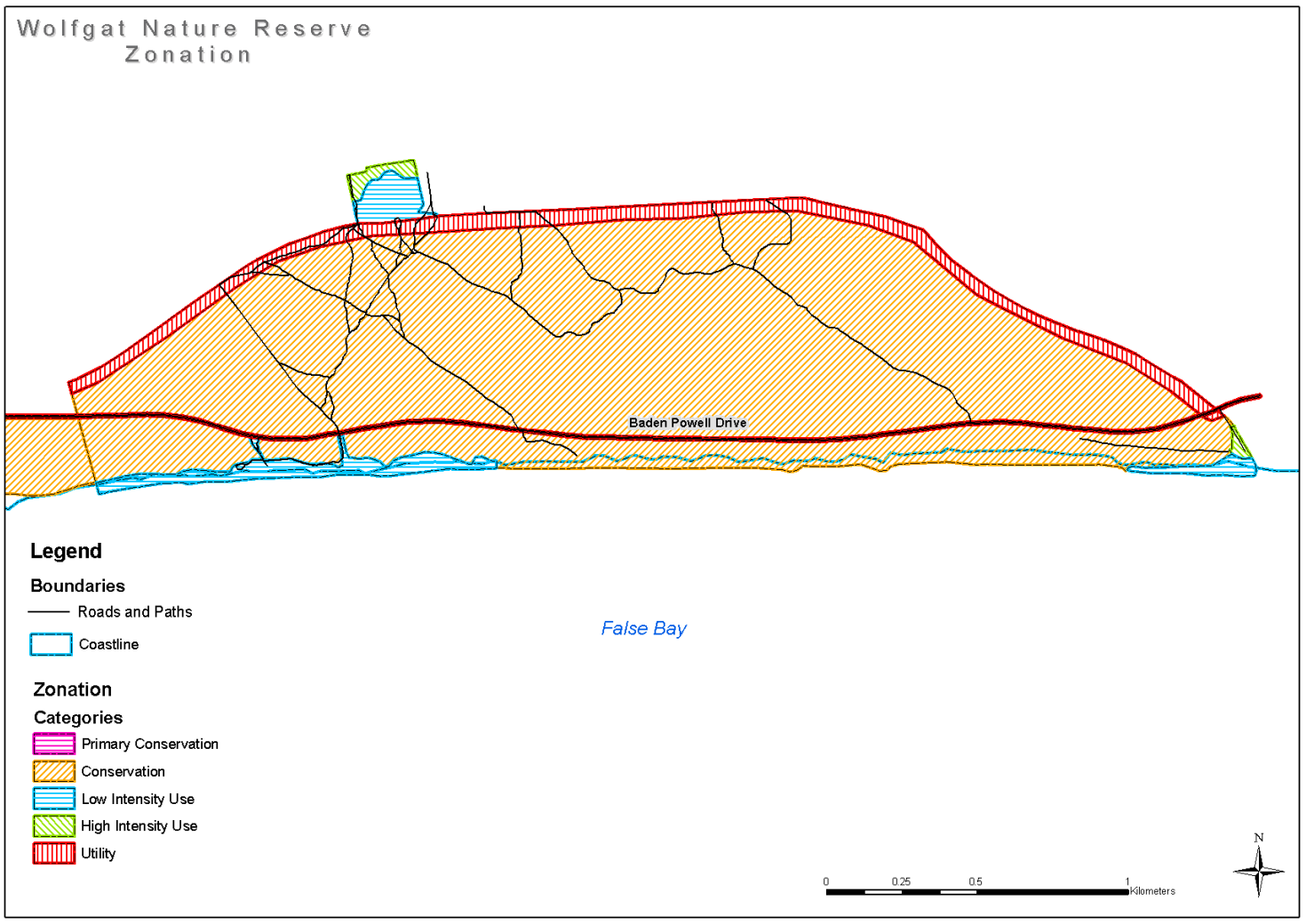


Figure 8: Wolfgat Nature Reserve – Draft Zonation

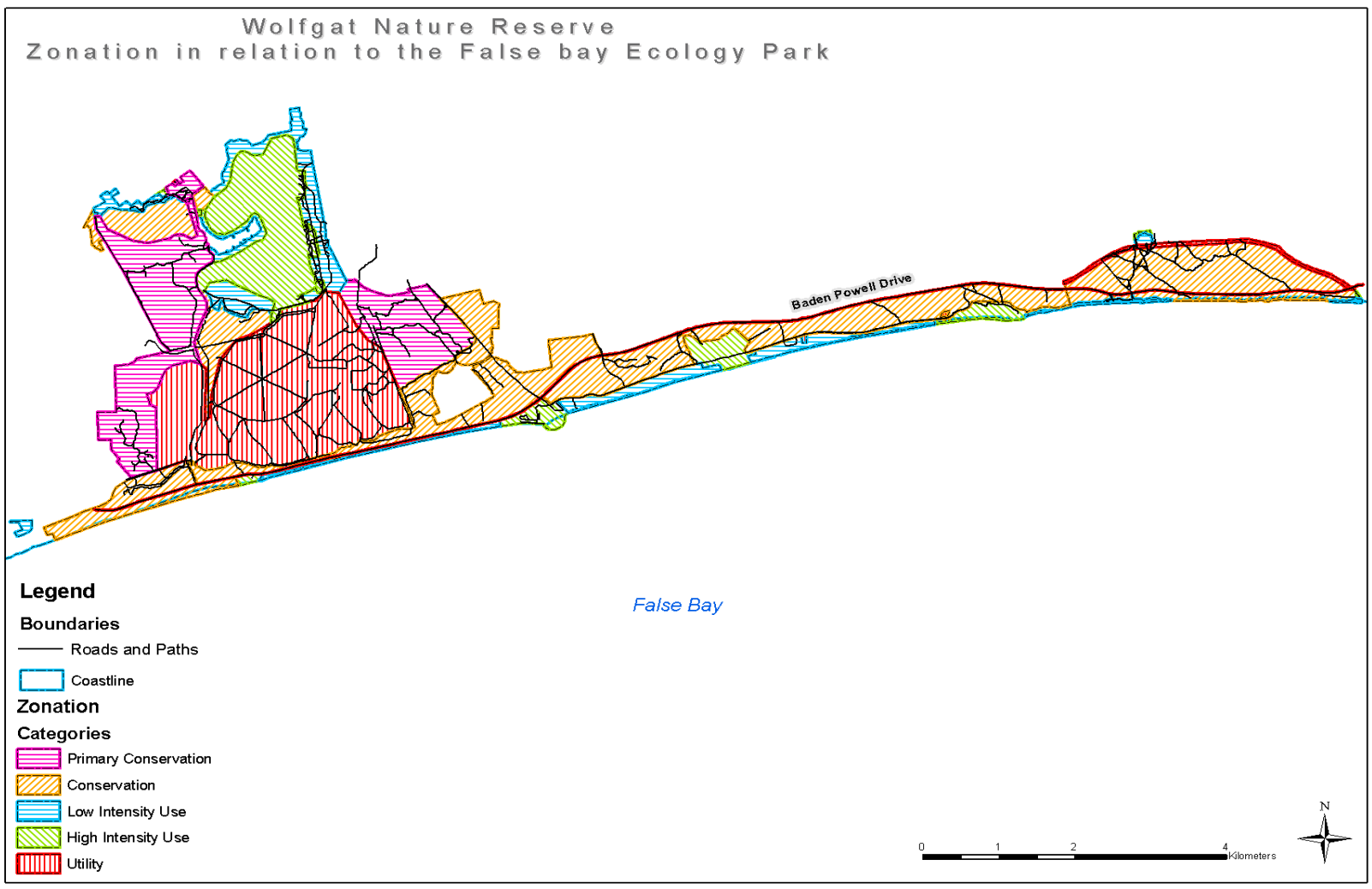


Figure 9: Wolfgat Nature Reserve Zonation in context of the False Bay Ecology Park

5.3 Zoning Definitions and Descriptions

Table 10 (see Appendices) outlines the proposed zonation and zone descriptions. The link is still made to the Zonation used for the CapeNature Reserves (Holness, 2008) as there should be general alignment of the broader use zones for ease of comparison and integration if required in Provincial documents.

5.3.1 Special Management Overlays

Overlay zones are applied to different areas of the reserve requiring special management intervention. Overlay management zones are applied to areas of national, regional or reserve based importance for example: RAMSAR SITE or IBA (important Bird Areas), NB cultural sites or Natural resource consumptive use areas (Medicinal Plants).

The potential special management overlays are:

1. Heritage
2. Special Conservation
    a. This special management overlay defines areas around known locations of critically endangered species or species requiring specific management interventions.
3. Rehabilitation
    a. Areas identified for restoration and rehabilitation

6. Conclusions and Recommendations

- The rerouting of Baden Powel drive will be in the long term interests of the reserve.
- The development footprint must be kept to an absolute minimum.
- The provision of facilities (Environmental Education Centres etc.) should be accommodate outside of the reserve where they can be readily accessed by the community and still enjoy easy access to the reserve.
- All unnecessary roads and tracks should be closed off and rehabilitated.
- Wolfgat's zonation also needs to be considered in the greater False Bay coastline context (Figure 9).

7. References

Benn, G. 2008. Terrestrial Systematic Conservation Plan re-Analysis: Methods and results. City of Cape Town Internal report.

Driver, A., Maze, K., Rouget, M., Lombard, A. T., Nel, J., Turpie, J. K., Cowling, R.M., Desmet, P., Goodman, P., Harris, J., Jonas, Z., Reyers, B., Sink, K. & Strauss, T. 2005. National Spatial Biodiversity Assesment 2004: Priorities for biodiversity conservation in South Africa. Strelitzia 17. SANBI, Pretoria.

Holness, 2005. Sensitivity Value Analysis Manual. A decision support tool, operating on the principles of systematic conservation planning, for integrating best available biodiversity knowledge into spatial planning within national parks. SANParks Internal Report.

Holness, S. Skowno, A. 2008. Report on Sensitivity-Value Analysis and Zonation Process for the Boland Mountain Complex. CapeNature Conservation Internal report.

National Environmental Management: Biodiversity Act (NEMBA). 2004 (Act No. 10 of 2004). Draft National List of Threatened Ecosystems.

Rebelo A. G., C. Boucher, N. Helme, L. Mucina, M.C. Rutherford *et a*l. 2006. Fynbos Biome, in: L. Mucina & M.C. Rutherford (eds). The Vegetation of South Africa, Lesotho and Swaziland. *Strelitzia* 19, pp 52-219.

SRK Consulting. 2008. Final Conservation Development Framework for Settlers Park Nature Reserve. Nelson Mandela Bay Municipality. Internal report.

SRK Consulting. 2008. Final Conservation Development Framework for Van Stadens Wildflower Nature Reserve. Nelson Mandela Bay Municipality. Internal report.

Snaddon, K. Day, L. Nel, J. Maherry, A. 2009. Prioritisation of City Wetlands. City of Cape Town Report.

Appendices

Table 9: Base values: Ecosystem Status of National vegetation types occurring in the City

Vegetation Type	NSBA Conservation Status	NSBA Conservation Status - Score	Criterion D Status	Criterion D score	SANBI Conservation Status (% target Conserved in City)	Conservation Status Score
Atlantis Sand Fynbos	Vulnerable	6	Critically endangered	10	Not Protected	5
Boland Granite Fynbos	Endangered	8	Vulnerable	6	Poorly Protected	3
Cape Estuarine Salt Marshes	Least threatened	4			Well Protected	-1
Cape Flats Dune Strandveld: False bay	Endangered	8	Endangered	8	Poorly Protected	3
Cape Flats Dune Strandveld: West Coast	Least threatened	4	Endangered	8	Poorly Protected	3
Cape Flats Sand Fynbos	Critically endangered	10	Critically endangered	10	Hardly Protected	4
Cape Lowland Freshwater Wetlands	Least threatened	4			Well Protected	-1
Cape Winelands Shale Fynbos	Endangered	8			Poorly Protected	3
Elgin Shale Fynbos	Critically endangered	10			Hardly Protected	4
Hangklip Sand Fynbos	Vulnerable	6	Vulnerable	6	Well Protected	-1
Kogelberg Sandstone Fynbos	Least threatened	4	Critically endangered	10	Moderately Protected	2
Lourensford Alluvium Fynbos	Critically endangered	10	Critically endangered	10	Poorly Protected	3
North Peninsula Granite Fynbos	Least threatened	4			Well Protected	-1
Peninsula Sandstone Fynbos	Least threatened	4	Endangered	8	Well Protected	-1
Peninsula Shale Fynbos	Vulnerable	6			Well Protected	-1
Peninsula Shale Renosterveld	Critically endangered	10			Poorly Protected	3
South Peninsula Granite Fynbos	Endangered	8			Moderately Protected	2
Southern Afrotemperate Forest	Least threatened	4			Well Protected	-1
Swartland Alluvium Fynbos	Critically endangered	10			Not Protected	5
Swartland Granite Renosterveld	Critically endangered	10	Critically endangered	10	Hardly Protected	4
Swartland Shale Renosterveld	Critically endangered	10	Critically endangered	10	Hardly Protected	4
Swartland Silcrete Renosterveld	Critically endangered	10			Not Protected	-1
Western Shaleband Vegetation	Least threatened	4			Poorly Protected	3

1.1.1 *Table 10: National vegetation types for the City of Cape Town showing historic extent, remaining extent, targets and targets achieved inside and outside Protected Areas*

National Vegetation Type	Historic extent (ha)	Current extent (ha)	Selected in Bionet (ha)	Target %	Target (ha)	Extent in proclaimed Protected Areas	Target met in selected Bionet	% Target conserved	% Target met in proclaimed Protected Areas	% Selected in Bionet from current extent	% Remaining from historic extent	15% of historic extent	% that is not selected in Bionet	Conservation Status	SANBI Conservation Status
Atlantis Sand Fynbos	25234.63	15711.95	12695.95	30	7570.39	0.00	Yes	168	0	81	62	3785.19	19	VU	Not Protected
Boland Granite Fynbos	9575.31	6064.19	4807.17	30	2872.59	354.52	Yes	167	12	79	63	1436.30	21	EN	Poorly Protected
Cape Estuarine Salt Marshes	39.86	25.79	25.64	24	9.57	25.64	Yes	268	268	99	65	5.98	1	LT	Well Protected
Cape Flats Dune Strandveld: False Bay	27260.11	8467.86	7272.84	24	6542.43	1855.58	Yes	111	28	86	31	4089.02	14	EN	Poorly Protected
Cape Flats Dune Strandveld: West Coast	12700.27	10603.88	6892.82	24	3048.07	964.79	Yes	226	32	65	83	1905.04	35	LT	Poorly Protected
Cape Flats Sand Fynbos	54410.34	8466.70	8464.75	30	16323.10	464.07	No	52	3	100	16	8161.55	0	CE	Hardly Protected
Cape Lowland Freshwater Wetlands	1463.98	1095.47	1068.83	24	351.36	786.66	Yes	304	224	98	75	219.60	2	LT	Well Protected
Cape Winelands Shale Fynbos	2666.97	1706.19	1388.97	30	800.09	217.89	Yes	174	27	81	64	400.05	19	EN	Poorly Protected
Elgin Shale Fynbos	841.18	321.14	282.77	30	252.35	4.58	Yes	112	2	88	38	126.18	12	CE	Hardly Protected
Hangklip Sand Fynbos	3301.60	1910.25	1489.88	30	990.48	1363.63	Yes	150	138	78	58	495.24	22	VU	Well Protected
Kogelberg Sandstone Fynbos	9499.63	9260.73	8814.04	30	2849.89	1944.47	Yes	309	68	95	97	1424.94	VU	LT	Moderately Protected
Lourensford Alluvium Fynbos	4819.25	409.97	409.97	30	1445.77	190.30	No	28	13	100	9	722.89	0	CE	Poorly Protected
North Peninsula Granite Fynbos	1997.35	1439.12	1343.54	30	599.21	986.44	Yes	224	165	93	72	299.60	7	LT	Well Protected
Peninsula Sandstone Fynbos	21896.12	21348.95	20761.60	30	6568.83	17306.57	Yes	316	263	97	98	3284.42	3	LT	Well Protected
Peninsula Shale Fynbos	1262.79	690.37	688.96	30	378.84	686.97	Yes	182	181	100	55	189.42	0	VU	Well Protected
Peninsula Shale Renosterveld	2374.81	316.89	316.89	26	617.45	261.67	No	51	42	100	13	356.22	0	CE	Poorly Protected
South Peninsula Granite Fynbos	7148.66	2481.74	2290.70	30	2144.60	1770.19	Yes	107	83	92	35	1072.30	8	EN	Moderately Protected
Southern Afrotemperate Forest	347.52	346.79	346.79	34	118.16	276.80	Yes	294	234	100	100	52.13	0	LT	Well Protected
Swartland Alluvium Fynbos	1742.41	75.91	75.91	30	522.72	0.00	No	15	0	100	4	261.36	0	CE	Not Protected
Swartland Granite Renosterveld	8059.16	1951.89	1951.89	26	2095.38	35.64	No	93	2	100	24	1208.87	0	CE	Hardly Protected
Swartland Shale Renosterveld	46712.40	4019.33	4018.76	26	12145.22	408.13	No	33	3	100	9	7006.86	0	CE	Hardly Protected
Swartland Silcrete Renosterveld	1066.65	188.43	188.43	26	277.33	0.00	No	68	0	100	18	160.00	0	CE	Not Protected
Western Shaleband Vegetation	328.59	328.57	328.57	30	98.58	31.11	Yes	333	32	100	100	49.29	0	LT	Poorly Protected
	244749.59	97232.12	85925.67		68622.40	29935.65						36712.44			

Appendix 14: **Security Audit**

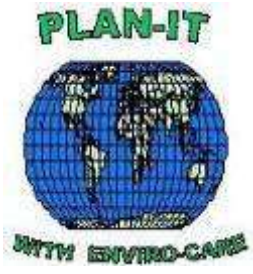
CITY OF CAPE TOWN

BIODIVERSITY MANAGEMENT BRANCH

Executive Brief

Comprehensive Security Audit of the Biodiversity Management Branch of the City of Cape Town

MARCH 2010



THORN-EX

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INTRODUCTION

The City of Cape Town' Biodiversity Management Branch, in wishing to ensure the safety of visitors and staff, requested assistance on conducting a security audit of all (25) its managed (and envisaged) Nature Reserves.

The need was based on the following assumptions:

- That the areas are poorly managed
- Security Agencies are inefficient in their operations
- The lack of tools to measure management effectiveness
- Safety and security of visitors as well as that of personnel are threatened.

Plan-It, in collaboration with Thorn-Ex and Titan Security, agreed to undertake the project. Owing to the budgetary constraints, it was agreed that the audit would encompass 12 priority Reserves, as selected by the Biodiversity Management Branch.

The following outcomes were proposed and accepted:

- A desktop exercise to evaluate existing information and identify gaps
- A physical Audit of the listed facilities
- Consultation with public user groups
- Recommendations in respect of security technology and infrastructure
- A comprehensive report on all findings
- A basic entry level conservation security training session for staff

The project was to be completed by the end of April 2010.

APPROACH

The focus was to be on the safety and security of staff working in the different reserves, of visitors to theses reserves and of the biodiversity within the reserves.

The audit was to involve the reserve managers, site managers and any other staff the Biodiversity Management Branch deemed necessary to provide information for the audit.

The Project commenced with the Branch being approached to supply maps of each reserve with as much information as possible on all types of infrastructure, bio-physiographic information etc e.g. boundaries of reserves and kind of fence along these, access points, roads, tracks, paths, power lines, telephone lines, buildings, cell phone towers, masts, aerials, bridges, streams, rivers, contours, vegetation, adjacent land use, habitation or settlements in close proximity.

Questionnaires were then drawn up and sent to all the Reserve Managers as well as separate questionnaires which were sent to the various public interest groups, via the Reserve Managers.

Upon receipt of the above the project team drafted a preliminary working document to guide and focus the audit.

The audit commenced on the 15th of February 2010 with a workshop with the various Managers and a presentation of the findings from the questionnaires to the Biodiversity Branch.

The audits commenced on the 16th of February 2010 with a visit to each Reserve..

During each audit the manager and staff were interviewed and a physical inspection of infrastructure was conducted. The audits focused on existing security systems, security infrastructure, activities, incidents, job descriptions, training and manpower

In addition to the audits workshops were scheduled, via the Reserve Manager with relevant external safety and security institutions and public interest groups. The workshops were then held with various District and Reserve-specific public interest groups.

On conclusion of the audit phase, the security technology specialist visited the Reserves to inspect the systems and infrastructure in place at each reserve. Based on and with reference to the initial draft Audit Report, the specialist undertook an assessment of technology short-comings in order to arrive at feasible recommendations for practicable improvements.

The completed report was then circulated to all the Reserve Managers as a Draft Report for comment, prior to the Final Comprehensive Report incorporating such comment being presented to the Branch.

The Project was then concluded with a basic entry level security training session for nominated staff covering aspects such as:

- Information gathering and reporting
- Patrol structuring, planing and safety
- Preparedness and response
- Handling of transgressors (armed or un-armed)
- Incident handling
- Charge office procedures
- Evidence and Statements
- Record keeping and dossier development

EXECUTIVE SUMMARY

A safety and security audit was carried out on twelve Reserves under the jurisdiction of the Biodiversity Branch of the Directorate Environmental Resource Management.

The Audit was aimed at doing a rapid and verifiable analysis of the current security situation, security services, infrastructure, staffing, and social contexts. The information allowed for a “threat” level to be determined for each reserve.

Information acquired through a questionnaire survey with the Reserve Mangers, and information provided by the Branch was used as a baseline to guide and provide focus for the individual Reserve audits.

The Audits very quickly revealed that the location of the various reserves with their own unique social contexts primarily dictated the level of threat of each Reserve.

Some Reserves perceived as being “dangerous” were found to be “safe” with very low key incidents actually occurring. Although social ills do tend to spill over into Reserves the occurrence thereof is very localised and relate to prostitution, substance abuse, theft and illegal plant harvesting for the muti trade.

General security observations revealed that any metal infrastructure or equipment and solar panels are at greatest risk and are stolen on a regular basis. Trespassing, vagrants traversing the reserves and the harvesting of plants for the commercial flower industry and commercially driven herbal medicine /”muthi” industry are linked to an associated threat to staff and visitors. However incidents of visitors and staff being accosted by vagrants are rare.

Security activities were generally viewed as an add-on function when incidents are reported, with some Reserve Managers and Field staff trying to fit security patrols and activities into their management work schedule. The Visitor Controller Officers, on the other hand are essentially Access Control Officers who may be called on to perform some Law Enforcement function if their training enables them to do so. However staff does carry out combined operations with Law Enforcement bodies like Marine and Coastal Management, SAPS or City Law Enforcement when activities in the vicinity of the reserves warrant this in the interests of conservation.

One of the most evident security shortcomings found was that Reserves were “abandoned”, for all practical purposes, after hours, on weekends and on public holidays.

The investigation also found that very few Reserves actively patrol the Reserve and fences on a regular basis.

The Findings of each audit, including the responses received form the public interest groups were used to determine the threat level of each Reserve. The threat levels are based on a combination of factors which may affect security to the reserve, its staff and visitors as well as these threats in relation to other reserves.

The threat levels low, medium, and high reflects the safety threat to visitors, staff, and infrastructure. Further to which the threat level provides an indication in respect of intervention priority (staffing, infrastructure, equipment).

The results were as follow:

Reserve	Threat Level	Threat	Primary Cause

Witzands ACA	Medium	Illegal Access / Trespassing	Lack of fencing
Blaauwberg CA	Medium	Illegal Access / Trespassing	Lack of coverage
Rietvlei WR	Low	Illegal Access / Trespassing	Lack of coverage
Durbanville NR	Low	Theft	Lack of presence
Bracken NR	Low	Trespassing	Lack of coverage
Tygerberg NR	High	Trespassing / poaching	Lack coverage
Zandvlei NR	Low	Illegal Access / Trespassing	State of infrastructure
Falls Bay EP	High	Violent crime	Lack of fencing /coverage
Edith Stephens WP	Low	Theft	Lack of fencing
Wolfgat & Macassar NR	Severe	Violent crime	Location & Social
Kogelberg NR	Medium	Illegal Access / Trespassing	Extent / coverage
Helderberg NR	Low	Illegal Access / Trespassing	Lack coverage

Understaffing and poor or non-existent boundaries were found to be the primary cause of compromised Reserve security. The provision of “feet on the ground” or a management presence is therefore viewed as the first step towards improving the current situation.

The Investigation did conclude that technology solution options entailed fairly low key equipment such as Day-Night or Peak Inversion monitoring cameras, basic building alarm systems, external building detection beams, lighting, etc.

Infrastructure requirements were predominantly in respect of fencing.

Fencing is not always the preferred solution for safeguarding and demarcating an urban Reserve. However, it is suggested that failure to demarcate the boundaries of a Reserve compromises the authority’s ability to manage a designated area and severely limits the authority’s ability to prosecute transgressors. Simple in-expensive measures such as signage and markers will greatly aid in addressing these matters.

The relative “newness” of the Branch was found create various generic management challenges which negatively affect the efficiency and effective of Reserve management.

The aforesaid institutional matters included:

- Lack in consistency of staff designations
- Lack of consistency in functional content (job descriptions)
- Lack of career pathing and skills development program
- Lack of measurable performance standards
- Lack of training and capacity building
- Lack of uniform operational procedures and protocols
- Un-clear performance objectives of Advisory Boards
- Jurisdictional uncertainties in respect of cooperation with other environmental law enforcement agencies
- Lack of memorandums of Understanding with Utility Service Branches active in Reserves

The apparent absence of a clear and definitive Branch Policy on Reserve Safety and Security was viewed as a contributing shortcoming. Further to which, no consistency was found in respect of operational procedures or protocols. Some stations had a Management Plan whilst others were still going to develop such plans. Some stations had developed their own safety procedures.

In respect of Procedures and Protocols it is suggested that the Biodiversity branch consider the developing the following procedures and protocols;

- Incident response (poaching, trespassing, theft, fire, attack, medical emergency, land invasion, pollution, un-wanted pets)
- Reserve patrols
- Fence and gate security
- Visitor control

It is suggested that the above procedures and protocols be developed in conjunction with an auditable reserve management system which is linked to the personnel and finance performance requirements. It is also recommended that the Branch conduct an Institutional “Governance Audit” to guide the above protocols, relationships with other government institutions and law enforcement bodies as well as the Branch’s legal obligations.

Consultation with public interest groups and reserve managers highlighted the benefits of “friend” groups. Some stations financial ability and conservation maintenance activities were greatly enhanced by such “friends” groups. Further to which, the social role that urban reserves play as “safe areas” for people to walk their pets, have picnics or conduct social functions was highlighted at several public meetings. It was also mentioned that in some areas where “gang turf” issues were dominant the reserves were viewed as “neutral” territories.

Advisory Boards are a requirement in terms of reserves proclaimed under the Protected Areas Act although no clarity could be defined with respect to the extent, role and responsibilities of the various Reserves Advisory Boards. Some Reserves indicated that they played an active role whilst others were not aware of their existence. The development of clear responsibilities and objectives for each Board is viewed as

imperative to contributing to the achievement of the Reserve objectives whilst providing a formal link to neighbouring communities and local government.

Most Reserves have other City Utility Departments executing functions within the Reserve, share boundaries with them, or manage large tracts of land under their jurisdiction. None of the Reserves were aware of any Memorandums of Understanding which clarify joint management matters. This was viewed as institutional shortcoming requiring attention at higher level.

A variety of Security Service providers render various levels of security to Reserves. These services vary from private security firms providing uniformed guards to provide a static or gate control service to services where such guards are used as Bushrangers. It was the investigation's conclusion that each District or Reserve negotiates their own contract conditions with such service providers, a situation which does not contribute to clear and measurable security service provisioning.

The City Law Enforcement Services and structures were generally viewed as not being able to respond to conservation related incidents. Only a few Reserves reported adequate responses to call-outs or incidents with most Reserves saying they rely on the local SAPS for assistance.

Reserves which have installed alarm systems linked to the City Law Enforcement Control Rooms, reported that in the event of alarm activation the Reserve manager is phoned to investigate. No direct service benefit could be found in respect City Law Enforcement.

What was most evident during the investigation was the risk posed by staff acting outside their areas of jurisdiction. These transgressions are not through ill intent and staff is not necessarily aware that they are exceeding their authority. Urgent attention should be paid to the authority necessary for the role staff plays in enforcing provincial conservation laws, fisheries laws, and National laws. This should be done in cognisance of the criminal Procedures Act. It is further suggested that cooperation agreements and execution delegations be formalised with other environmental and conservation agencies.

Due to several reserves having a coastal boundary and the ever present activities of highly organised and dangerous Abalone poaching gangs the involvement of staff in curbing these activities need to clearly defined and coordinated. It is suggested that this should be the preserve of a highly trained and well equipped District based Law Enforcement Component conducting their duties in collaboration with other authorities and with the necessary jurisdiction.

It is the opinion of this investigation team that the establishment of a District based Law Enforcement Component will greatly contribute in addressing some of the security shortcomings highlighted. In addition, such a component will also alleviate some of the external enforcement requirements placed on Reserve staff thus allowing them to focus on reserve management and security.

CONCLUSION AND GENERIC RECOMENDATIONS

The audit results correlated closely with the location and management capacity of each Reserve. High concentrations of un-employed people living in dense informal settlements adjacent to reserves do pose a greater risk to the Reserves. Staff was found to be more exposed to violent crimes in such circumstances than those located in rural or medium to high income areas.

Although social ills do tend to spill over into Reserves the occurrence thereof is very localised and relates to prostitution, substance abuse, theft and illegal plant harvesting for the muti trade.

The Findings of each audit, including the responses received form the public interest groups were used to determine the threat level of each Reserve.

The threat levels low, medium, and high reflects the safety threat to visitors, staff, and infrastructure. Further to which the threat level provides an indication in respect intervention priority (staffing, infrastructure, equipment).

The results were as follow:

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Wolfgat & Macassar NR	Severe	Violent crime	Location & Social
Kogelberg NR	Medium	Illegal Access / Trespassing	Extent
Helderberg NR	Low	Illegal Access / Trespassing	Lack coverage

Understaffing and poor or non-existent boundaries were found to be the primary cause of compromised Reserve security. The provision of “feet on the ground” or a management presence is therefore viewed as the first step towards improving the current situation.

The Investigation did conclude that technology solutions entail fairly low key equipment such as Day-Night or Peak Inversion monitoring cameras, basic building alarm systems, external building detection beams, lighting, etc.

Infrastructure requirements were predominantly in respect of fencing.

Fencing is not always the preferred solution for safeguarding and demarcating an urban Reserve. However, it is suggested that failure to demarcate the boundaries of a Reserve compromises the authority’s ability to manage a designated area and severely limits the authority’s ability to prosecute transgressors. Simple in-expensive measures such as signage and markers will greatly aid in addressing these matters.

In areas where fencing is vandalised on a regular basis the use of electric fencing (long distances, or Diamond Razor Mesh (short distances) is recommended. However it is recommended that spring-steel barb wire be used in all other instances.

The relative “newness” of the Branch was found to create various generic management challenges which negatively affect the efficiency and effective of Reserve management.

The apparent absence of a clear and definitive Branch Policy on Reserve Safety and Security was viewed as a contributing shortcoming.

A great inconsistency was found in staff designations, with some staff fulfilling similar conservation functions being called Conservation Officers whilst other were called Site Managers or Assistant Managers. The same problem was evident within the junior staff ranks. On some stations “labourers” conducted similar duties to those of Bushrangers.

The appointment and use of Contract staff was found to be a management challenge to most Reserves. Contract staff are generally employed by an external service provider whilst The Branch is responsible for the day to day management of said staff including the provision of uniforms

and training. The opinion is held that the cost of these services could very well be such that the Branch could employ these contract staff directly to a greater benefit.

Several instances were found of junior staff being employed for several years as “Small Plant operators” or “Foreman” and having developed a keen interest and expertise in various conservation matters. The provision of career pathing opportunities to staff will not only contribute to the goals of the Branch but also provide an incentive to junior staff.

No evidence was found of a clear skills development program for officers and the impression was created that each officer arranges and sees to his or her own training. This was especially evident with some officers having been trained as Peace officers and appointed whilst others had been trained but not appointed and some still needed to be trained. Some Officers were also expressing the need to be appointed as Fisheries Officers whilst other believed they should be trained and appointed as Environmental Inspectors.

Most reserves had Conservation Students and Interns fulfilling a variety of roles and responsibilities, in some instances un-paid. The rotation of Students and interns was thought to be a good means of exposing them to various experiences and opportunities.

The investigation also found that most staff lacked basic equipment such as binoculars, handcuffs, batons or mace thereby limiting their ability to execute their duties.

The apparent lack of a dress code was viewed as a factor which contributed to the public’s sense of security or respect when coming into contact with officers. The wearing of T-shirts, overalls, or golf shirts should not be promoted whilst on duty in the public eye.

No consistency was found in respect of operational procedures or protocols. Some stations had a Management Plan whilst others were still going to develop such plans. Some stations had developed their own safety procedures.

One of the most evident security shortcomings found was that Reserves were “abandoned”, for all practical purposes, after hours, on weekends and on public holidays. It is understood that staff work standard working hours. However, the provision of accommodation, which most Reserves have, to either Site managers or Bushrangers are seen as a simple cost effective measure. Where there are operational staff resident on the Reserves (mostly students) it acts as a definite deterrent to illegal activities. Staff stationed on Reserves can then work on a “conservation standard” shift schedule of 20 days on 5 days off.

The investigation also found that very few Reserves actively patrol the Reserve and fences on a regular basis. Although staff shortage is a contributing factor, careful planning and allocation of available resources will ensure that Reserves are patrolled on a regular basis. It is further suggested that the sharing of resources between Reserves will allow for more frequent patrols.

With regard to Procedures and Protocols it is suggested that the Biodiversity branch consider developing the following;

- Incident response (poaching, trespassing, theft, fire, attack, medical emergency, land invasion, pollution, un-wanted pets)
- Reserve patrols
- Fence and gate security
- Visitor control

It is suggested that the above procedures and protocols be developed in conjunction with an auditable Reserve management system which includes a personnel and finance performance aspect.

Consultation with public interest groups and reserve managers highlighted the benefits of “friend” groups. Some stations’ financial ability and conservation maintenance activities were greatly enhanced by such “friends” groups. It is accepted that not all Reserves have the opportunity to have well capacitated “friends”. However, the neighbouring community’s sense of ownership was found to be a primary contributor to a Reserves state of security.

Further to which the social role that urban reserves play as “safe areas” for people to walk their pets, have picnics or conduct social functions was highlighted at several public meetings. It was also mentioned that in some areas where “gang turf” issues was dominant the reserves were viewed as “neutral” territories.

Advisory Boards are a requirement in terms of reserves proclaimed under the Protected Areas Act. The aim of which is to allow participation by interested parties and to ensure their continual engagement. With regard to reserves not yet proclaimed under the Protected Areas Act but which have Advisory Boards their role is much the same with the possible addition of raising and allocation of funds. This investigation could not clearly define the extent, role and responsibilities of the various Reserves Advisory Boards. Some Reserves indicated that they played an active role whilst others were not aware of their existence. The development of a clear responsibilities and objectives for each Board is viewed as imperative to contributing to the achievement of the Reserve objectives whilst providing a formal link to neighbouring communities and local government.

The removal of Spare tyres from Reserve vehicles by the Transport Sections should be halted as it poses a significant risk to staff operating in remote areas or providing law enforcement services.

Most Reserves have other City Utility Departments executing functions within the Reserve, share boundaries with them, or manage large tracts of land under their jurisdiction. None of the Reserves were aware of any Memorandums of Understanding which clarify joint management matters. This was viewed as institutional shortcoming requiring attention at higher level.

A variety of Security Service providers render various levels of security to Reserves. These services vary from private security firms providing uniformed guards to providing a static or gate control service to services where such guards are used as Bushrangers. It was the investigations conclusion that each District or Reserve negotiates their own contract conditions with such service providers, a situation which does not contribute to clear and measurable security service provisioning.

The City Law Enforcement Services and structures were generally viewed as not being able to respond to conservation related incidents. Only a few Reserves reported adequate responses to call-outs or incidents with moth Reserves saying they rely on the local SAPS for assistance.

Reserves which have installed alarm systems linked to the City Law Enforcement Control Rooms, reported that in the event of an alarm activation, the Reserve manager is phoned to investigate. No direct service benefit could be found in respect of City Law Enforcement.

What was most evident during the investigation was the risk posed by staff acting outside their areas of jurisdiction. These transgressions are not through ill intent and staff are not necessarily aware that they are exceeding their authority. Urgent attention should be paid to necessary authority and the role staff play in enforcing provincial conservation laws, fisheries laws, and National laws. This should be done in cognisance of the criminal Procedures Act. It is further suggested that cooperation agreements and execution delegations be formalised with other environmental and conservation agencies.

Due to several reserves having a coastal boundary and the ever present activities of highly organised and dangerous Abalone poaching gangs, the involvement of staff in curbing these activities need to be clearly defined and coordinated. It is the opinion of this team that this should be the preserve of a highly trained and well equipped District based Law Enforcement Component conducting their duties in collaboration with other authorities and with the necessary jurisdiction.

It is the opinion of this investigation team that the establishment of a District based Law Enforcement Component will greatly contribute in addressing some of the security shortcomings highlighted. In addition, such a component will also alleviate some of the external enforcement requirements placed on Reserve staff thus allowing them to focus on reserve management and security. The current practice of Law enforcement staff working a daily night shift is questioned as no evidence could be found on its effectiveness. It is suggested that through information gathering, coordination with other authorities and planning, such nightly activities could take place on a sporadic basis with much greater successes.

The investigation team was also of opinion that the management requirements of the various Reserves need to be included in the Municipal Spatial Development Framework so as to ensure that the Reserve - Neighbourhood interface receive adequate attention.

SUMMARY OF RECOMMENDATIONS

INSTITUTIONAL		
Aspect	**Issue**	**Recommendation**
Governance	1. Relationship with other National & Provincial Conservation/Environmental institutions 2. Relationship with other City Institutions 3. Obligations in respect of By-laws, Municipal Systems Act (2000) and the Municipal Finance Management Act (2003) 4. Working agreements with other Utility Services	1. Conduct Institutional Governance Audit 2. Draft MOU's
Policy & Procedures	1. Management Policies, Goals, Objectives	1. Develop management Policies Goals & Objectives

	2. Operational Procedures &Protocols	2. Develop Procedures and Protocols
Management	1. Consistency in personnel designations 2. Consistency in personnel functional content 3. Career pathing 4. Skills development 5. Reserve Management Standards	1. Develop consistent Job Descriptions 2. Develop Skills Development and career pathing Protocol 3. Develop Auditable Reserve Management System linked to Personnel & Financial Performance Management System

Reserve	Additional Staffing	Security and Equipment	Infrastructure
NORTH			
Witzands	1. 3x Bushrangers 2. Small labor team 3. Staff must be trained in 4 wheel driving 4. Officers appointed as Peace Officers	1. Establish a MOU with Bulk Water 2. Replace damaged fences 3. Monitor Wood cutter activities 4. Permits must contain more information 5. Reserve map required 6. Curb illegal access 7. Regular perimeter patrols.	1. 4x4 vehicle in good condition 2. Office Trellidor and burglar bars 3. Demarcation of boundaries 4. Erect signage 5. Electric fence along north and north-eastern boundary 6. Basic staff equipment
Blaauwberg	6. 6x Bushrangers (2 x3-member teams) 7. 2 x Permanent Visitor Controller Off's 8. Officers appointed as Peace Officers 9. Station District Law Enforcement Component	4. Staff be appointed as Peace Officers 5. Law Enforcement Component duties expanded to cover "hot spots" in district. 6. Daily night shifts limited to conduct patrols across district and do ad hoc night time	1. Link present alarm system to security service provider. 2. Mount Day-Night camera to cover main resort area. 3. Active Monitor to monitor activities during peak periods. 4. Erect signage 5. Basic staff equipment
Rietvlei	1. 2 x Bushrangers 2. Officers appointed as Peace Officers	1. Regular perimeter patrols 2. Co-ordinate with MCM	1. Fence along R27 road. 2. Alarm systems at new facilities 3. Peak Inversion camera with recording facility for main gate 4. Fence open residential property boundaries 5. Patrol boat 6. Basic staff equipment
CENTRAL			
Bracken	1. 1x EE Officer/Community Officer.	1. Visible patrols 2. Liaison with Everite Hostel.	1. Ablutions at gate 2. Day-night camera for main access area.

	2. 1x Labourer		3. Removal of derelict buildings 4. Guard monitoring 5. Clear alien vegetation along fences 6. Basic staff equipment
Durbanville	1. 2x Visitor Controller Officers 2. Officers appointed as Peace Officers	1. Boundary fence cleared of vegetation 2. Erect signage iro handling of unwanted pets	1. Steel gate at offices to be kept locked, and fitted with buzzer and solenoid access control 2. Video monitor for door 3. Service counter inside front door 4. Alarm system to include response 5. Long-range mobile panic buttons 6. Lighting at offices and main gate 7. Peak Inversion camera for main gate 8. Guard Monitoring system 9. Basic staff equipment
Tygerberg	1. Employ current 3 Contract Bushrangers 2. 2x Bushrangers 3. 1x Site Manager 4. 1x Foreman 5. 5x Llabourers 6. 1x Additional EE Officer/Community Liaison 7. 2x Visitor Controller Officers 8. Officers appointed as Peace Officers 9. Station District Law Enforcement Component	1. Attend Community Police Forum and Crime Watch meetings. 2. Bushrangers obtain drivers licenses 3. Staff presence over week-ends and after hours 4. All gate remotes currently issued be recovered immediately and re-issued under a new access signal code 5. Keys handed out should be retrieved and locks changed. 6. Kanonberg be afforded controlled access in the event of a fire.	1. Replace existing camera at main entrance gate with a Peak Inversion camera with recording facility 2. Present cameras be replaced with Day-Night cameras. 3. Plattekloof and Quarry area be re-fenced with electric fence 4. Perimeter road should be constructed where feasible 5. Flatrap razer coils installed on top of all fences and along bottom of select fences 6. Accommodation for Bushranger teams 7. Installation of trigger operated floodlight in darker area of parking 8. Additional mountain bike 9. Basic staff equipment
SOUTH			
Zandvlei	1. 3x Visitor Controller Officers 2. 3x Bushrangers 3. 4x Labourers 4. Officers appointed as Peace Officers	1. Cease involvement in public amenity facilities on eastern side 2. Formal gate control required during open hours 3. Formalise relationship with Mountain Men Security Services 4. Evening security at offices by private security service provider	1. Northern access well designated and controlled access point 2. Signage at the entrance, parking areas & along the water 3. Re-fence office area with Diamond Razor Mesh 4. Provide appropriate security lighting 5. Replaced northern

		5. Introduce ad hoc evening patrols 6. Formalise co-operation with Marine and Coastal Management regarding control at the estuary.	and western fence with Diamond Razor Mesh fence 6. New offices need to be completed & fitted with monitored alarm system and BX Outdoor Beams 7. Guard Monitoring system 8. Motorized boat 9. Basic staff equipment
False Bay	1. 9x Bushrangers 2. 4x Static Guards 3. Officers appointed as Peace Officers 4. Station District Law Enforcement Component	1. Regular patrols supported 2. Bushrangers and Visitor Control officers should be circulated & deployed to cover peak periods of public use within the Park. 3. Change permanent night shift to a planned basis during periods of specific risk or in response to specific incidents 4. Co-ordinate night activities with other law enforcement bodies 5. Visitor Controller Officers patrol Zeekoevlei picnic area during peak periods.	1. Establish two or three Bushranger bases 2. Re-fence southern and eastern boundary electric fence 3. Motorised patrol 4. 2x Quad 5. Install Guard Patrol Monitoring system 6. Fence Rondevlei offices and EE Centre with Diamond Razor Mesh Install additional trigger 7. Install flood lights at all facilities 8. Day-Night camera to Rondevlei Viewing Tower for office and entrance area 9. Upgrade all existing cameras to Day-Night cameras with recording 10. Additional cameras for Zeekoevlei entrance gate and new office complex 11. Buildings should be alarmed with a siren and linked to a security service provider 12. Buildings which do not have security staff at night should be fitted with BX80 13. Erect signage 14. Basic staff equipment
Edith Stephens	1. Replace “small plant operator” with a fence maintenance post.	1. The reserve fence needs to be patrolled daily or at least twice a week 2. Walk-in access should be controlled and documented at the gate 3. Office gate should remain locked	1. Northern and southern fences must be replaced with Razor Diamond Mesh be considered or electric fence using spring steel wire 2. Management track should be created along the fence 3. Basic staff equipment
EAST			
Wolfgat & Macassar	1. 8 x Bushrangers. 2. 3x District Law Enforcement Officers	1. Weltevreeden office security system should include a response system	1. Demarcate reserve using cement poles 2. Erect signage 3. Move Macassar Gate

	3. 2 x Community Liaison Officers 5. Officers appointed as Peace Officers 6. Station District Law Enforcement Component	2. City employed private security with mobile support to patrol coastal road esp. parking areas 3. Investigate sand mining permits	4. Basic staff equipment
Kogelberg	1. 1x Visitor Controller Officer 2. 3x Bushrangers 3. Officers appointed as Peace Officers	1. Improve communication services	1. Construct Bushranger camp 2. Erect signage 3. Fence Erf 19 and north-west boundary using electric fence 4. Install alarm at all buildings 5. Install trigger lighting 6. Install depot fence at rear 7. Install Reed Switches for solar panels 8. Peak Inversion Camera for entrance gate to depot 9. Basic staff equipment
Helderberg	1. 6 existing Labourers trained to level of Bushrangers 2. Officers appointed as Peace Officers	1. Develop system for evening monies 2. Regular perimeter patrols	1. Erect signage 2. Electric fence be retained 3. Peak Inversion camera at main gate 4. Day –Night camera to cover parking area 5. Basic staff equipment

COSTING

The equipment costing listed below are based on actual quotes provided.

Fencing:

Diamond Razor mesh fencing installed per 100m	R 440,00/meter
1,8m, 12 strand electric fencing installed at 100m (Au Alloy wire)	R 55,00/meter
12 Joule Nemtek energizer with built in fence monitor	R 3400,00 excl

Alarm Equipment:

To supply and install an 8-zone alarm Paradox alarm system complete with battery back-up, keypad, 15 watt siren, four internal infra red passives, two fixed panic buttons and two reed switches. Alarm system can be zone doubled to a 16 zone system.

R 3600,00 excl.

To supply and install one outdoor BX80 beam R 1500,00 excl.

GSM 4 channel radio, programmed to four cellular phone numbers and linked to fence energizers, Alarm systems, Solar panels and standalone panic systems R 1800,00 excl

Long Range remote panic – one long range remote	R 250,00 excl.
Long Range receiver – installed	R 1100,00 excl.

Cameras:

To supply and install one gate camera – Peak inversion camera, auto-iris lens, 40m co-axial cable, power supply, 4-channel embedded digital recorder (250 G) hard drive and one 17 inch monitor. Price includes camera housing and installation R 11 900,00 excl.

To supply and install one day/night camera – Day/Night camera, auto-iris lens, 40m co-axial cable, power supply, 4-channel embedded digital recorder (250 G) hard drive and one 17 inch colour monitor. Price includes housing and installation R 12 900,00 excl.

Appendix 15: METT-SA Wolfgat Report

REPORTING PROGRESS IN URBAN PROTECTED AREAS

A Site-level rapid assessment tool based on the World Bank & WWF's "Management Effectiveness Tracking Tool"

Wolfgat Nature Reserve

Prepared for the

City of CapeTown

by

Howard Langley & Paul Britton

22 May 2007

REPORTING PROGRESS AT PROTECTED AREA SITES: DATA SHEET

Name of protected area	Wolfgat Nature Reserve		
Location of protected area (country and if possible, map reference)	South of Mitchell's Plain, North East of Khayelitsha on the False Bay Coastline, Cape Town, W Cape, RSA		
Date of establishment (distinguish between agreed and gazetted	*Agreed*	*Gazetted* 1986	
Ownership details (i.e. owner, tenure rights etc.)	City of Cape Town		
Management Authority	Environmental Resource Dept: Biodiversity Management		
Protected area size (ha)	248		
Staff numbers	*Permanent* 5	*Temporary* 1 Student	
Budget	Total R1,640 325.53 divided into 3 R547 751.76		
Designation (ICUN category), World Heritage, RAMSAR etc	local Authority nr		
Reason for designation	Core area of high conservation importance		
Brief detail of World Bank funded project or projects in PA	NONE		
Brief detail of WWF funded project or projects in PA	NONE		
Brief detail of other relevant projects in PA	Urban Renewal Programme		
List two of the primary protected area objectives			
Objective 1	Community Development and integration		
Objective 2	Biodiversity Conservation		
List the top two most important threat to the PA (and indicate reasons why they are selected)			
Threat 1	Impacts of the surrounding urban area including illegal dumping, removal of flora and fauna, antisocial behaviour.		
Threat 2	Lack of political will. There is no community or political champion supporting the area, it thus tends to be neglected.		
List top two critical management activities			
Activity 1	Law Enforcement		
Activity 2	Infrastructure/User Development		
Date assessment carried out:	**20th June 2007**		
Name of assessor:	**Charline Mc Kie**		

1: Context : Where are we now?	Criteria	Value	Score	Comments	Next steps
1.1 Legal status **Does the PA have secure permanent conservation legal status?**	The PA's permanent legal conservation status is not secured by its	0		Proclaimed local authority nature reserve in 1986.	Incorporation of area from Strandfontein Pavilion and area between Wolfgat NR and Macassar Dunes Conservation Area.
	There is a formal agreement that the PA should be afforded the highest possible legal protection, but the process has not yet begun.	1			
	The PA is in the process of being afforded the highest possible legal protection.	2			
	The PA has Local Authority Nature Reserve status, or a higher level of legal protection.	3	3		
1.2. Protected Area regulations	There are no legal mechanisms for controlling inappropriate land use and activities in the PA	0		CoCT By-laws applicable & Provincial Nature & Environmental Ord, 19/1974, thus legislation sufficient but staff remains a constraint.	Reserve inventory consist of a copy of the applicable CoCT by-law, Acts and Ordinances.
	Legal mechanisms for controlling inappropriate land use activities in the PA exist but are not being implemented.	1	1		
	Legal mechanisms for controlling inappropriate land use and activities in the PA exist but there are some problems in effectively implementing them	2			
	Legal mechanisms for controlling inappropriate land use and activities in the PA exist and are being effectively implemented	3			
1.3. Law enforcement PA has capacity/resources to enforce regulations & bylaws well enough?	PA has no effective capacity/resources to enforce regulations & bylaws	0		No support from local law enforcement authorities. Have approached Law Enforcement for once per month joint patrol, SAPS wrt joint roadblocks along Baden Powell & criminal activities in & around the area. Have remained in contact with Huguenot Neighbourhood Watch of Tafelsig.	Attended Law enforcement course, awaiting appointment and appropriate legal supporting documentation in order to issue 'spot fines'. However R van Wyk & I are just 2 persons and that is part of what we are supposed to do and not our sole core business. R van Wyk to get in contact with Metro Police. Attend CEPF meetings 2/3 per annum.
	There are major deficiencies in capacity/resources to enforce regulations & bylaws (e.g. lack of skills, no patrol budget)	1	1		
	PA has acceptable capacity/resources to enforce regulations & bylaws but some deficiencies remain	2			
	PA has excellent capacity/resources to enforce regulations & bylaws	3			
1.4. Protected Area boundary demarcation **Is the boundary known and demarcated?**	The boundary of the PA is not known by the management authority or local residents/neighbouring land users	0		The boundary is recognised by some of the residents only. The Boundary is not adequately demarcated. The need for a 500m palisade fence is required along the Lost City section bordering on the Reserve. This area is densely populated, the Reserve has been encroached upon in this particular area by the local community and initiation shacks. The boundary is clear to the Reserve manager except for the section at Lost City and where the Reserve actually starts off from Eisleben Rd.	I have been trying for 1 year to get the exact Grid reference for the Reserve boundaries. Attempt to obtain a map indicating the edge of the houses in Lost City from a member of the Lost City community. The rerouting of Baden Powel drive is important to form a difinitive boundary and better control access.
	The boundary of the PA is known by the management authority but is not known by local residents/neighbouring land users	1	1		
	The boundary of the PA is known by both the management authority and local residents but is not appropriately demarcated	2			
	The boundary of the PA is known by the management authority and local residents and is appropriately demarcated	3			
1.5. Resource inventory Do you have enough information to manage the area?	There is little or no information available on critical habitats, species and cultural values of the PA	0		Information is scattered and there are different sources, especially require specialised info eg wrt more Archeological info. Also original copies of documentation, booklets etc. Appropriate and sufficient storage space is a limiting factor.	Keep trying to get appropriate info from whichever source. Visit Izikio Museum again.
	Information on critical habitats, species and cultural values of the PA is not sufficient to support planning and decision making	1	1		
	Information on critical habitats, species and cultural values of the PA is sufficient for key areas of planning/decision making but the necessary survey work is not being maintained	2			
	Information concerning critical habitats, species and cultural values of the PA is sufficient to support planning and decision making and is being maintained	3			
Subtotal: Context		**15**	**7**		

2: Planning: Where do we want to be?	Criteria	Value	Score	Comments	Next steps
2.1. Protected area design Does the protected area need enlarging, corridors etc to meet its objectives?	Inadequacies in design mean achieving the PA's major management objectives is impossible	0		The area is currently easily accessible from multiple points from the urban area. Re-routing of Baden Powell drive will create a far less accessible boundary and will be easier to fence. Corridors connecting to coastal areas and other protected areas can be achieved to create connectivity and improve biodiversity conservation. .	Student' s research project supports this process as a biodiversity baseline sample survey of the a sample area between WNR and MDCA.
	Inadequacies in design mean that achievement of major objectives are constrained to some extent	1	1		
	Design is not significantly constraining achievement of major objectives, but could be improved	2			
	Reserve design features are particularly aiding achievement of major objectives of the PA	3			
2.2 Management plan Is there a management plan (compliant with Protected Areas Act) and is it being implemented?	There is no standard Management Plan for the PA	0		June, 2001 Draft management plan exists. It has not been approved.	Dept to ensure that Draft is approved. Look at a management plan review system and simplify a standard management plan.
	A standard Management Plan is being prepared or has been prepared, but is not yet approved.	1	1		
	An approved Management Plan exists and is being implemented, but has not been updated/reviewed during the past five years.	2			
	An approved Management Plan exists, is being implemented and has been updated/reviewed during the past three years	3			
2.3. Conservation Development Framework (CDF) Is there a visitor use zoning system indicating position and nature of operation & visitor infrastructure?	There is no CDF for the PA	0		Planned (10 years now) Wolfgat EEC plays pivotal role in the development of the CDF as it will be the gateway into the Reserve. User areas has been appropriately identified through the type of user activities throughout the Reserve. However as there is no fence it makes it difficult to control movement and access into and through the Reserve.	Attempt to again re-rally Departmental support for the EEC.
	A CDF is being prepared or has been prepared but is not being implemented	1	1		
	An approved CDF exists but it is only being partially implemented because of funding constraints or other problems	2			
	An approved CDF exists and is being implemented	3			
Additional points	The planning process allows adequate opportunity for key stakeholders to influence the management plan	1	1	Planning is done with Community partners & in this way they could have an influence on the review and update process of management plans. Monitoring and research results are part of planning and in particular evaluation is vital to the planning process.	Planning with stakeholders will continue to be necessary. Monitoring and research for inclusion into the biodiversity database. Evaluation is an integral part of planning as a learning and developmental process for staff and the Reserve.
	There is an established schedule and process for periodic review and updating of the management plan	1			
	The results of monitoring, research and evaluation are routinely incorporated into planning	1	1		
Subtotal Score: Planning		**12**	**5**		

3: Inputs: What do we need?	Criteria	Value	Score	Comments	Next steps
3.1. Research Is there a programme of management-orientated research work?	Research needs have not been identified nor is any research work taking place in the PA	0		People, adequate skills and knowledge is limited amongst own staff. Time constraints also a huge factor. Monitoring priorities have been identified.	Contact Tertiary institutions to provide opportunities for research projects specifically targeted projects for Reserve have been identified. Identify and confirm 'keystone' species
	Research needs have been identified, but other than for ad hoc research, no management orientated research is being done.	1	1		
	There is considerable research work but only limited "management" orientated research is being done.	2			
	There is considerable research work being undertaken, which is relevant to management needs	3			
3.2. Human Resource capacity Does the PA have sufficient HR capacity to manage the protected area?	The PA has no HR capacity	0		5 Staff members & 1 student to cover a 248 ha PA, not in the least sufficient.	Line management to ensure that staff component is sufficient according to the most updated Branch organogram.
	HR capacity is inadequate for critical management activities	1	1		
	HR capacity is sufficient, but there are deficiencies in necessary skills for critical management activities	2			
	HR capacity and expertise is adequate for management needs	3			
3.3. Current budget Is the current budget sufficient?	There is no dedicated budget for the PA	0	0	Pool budget (shared between 3 Reserves) is inadequate.	Individual budgets to be motivated for.
	The available budget is inadequate for basic management needs and presents a serious constraint to the capacity to manage	1			
	The available budget is acceptable, but could be further improved to fully achieve effective management	2			
	The available budget is sufficient and meets the full management needs of the PA	3			
Additional points	The budget is secure/guaranteed for the PA on an annual cycle	1	1	Wolfgat only	Line management to secure a budget for ESWP and MDCA. External funding. Planning for protected areas not to be done in an ad hoc manner in the past. Operational budgets should be part of the initial planning.
	The budget is secure/guaranteed on a three year cycle	2			
	The PA is not reliant on external funding	2			
Subtotal		**14**	**3**		

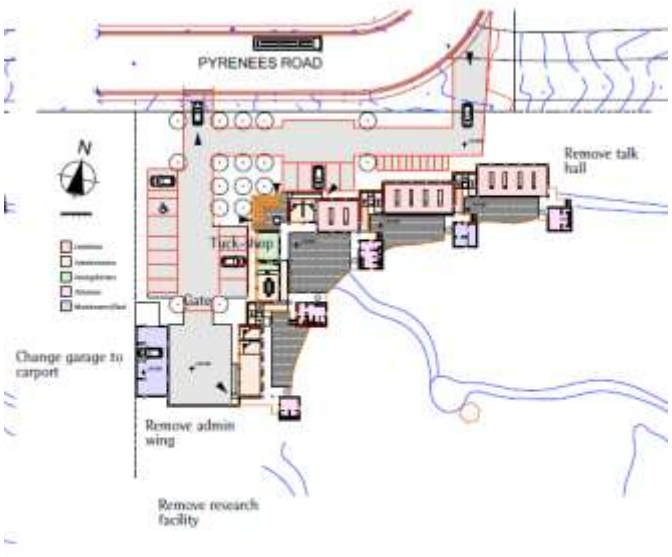
4: Process : How do we go about it?	Criteria	Value	Score	Comments	Next steps
4.1. Annual Plan of Operation (APO) Is there an annual work plan/APO that is approved by the organisation?	No approved/standardised APO exists	0		Approved Branch APO, targets are evaluated on a quarterly basis.	Continue with quarterly evaluation as part of the Biodiversity Management Branch. Implement at Reserve staff level. Evaluation should somehow be linked to Performance outcomes appropriate to the City?
	An approved APO exists but activities are not monitored against the plan's targets	1			
	An approved APO exists and actions are monitored against the plan's targets, but many activities are not completed	2			
	Actions are monitored against the approved APO's targets and most or all prescribed activities are completed	3	3		
4.2. Resource management Is the protected area adequately managed (e.g. for fire, invasive species, poaching)?	Requirements for active management of critical ecosystems, species and cultural values have not been assessed	0		Staff & financial constraints. Problems have been identified & other mechanisms are being implemented in an effort to limit degradation of resources under the circumstances.	Assess why these are particular problems, methods to address/engage these problems with the community and pro-actively find common ground. Also look at capital funds for enhancement for the protection of these resources e.g. get more fire hydrants distributed within the Reserve.
	Requirements for active management of critical ecosystems, species and cultural values are known but are not being addressed	1			
	Requirements for active management of critical ecosystems, species and cultural values are only being partially addressed	2	2		
	Requirements for active management of critical ecosystems, species and cultural values are substantially or fully addressed.	3			
4.3. Staff training Is there enough training for staff?	Staff are untrained	0		We are in the process of training by the Dept. Many relevant training opportunities have arisen in the past few months. Training Focus group has been appointed for the Branch. Training officer has been identified for the Branch.	Ensure that staff attend relevant training and keep them informed.
	Staff training and skills are low relative to the needs of the PA	1	1		
	Staff training and skills are adequate, but could be further improved to fully achieve the objectives of management	2			
	Staff training and skills are in tune with the management needs of the PA, and with anticipated future needs	3			
4.4. Budget management Is the budget managed to meet critical management needs?	Budget management is poor and significantly undermines effectiveness	0	0	Appropriate Budget management by the City is non-existent. Budget management by the Branch is well done, but we are all aware of the huge gaps and unfortunately do not hold any much 'say' as to the determination of any of the final budgets.	Inform line management of Operational and capital needs for the next financial year.
	Budget management is poor and constrains effectiveness	1			
	Budget management is adequate but could be improved	2			
	Budget management is excellent and aids effectiveness	3			
4.5. Operational equipment & infrastructure (as required for operational management purposes, but excluding tourism/visitor facilities)	There is little or no operational equipment & infrastructure	0		The only infrastructure refers to the management service tracks, hiking trail, signs, parking areas, boom gates. We have an adequate supply of tools and equipment in the store. Storage capacity also remains a limiting factor as we are again lodging at another Depts. premises.	
	There is some equipment & infrastructure but these are wholly inadequate	1			
	There is equipment and infrastructure, but still some major gaps that constrain management	2	2		
	There is adequate operational equipment and infrastructure	3			
4.6 Maintenance of equipment & infrastructure Is equipment & infrastructure (including tourism/visitor facilities) adequately maintained?	There is no approved Maintenance Plan and no maintenance is taking place	0		There is a maintenance checklist and is applied where applicable as part of the H&S regulations. The equipment register and store is inspected from month to month.	Keep monthly inspections
	There is no Maintenance Plan and maintenance is taking place to an unsatisfactory standard.	1			
	There is no Maintenance Plan, but maintenance is taking place to a satisfactory standard.	2	2		
	There is an approved Maintenance Plan that is being fully implemented to a high standard.	3			
4.7. Education and awareness programme Is there a planned education programme?	There is no education and awareness programme	0		Planned education programmes, 2 most important themes Waste management & Rocky shores. Assistant EE officer still in training, but producing EE of a high quality in line with the schools curriculum and site based lesson plans. Have linked up with the local Eco-schools programme (20 schools).	Continue to build EE officers capacity & thus EE programme ands provide the necessary support. Evaluate EE of the past 6 months.
	There is a limited and *ad hoc* education and awareness programme, but no overall planning for this	1			
	There is a planned education and awareness programme but there are still serious gaps	2	2		
	There is a planned & effective education & awareness programme fully linked to the objectives and needs of the PA	3			
4.8. Government & commercial neighbours Is there co-operation with adjacent land users?	There is no contact between managers and neighbouring official or corporate land users	0		Adjacent land users or owners are the residential property owners. I have had contact with 40% of the property owners. Some more regularly than others. Other landowners are CoCT open spaces.	Long term plan to implement a greening your neighbours project.
	There is limited contact between managers and neighbouring official or corporate land users	1	1		
	There is regular contact between managers and neighbouring official or corporate land users, but only limited co-operation	2			
	There is regular contact between managers and neighbouring official or corporate land users, & substantial co-operative management	3			
4.9. Advisory committee/forum An Advisory Committee of local representatives and specialists advises on PA management & development issues.	There is no Advisory Committee/forum	0		An Advisory Committee does not work as was established by the previous Wolfgat manager as the members did not attend the meetings.	Establish an active group consisting of community organisational representatives.
	An Advisory Committee/forum is in the process of being established communities	1			
	An Advisory Committee/forum exists, but does not contribute significantly to the management/development of the PA.	2	2		
	A well represented Advisory Committee/forum contributes significantly to the proper management/development of the PA.	3			
4.10. Community partners Do community partners have input to management decisions via the Advisory Committee?	Community partners have no input into decisions relating to the management of the PA	0		Reserve manager meets regularly with Community partners, to inform or discuss future projects which could benefit them and or requires their assistance.	Build their capacity: will be doing a Vision, APO, planning workshop for them.
	Community partners have limited input into the PA's management decisions via local governance structures	1			
	Community partners contribute to some decisions relating to management via the PA's Advisory Committee	2	2		
	Community partners are fully representative on the PA's Advisory Committee and directly participate decisions making.	3			
4.11. Commercial tourism Do commercial tour operators contribute to protected area management?	There is little or no contact between managers and tourism operators using the PA	0		The local MP Tourism forum, have attended meetings and visa versa. Have made contact with a local tour operator in 2005 and asked for stats but have had no contact with him since 2006 and have not received any info from him at all.	Re-contact MP Tourism forum to establish if they still exist.
	There is contact between managers and tourism operators but this is largely confined to administrative or regulatory matters	1	1		
	There is limited co-operation between managers and tourism operators to enhance visitor experiences and maintain conservation values	2			
	There is excellent co-operation between managers and tourism operators to enhance visitor experiences, protect values and resolve conflicts	3			
4.12. Monitoring & evaluation	There is no monitoring and evaluation in the PA	0		Each Reserve has their own system of monitoring and evaluation.	This should be standardised throughout the Branch
	There is some *ad hoc* monitoring & evaluation, but no overall strategy and/ or no regular collection of results	1			
	There is an agreed and implemented monitoring & evaluation system but results are not systematically used for management	2	2		
	A good monitoring & evaluation system exists, is well implemented and used in adaptive management	3			
Additional points	There is open communication and trust between local stakeholders and PA managers	1	1	Community partners can at any time get in touch with me and visa versa. Various programmes are being implemented.	
Subtotal		**37**	**21**		

5: Outputs/Outcomes: What were the results/achievements?	Criteria	Value	Score	Comments	Next steps
5.1. Visitor facilities Are visitor/tourism facilities good enough and sufficient to prevent damage to the PA?	There are no visitor facilities and services	0		No visitor facilities, no ablution facilities, only an established hiking trail and management service tracks. People have established a network of footpaths and this is definitely causing erosion and trampling particularly along the more established dunes.	Compile a CDF and obtain funds for implementation. Re-routing of BP Drive????
	Visitor facilities and services are inappropriate for current levels of visitation or are under construction	1	1		
	Visitor facilities and services are adequate for current levels of visitation but could be improved	2			
	Visitor facilities and services are excellent for current levels of visitation	3			
Additional points	There are active programmes for restoration of degraded areas within the PA and/or in associated buffer zone	1			
5.2. Ecological & Cultural condition assessment Is the protected area being managed consistent to its objectives?	Important biodiversity, ecological and cultural values are being severely degraded in the PA	0		Foreign material and rubble is dumped in the Reserve with invasive seed. Grysbok and Porcupine poaching thus the Arum Lilies and more woody vegetation are dominating the veld in certain areas of the Reserve. The Reserve is viewed as a bushland where potentially dangerous criminal activities are taking place.	Environmental education and activities are being implemented on a weekly basis. There is a drive for Political and other institutional support from Reserve management and staff.
	Some biodiversity, ecological and cultural values are being severely degraded	1	1		
	Some biodiversity, ecological and cultural values are being partially degraded but the most important values have not been significantly impacted	2			
	Biodiversity, ecological and cultural values are predominantly intact	3			
5.3. Access assessment Are the available management mechanisms working to control access or use?	Protection systems (patrols, permits etc) are ineffective in controlling access or use of the PA in accordance with designated objectives	0	0	No single point of access.	EEC
	Protection systems are only partially effective in controlling access or use of the PA in accordance with designated objectives	1			
	Protection systems are moderately effective in controlling access or use of the PA in accordance with designated objectives	2			
	Protection systems are largely or wholly effective in controlling access or use of the PA in accordance with designated objectives	3			
5.4. Economic benefit assessment **Is the Protected Area providing economic benefits to local communities?**	The existence of the PA has reduced the options for economic development of the local communities	0		There has been casual employment but is has not been sustainable. The short term employment is an exploitation of local labour.	More innovative longer term programmes need to be implemented and proper exit strategies need to be part of the initial planning process when employing or designing economically beneficial projects for the Reserve.
	The existence of the PA has neither damaged nor benefited the economy of the local economy	1	1		
	There is some flow of economic benefits to local communities from the existence of the PA but this is of minor significance to the regional economy	2			
	There is a significant or major flow of economic benefits to local communities from activities in and around the PA (e.g. employment of locals, locally operated commercial tours etc)	3			
5.5. Community benefit assessment (other than economic) e.g. recreation & education facilities, community hall, sport facilities etc.	The existence of the PA has not delivered any direct or indirect community benefits	0		As mentioned above. Only short term basic employment has been provided.	
	The existence of the PA has delivered some minor short term community benefits	1	1		
	The PA delivers some quantifiable long term community benefits that make a difference to the lives of local communities	2			
	The PA delivers considerable quantifiable long term community benefits that make a real difference to the lives of local communities	3			
Subtotal Score: Outcomes		16	4		

1: CONTEXT	VALUE	SCORE	
1.1. Legal status	3	3	
1.2. Protected Area regulations	3	1	
1.3. Law enforcement	3	1	
1.4. Protected area demarcation	3	1	
1.5. Resource Inventory	3	1	
Subtotal	**15**	**7**	
2: PLANNING			
2.1. Protected area design	3	1	
2.2. Management plan	3	1	
2.3. Conservation Development Framework	3	1	
Supplementary items	3	2	
Subtotal	**12**	**5**	
3: INPUTS			
3.1. Research	3	1	
3.2. Staff numbers	3	1	
3.3. Current budget	3	0	
Supplementary items	5	1	
Subtotal	**14**	**3**	
4: PROCESS			
4.1. Annual Plan of Operation	3	3	
4.2. Resource management	3	2	
4.3. Staff training	3	1	
4.4. Budget management	3	0	
4.5. Operational equipment & infrastructure	3	2	
4.6. Maintenance of equipment & infrastructure	3	2	
4.7. Education & awareness	3	2	
4.8. Government & commercial neighbours	3	1	
4.9. Advisory committee	3	2	
4.10. Community partners	3	2	
4.11. Commercial Tourism	3	1	
4.12. Monitoring & Evaluation	3	2	
Supplementary items	1	1	
Subtotal	**37**	**21**	
5: OUTPUTS/OUTCOMES			
5.1. Visitor facilities	3	1	
5.2. Condition assessment	3	1	
5.3. Access assessment	3	0	
5.4. Economic benefit assessment	3	1	
5.5. Community benefit assessment	3	1	
Supplementary items	1	0	
Subtotal	**16**	**4**	
TOTAL SCORE	**94**	**40**	**43%**

Appendix 16: Development Plans

WOLFGAT ENVIRONMENTAL EDUCATION CENTRE



New Scheme

May 2009

Appendix 17: Vegetation Monitoring Protocol

VEGETATION MONITORING PROTOCOL

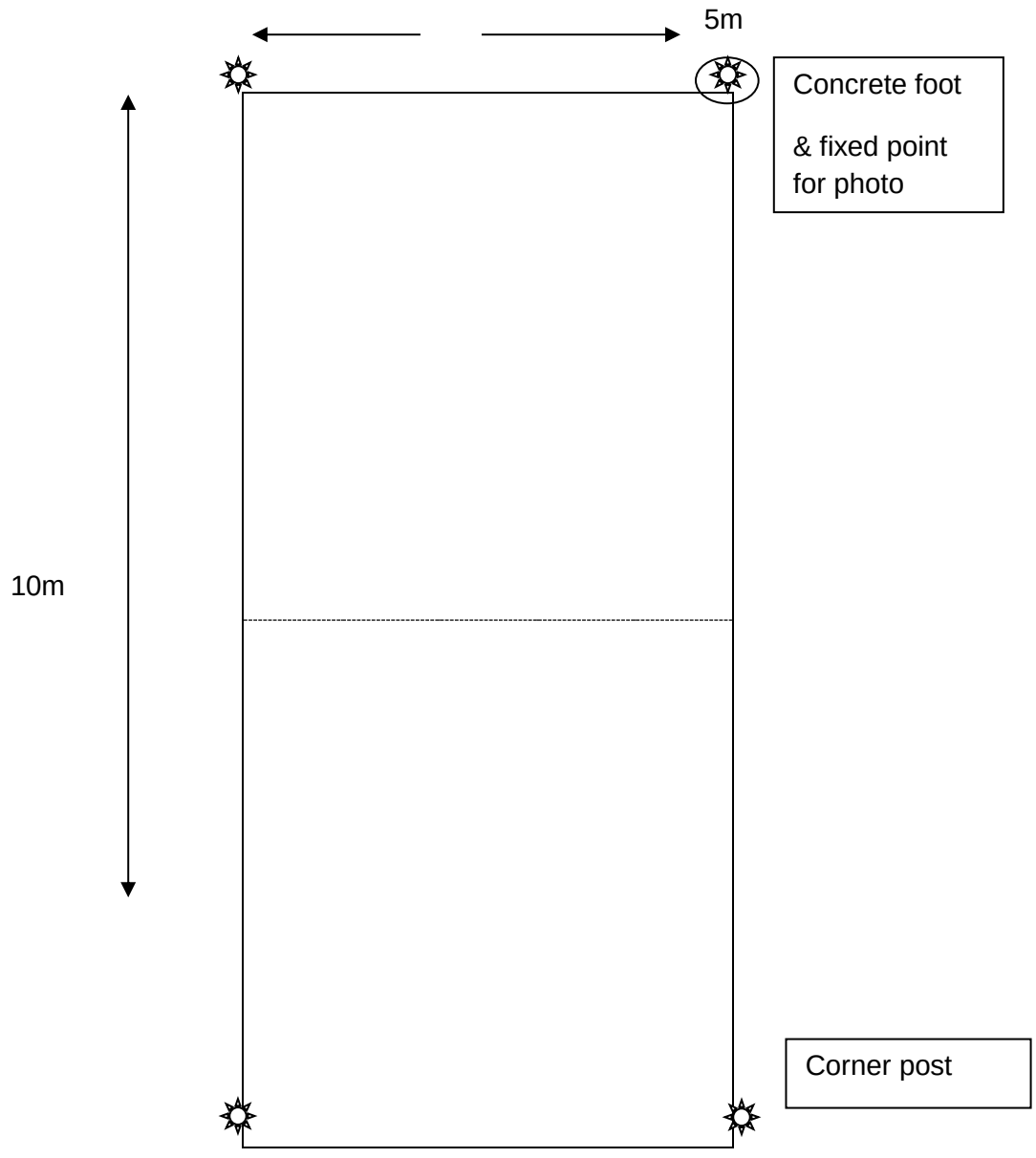
- Establish permanent plots – essential for long-term monitoring of vegetation change
    - Impact of management (grazing, fire regime, alien invasion, hydrology etc)
    - Post-fire succession
- Plot size – most species in shrubland communities are captured in a 5m X 10 m plot ($50m^2$) and this is the recommended size for these vegetation types in scientific studies. In most cases this is suitable (exceptions may be azonal vegetation that is structurally low, where a smaller plot is needed).
- Replication required – minimum of 3 plots per major vegetation type
    - Allows findings to be generalized
    - Minimizes risk of poor site selection & random events affecting data
    - Enables data to be used in scientific research (statistical analyses possible)
- Frequency & timing of monitoring
    - Plots should be monitored in the first 6 months after a fire, then at about 12 months (to ensure capture of fire ephemerals) and at 2 years and 3 years post-fire. Thereafter, the vegetation should be fairly mature and monitoring is only required every 3-5 years until the next fire or major disturbance.
    - Useful to have spring data (ephemerals present) and early autumn data (to record survivorship over the hot, dry season).
- What to monitor?
    - Species presence
    - Abundance – a good surrogate is plant projected canopy cover as a % of plot area.
    - Density – useful for rare species and bulbs; very time-consuming for other growth forms, so not recommended as a routine measurement.
    - Vegetation structure – most easily done using fixed point photography, with a scale-bar such as a metre stick as reference
- Fixed Point Photography
    - Useful back-up monitoring tool: can take repeat measurements if set up carefully
    - Very useful visual tool to show changes in vegetation communities over time. Usefulness increases the longer the data is collected.
    - Concrete foot to be permanently planted. The top North East corner of each quadrant will be a permanent marker and be a bracket mounting for the fixed point photography. The same bracket and camera will be used to take photographs in a North, South, East and West Direction.
    - Use a scale – such as a person holding a metre stick – as reference.

Setting up a vegetation monitoring plot

- Decide on number of plots required & suitable locations.
- Gather equipment:

- **4 corner poles** (one **concreted** in for permanency to be used as a mount for fixed point photography) the other 3 robust fence angle (Y – standards) uprights hammered deep into soil with **mallet**
- **GPS** to record plot position (take reading in plot centre)
- **50m – tape** to delineate plot while monitoring
- **10m – tape** – useful to split plot into 2 sections to assist visual estimates
- **Camera, camera mount & metre stick** for fixed point photographs
- **Field sheets** to record monitoring information
- **Field guides** to assist in plant identification in field
- **Plant labels** (jewellery tags or masking tape) to label specimens
- **Plastic bags & cool box** in which to place unidentified specimens for later identification and pressing

PLOT LAYOUT



Field sheet for vegetation monitoring in the CCT

Plot name & number		**Recorder** (names)	
Date		**Plot size**	
Locality information		**Environmental information**	
Locality (Wolfgat Nature Reserve or remnant name)		Vegetation type	
Land owner		Geology	
GPS reading		Habitat (dune slack, scree slope etc)	
Altitude		Soil description	
Aspect		Total indigenous vegetation cover (%)	
Fixed point photo-graph (direction)?		Total alien vegetation cover (%)	
Other observations (threats etc)		Date of last fire (month & year)	

Species composition of plot: record numbers (dens) of geophytes & rare plants

Species	**% cover**	**dens**	**Species**	**% cover**	**dens**

Species	% cover	dens	Species	% cover	dens

Notes: (insert a photo of the quadrate)

Appendix 18: Summarized Descriptions of the National Vegetation Types

Summarized Descriptions of National Vegetation Types Occurring in the City of Cape Town

Patricia Holmes, Biodiversity Management Branch, July 2008

The following descriptions reflect the latest national vegetation information available[2] [3] and the vegetation units described below (in alphabetical order) form the basis for the latest terrestrial conservation planning done in the City. Vegetation types are landscape-scale units of biodiversity that comprise a range of different plant communities and habitats. For example, calcrete outcrops and wetlands occur within particular vegetation types and contribute to overall biodiversity in those vegetation types. In addition, where two different vegetation types meet, there may be an abrupt vegetation boundary, reflecting a sudden change in underlying geology and soils, or else a wide transition zone – often called an ecotone – where physical changes are more gradual and attributes of both vegetation types are mixed.

It is important to note that all fynbos and renosterveld vegetation types are fire-prone and require periodic fires to regenerate their full species complement and prevent plant extinctions. Fire-return intervals are generally prescribed at between 8-30 years for fynbos and 4-10 years for renosterveld, with factors such as rainfall and soil-type playing a role in growth rates and required burning schedules. In the Cape Town area the natural fire season (and the optimal season for biodiversity conservation) is summer (January to March). By contrast, fire is not essential (but may occur occasionally) in strandveld and forest vegetation types.

Atlantis Sand Fynbos

(Previously described as Sand Plain Fynbos)

Distribution: Western Cape Province: Rondeberg to Blouberg on the West Coast coastal flats; along the Groen River on the eastern side of the Dassenberg-Darling Hills through Riverlands to the area between Atlantis and Kalbaskraal, also between Klipheuwel and the Paardeberg with outliers west of the Berg River east and north of Riebeek-Kasteel betweeen Hermon and Heuningberg. Altitude 40–250 m. 37.5% of this vegetation type occurs within the City and 62.5% outside the City. However, transformation rates are higher nationally (49%) than inside City borders (43%).

Vegetation & Landscape Features: Moderately undulating to flat sand plains with a dense, moderately tall, ericoid shrubland dotted with emergent, tall sclerophyllous shrubs and an open, short restioid stratum. Restioid and proteoid fynbos are dominant, with asteraceous fynbos and patches of ericaceous fynbos in seepages.

Geology & Soils: Acidic tertiary, grey regic sands, usually white or yellow.

Climate: Winter-rainfall regime with precipitation peaking from May to August. MAP 290–660 mm (mean: 440 mm). Mists (fogs) common in winter and supplying additional precipitation. Mean daily maximum and minimum temperatures 27.9°C and 7.0°C for February and July, respectively. Frost incidence about 3 days per year.

Endemic Taxa: Low Shrubs*: Leucospermum parile, Erica malmesburiensis, Serruria linearis, S. roxburghii, S. scoparia.* Herb*: Steirodiscus speciosus.*

Conservation: Critically endangered as it contains 100 Red Data species. Target 30%. About 6% conserved in Riverlands, Paardenberg and at Pella Research Site. Some 47% has been transformed, mainly for cultivation (agricultural smallholdings and pastures), by urban sprawl of Atlantis and for setting up pine and gum plantations. Woody aliens include *Acacia saligna*, *A. cyclops* and various species of *Eucalyptus* and *Pinus*.

Boland Granite Fynbos

[2] Based on: Rebelo et al. Fynbos Biome (2006). In: Mucina L & Rutherford M L (editors). The vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19, SANBI, Pretoria; Driver A (in prep) Threatened ecosystems for listing under NEM:BA 2008, South African Biodiversity Institute, Pretoria.

[3] See Table 1. and accompanying vegetation map

(Previously described as Mesic Mountain Fynbos)

Distribution: Western Cape Province: Upper slopes and summits of Paardeberg and Paarl Mountain as well as the lower slopes of mountains spanning the Groenberg and Hawequasberge (western foothills near Wellington), Pniel (Simonsberg and Groot Drakenstein Mountains and Klapmutskop), Franschhoek (Middelberg, Dassenberg, Skerpheuwel, Middagkransberg), Stellenbosch (Jonkershoek Valley and northern side of the Helderberg) and Helderberg Municipality (including lower south- and west-facing slopes of Haelkop and the Hottentots Holland Mountains and also the free-standing Skapenberg). It also occurs in the Du Toitskloof and Wemmershoek Valleys, Kaaimansgat and lower Stettynskloof, with outcrops on the Bottelary Hills and Kanonkop (near Pella). Altitude 150–650 m, reaching 850 m in places. 14.3% of this vegetation type occurs within the City and 85.7% outside the City, with similar transformation rates inside and outside the City.

Vegetation & Landscape Features: Moderately undulating plains and hills, varying from extensive deep soils, to localised deep soils between large granite domes and sheets. A fairly dense, 1–2 m tall closed shrubland with occasional low, gnarled trees dotted through the landscape. A diverse type, dominated by scrub, asteraceous and proteoid fynbos (with *Protea repens*, *P. burchelli*, *P. laurifolia* with *Leucadendron rubrum* and *L. daphnoides* as dominants on drier slopes, *Leucospermum grandiflorum* or *L. guenzii* dominant in seepage areas, and *P. neriifolia* and *Leucadendron sessile* on moist slopes), but with patches of restioid and ericaceous fynbos in wetter areas. Waboomveld is very typical and very extensive within this unit.

Geology & Soils: Cape Granite Suite rocks (Paardeberg, Paarl, Stellenbosch and Wellington Plutons). Soils usually of Glenrosa, Mispah forms, or red-yellow apedal. Freely draining soils are dominant, with exposed dome rock and large boulders.

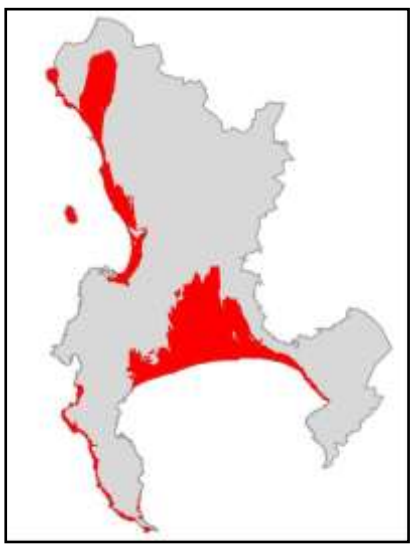
Climate: MAP 610–2 220 mm (mean: 985 mm), peaking from May to August. Mean daily maximum and minimum temperatures 26.6°C and 5.9°C for February and July, respectively. Frost incidence 2 or 3 days per year. The mean rainfall for this type is well below the 1 400 mm limit suggested by Campbell (1985) for fynbos on granite. Mists are common in winter.

Endemic Taxa: Tall Shrub*: Leucospermum grandiflorum.* Low Shrubs*: Aspalathus cephalotes subsp. cephalotes, A. stricticlada, Erica fausta, E. hippurus, E. lerouxiae, E. setosa, Leucospermum lineare, Lobostemon hottentoticus, Psoralea gueinzii, Pteronia centauroides, Serruria gracilis, Xiphotheca elliptica.* Succulent Shrubs*: Erepsia lacera, Lampranthus leptaleon, L. rupestris, Oscularia paardebergensis.* Herb*: Argyrolobium angustissimum.* Geophytic Herbs*: Babiana noctiflora, Ixia cochlearis, Lapeirousia azurea, Watsonia amabilis.* Succulent Herb*: Conophytum turrigerum.*

Conservation: Vulnerable. Target 30%. Some 14% statutorily conserved in the Hawequas, Hottentots Holland and Paarl Mountain Nature Reserves, with a further 34% found in Hawequas, Hottentots Holland mountain catchment areas and Helderberg and Paardenberg Nature Reserves. More than a half of the area has been transformed for vineyards, olive groves and pine plantations. Most common woody aliens include *Pinus pinaster*, *Hakea sericea* and *Acacia saligna*.

Cape Flats Dune Strandveld

(Dune Thicket)



Distribution: Endemic to Cape Town; mainly coastal, altitude 0-80m, but reaching 200m in places

Vegetation & landscape: flat to slightly undulating dune field landscape 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. 100% of this vegetation type occurs within the City and 56% is transformed.

Geology & Soil: tertiary to recent calcareous sand of marine origin. Outcrops of limestone found on the False Bay coast.

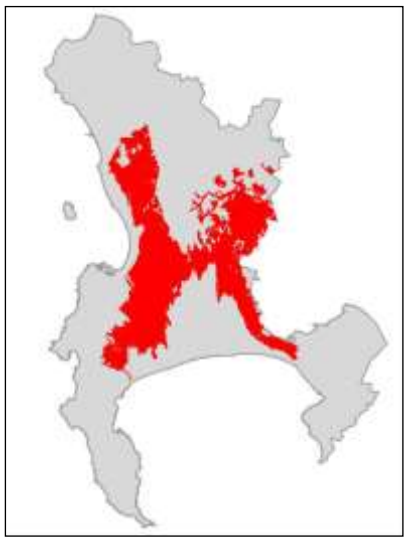
Climate: Mean Annual Rainfall 350mm in N to 560mm in S.

Endemic: *Lampranthus tenuifolius*

Conservation: Endangered: target 24%; 6% conserved.

Cape Flats Sand Fynbos

(Sand Plain Fynbos)



Distribution: Largely endemic to the City of Cape Town: Cape Flats from Blouberg and Koeberg Hills west of the Tygerberg Hills to Lakeside and Pelican Park in the south near False Bay, from Bellville and Durbanville to Klapmuts and Joostenberg Hill in the east, and to the southwest of the Bottelary Hills to Macassar and Firgrove in the south. Altitude 20–200 m. Nearly 100% of this vegetation type occurs within the City and 85% is transformed.

Vegetation & Landscape Features: Moderately undulating and flat plains, with dense, moderately tall, ericoid shrubland containing scattered emergent tall shrubs. Proteoid and restioid fynbos are dominant, with asteraceous and ericaceous fynbos occurring in drier and wetter areas, respectively.

Geology & Soils: Acid, tertiary, deep, grey regic sands, usually white, often Lamotte form.

Climate: Winter-rainfall regime with precipitation peaking from May to August. MAP 580–980 mm (mean: 575 mm). Mists occur frequently in winter. Mean daily maximum and minimum monthly temperatures 27.1°C and 7.3°C for February and July, respectively. Frost incidence about 3 days per year. This is the wettest and the coolest of the West Coast sand fynbos types.

Endemic Taxa: Low Shrubs: *Erica margaritacea, Aspalathus variegata* (probably extinct)*, Athanasia capitata, Cliffortia ericifolia, Erica pyramidalisW, E. turgida, E. verticillata, Leucadendron levisanus, Liparia graminifolia, Serruria aemula, S. foeniculacea, S. furcellata.* Succulent Shrub*: Lampranthus stenus.* Geophytic Herb: *Ixia versicolor.* Graminoids: *Tetraria variabilis, Trianoptiles solitaria.*

Conservation: Critically endangered. Target 30%. Less than 1% statutorily conserved as small patches in the Table Mountain National Park as well as some private conservation areas such as Plattekloof 430 and Blaauwberg Hill. This is the most transformed of the sand fynbos types—more than 85% of the area has already been transformed (hence the conservation target remains unattainable) by urban sprawl (Cape Town metropolitan area) and for cultivation. Most remaining patches are small pockets surrounded by urban areas, for example Rondevlei, Kenilworth, Milnerton, 6BKD, Plattekloof, and Rondebosch Common. Most of these patches have been identified as 'Core Conservation Sites'. They are mismanaged by mowing, fire protection and by alien plant invasion. Mowing eliminates serotinous and taller species, while fire protection results in a few common thicket species (e.g. *Carpobrotus edulis*, *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 Data 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 reintroduced from botanical gardens.

Cape Lowland Freshwater Wetland

Distribution: W Cape; altitude from 0-400m. 14.7% of this vegetation type occurs within and 85.3% outside the City. However transformation rates are higher inside City borders (55%) than nationally (22%).

Vegetation & landscape: flats & depressions with extensive tall reeds of *Phragmites australis* & *Typha capensis*, temporarily or permanently flooded restiolands, sedgelands & 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*.

Geology, soil & hydrology: substrate built of fine sandy, silty or clayey soils over young Quaternary sediments, largely derived from weathering Cape Supergroup shales & granites & Table Mountain sandstones. In places, especially on shales, these wetlands can acquire a brackish character.

Endemic: Low shrubs: *Passerina paludosa*; water bodies: Aquatic herbs: *Aponogeton angustifolius*, *A. distachyos*, *Cotula myriophylloides*.

Conservation: Critically endangered; Target 24%, some 14% conserved in Cape Peninsula & Agulhas National Parks, Rondevlei, Zandvlei etc.

Cape Winelands Shale Fynbos

Incorporating **Peninsula Shale Fynbos**

Distribution: Western Cape Province: Higher hills and lower mountain slopes in the Stellenbosch and Somerset West areas, in patches from Blousteen on Clarence Drive at Koeëlbaai to south of Elsenberg and within the Jonkershoek Valley, with pockets on the Cape Peninsula at Devils Peak, the Tygerberg Hills on Kanonkop, Groenberg near Wellington and the upper Franschhoek Valley. Altitude 0–700 m. 37.5% of this vegetation type occurs within and 62.5% outside the City. However, transformation rates are higher nationally (54%) than inside City borders (46.3%).

Vegetation & Landscape Features: Moderately undulating plains and steep slopes against the mountains. Vegetation is a moderately tall and dense shrubland dominated by proteoid and closed-scrub fynbos in structural terms.

Geology & Soils: Acidic, moist clay-loamy, red-yellow apedal and Glenrosa and Mispah forms derived from Malmesbury Shales.

Climate: MAP 520–1 690 mm (mean: 865 mm), peaking from May to August. This is the shale fynbos unit with the highest rainfall. Mean daily maximum and minimum temperatures 26.4°C and 6.6°C for February and July, respectively. Frost incidence 2 or 3 days per year.

Endemic Taxon: Geophytic Herb*: Moraea aristata.*

Conservation: Vulnerable, but well conserved. Target 30% already reached since about 25% is statutorily conserved in the Table Mountain National Park, Helderberg and Hottentots Holland Nature Reserves. An additional 25% enjoys protection in mountain catchment areas (Hottentots Holland, Hawequas). The rest of the area has been transformed, mainly for pine plantations and vineyards as well as by urban development in the Cape Town metropolitan area. Essentially only the steeper upper portions remain. The notable woody aliens include *Pinus pinaster* and *Hakea sericea*.

Elgin Shale Fynbos

(Mesic Mountain Fynbos)

Distribution: Western Cape Province: Elgin Basin east of Grabouw and Villiersdorp Basin around Vyeboom, with pockets to the north at the uppermost part of Stettynskloof, Kaaimansgat and Rooihoogte Pass, and at the Steenbras Dam to the west. Altitude 200–450m. 3% of this vegetation type occurs within and 97% outside the City. However transformation rates are higher nationally (76%) than inside City borders (39%), thus City land is crucial to meet national conservation targets.

Vegetation & Landscape Features: Undulating hills and moderately undulating plains and steep slopes of adjacent mountains. An open to medium dense tall proteoid shrubland over a matrix of moderately tall and dense evergreen shrubs, dominated by proteoid, asteraceous and closed-scrub fynbos, and ericaceous fynbos in the wetter facies.

Geology & Soils: Acidic, moist clay-loam, Glenrosa or Mispah forms derived from Bokkeveld Group shales.

Climate: Winter-rainfall regime, with MAP 560–1 300 mm (overall mean: 830 mm), peaking from May to August. Mean daily maximum and minimum temperatures 26.2°C and 6.2°C for February and July, respectively. Frost incidence 2 or 3 days per year.

Endemic Taxa: Low Shrubs: *Leucadendron elimense subsp. vyeboomense, L. globosum.*

Conservation: Critically endangered. The target of 30% is double that of the remaining natural distribution. Some patches of the unit are statutorily conserved in the Theewaters and Limietberg Nature Reserves. The privately owned Solva Farm (near Grabouw) has probably the best preserved patch of this rare fynbos type. Almost 80% of the areas have been transformed, with cultivation accounting for almost 60% (mainly fruit orchards, pine plantations and the flooded area of the Theewaterskloof and Steenbras Dams). This region is characterised by very intensive and profitable agricultural land. Aliens *Pinus pinaster* and *Hakea sericea* are problems in the remaining remnants.

Hangklip Sand Fynbos

(Sand Plain Fynbos)

Distribution: Western Cape Province: Cape Peninsula on old dune fields at Hout Bay, in the Fish Hoek gap (between Fish Hoek and Noordhoek) and on Smith's Farm (Cape Point Nature Reserve). Further on it occurs on the coastal flats from Rooiels and Cape Hangklip to Hermanus and it is well developed at the Bot River estuary. Altitude 20–150 m. 41.8% of this vegetation type is found within and 58.2% outside the City. 38.2% is transformed within the City and 31% nationally.

Vegetation & Landscape Features: Sand dunes and sandy bottomlands supporting moderately tall, dense ericoid shrubland. Emergent, tall shrubs in places. Proteoid, ericaceous and restioid fynbos are dominant, with some asteraceous fynbos also present. On the coastal fringe this unit borders on strandveld. The deep soils of the coastal plains are replaced by shallow soils on mountain slopes on the northern edge. Hangklip Sand Fynbos occurs mainly on old dunes, but the high rainfall and leaching allows many typical sandstone fynbos species to occur on older deposits as well, so that this unit is not as floristically distinct as other sandstone fynbos units. 31% of this vegetation type occurs within and 69% outside the City, with similar transformation rates (40%) inside and outside the City.

Geology & Soils: Leached, acid Tertiary sand in coastal areas, derived mostly from dunes. Soils generally of Lamotte or Houwhoek forms or grey, regic sands.

Climate: MAP 520–1 170 mm (mean: 750 mm), peaking from May to August. By far this is the wettest of all the sandstone fynbos types. Mean daily maximum and minimum temperatures 25.9°C and 7.5°C for January–February and July, respectively. Frost incidence about 3 days per year.

Endemic Taxa: Low Shrub: *Muraltia minuta.* Succulent Shrub: *Lampranthus serpens.* Herb*: Hypertelis trachysperma.* Geophytic Herb: *Haemanthus canaliculatus.* Graminoid*: Ischyrolepis feminea.*

Conservation: Vulnerable. Target 30%. About 20% statutorily conserved in the Table Mountain National Park, Kogelberg Biosphere Reserve and Kleinmond Nature Reserve, with an additional 3% protected in private conservation areas such as Sea Farm and Hoek-van-die-Berg. There are several reserves between Pringle Bay and Hermanus, but they are badly mismanaged with a continual attrition of reserves with sewerage farms, graveyards, golf courses and squatters and over-harvesting of flowers and plants for oils. Some 31% has been transformed, mostly by development of holiday home settlements (coastal platform between Pringle Bay and Hermanus), but also by cultivation and building of roads. Alien woody plants include *Pinus pinaster*, *Acacia cyclops*, *A. saligna*, various *Eucalyptus* species and very many other species in localised patches.

Kogelberg Sandstone Fynbos

(Mesic Mountain Fynbos)

Distribution: Western Cape Province: From Franschhoek, Groot-Drakensteinberge and Simonsberg (near Stellenbosch) in the north passing southwards between Gordon's Bay and Bot River to Cape Hangklip and Kleinmond in the south including the Jonkershoek, Stellenbosch, Franschhoek, Groenland, Hottentots Holland, Kogelberg and Palmietberge Mountains. Altitude 20–1 590 m at summit of Somerset Sneeukop. 10.3% of this vegetation type occurs within and 89.7% outside the City. Levels of transformation nationally are higher (12%) than inside City borders (1%).

Vegetation & Landscape Features: High mountains with steep to gentle slopes, and undulating plains and hills of varied aspect. General appearance of vegetation low, closed shrubland with scattered emergent tall shrubs. Proteoid, ericaceous and restioid fynbos dominate, while asteraceous fynbos is rare. Patches of Cape thicket are common in the northern areas; in the south similar habitats are occupied by scrub fynbos. Numerous seeps and seasonally saturated mountain-plateau wetlands (locally called 'suurvlakte') are very common and support restioid and ericaceous (dominated by Bruniaceae) fynbos.

Geology & Soils: Acidic lithosol soils derived from Ordovician sandstones of the Table Mountain Group (Cape Supergroup). Deep sandy blankets (whitish, nutrient-poor acidic sand) develop in depressions and on slopes resisting erosion.

Climate: MAP 670–3 000 mm (mean: 1 330 mm), peaking markedly May to August. This region has the highest recorded rainfall in the Cape (see section 2.4.2 of this chapter). Mean daily maximum and minimum temperatures 24.0°C and 6.1°C for February and July, respectively.

Frost incidence 2 or 3 days per year. The summit cloud (the 'Hottentot's Blanket') is a regular feature in summer when the Southeaster (part of the global system of trade-winds) brings heavy mist precipitation to the summits and adjacent south-facing and east-facing slopes.

Endemic Taxa: This is the heart of the Cape flora - a true crown jewel of the temperate flora of the world. The species-level endemism is staggering (195) and this vegetation type contains two endemic genera *Charadrophila* and *Glischrocolla.* Examples of endemics*:* Small Tree*: Mimetes arboreus.* Tall Shrubs*: Protea stokoei, Aspalathus globosa, A. stokoei, Cliffortia heterophylla, Liparia calycina, Mimetes hottentoticus, Orothamnus zeyheri.*

Conservation: Critically endangered as it contains 100 Red Data species. Target 30%. The unit is statutorily well conserved (58%) in the Hottentots Holland and Groenlandberg Nature Reserves and especially in the Kogelberg Biosphere Reserve (including Kogelberg and Kleinmond Nature Reserves). An additional 18% protected in the Hottentots-Holland Mountains catchment area. Some 17% transformed (pine plantations, cultivation, urban sprawl and spread of informal settlements). Aliens *Pinus pinaster* and *Hakea sericea* have been targeted for clearing, but remain of concern in some areas.

Lourensford Alluvium Fynbos

Distribution: Endemic to the City of Cape Town: Low-lying areas between Firgrove and Gordon's Bay, including much of the Strand and Somerset West, extending up the Lourens River Valley to the Sawmill above Lourensford Estate. Altitude 20–150 m. 100% of this vegetation type occurs within the City and transformation level is high at 93%.

Vegetation & Landscape Features: Low-lying plains supporting low, medium dense shrubland with short graminoid understorey. Restioid and asteraceous fynbos are dominant, although there is some evidence that proteoid fynbos might once have been dominant. Some remnants are exceptionally rich in geophytes.

Geology & Soils: Plinthic, duplex, silty soils often with small cobbles and pebbles embedded. Found over Cape Suite granite and metasediments of the Tygerberg Formation (Malmesbury Group).

Climate: Winter-rainfall climate peaking from May to August. MAP 470–980 mm (mean: 640 mm). Mean daily maximum and minimum temperatures 26.0°C and 7.4°C for February and July, respectively. Frost incidence infrequent. This is the only alluvium fynbos under strong maritime influence.

Endemic Taxa: None.

Conservation: Critically endangered. Less than 1% conserved in the Helderberg and Harmony Flats Nature Reserves. The conservation target of 30% is unattainable since more than 90% of the area has been transformed for urban development (Helderberg Municipality), cultivation, pine plantations and roads.

Remarks: This unit falls within areas farmed since earliest colonial times (Farm Vergelegen of W.A. van der Stel since 1700). Most of the remnants are transformed by grazing, mowing and changes in fire regime, and it is uncertain what has been lost and whether the remaining patches are representative of the original vegetation type.

Peninsula Granite Fynbos

(Mountain Fynbos)

Distribution: Endemic to the City of Cape Town: Lower slopes on the Cape Peninsula from Lion's Head to Smitswinkel Bay almost completely surrounding Table Mountain, Karbonkelberg and Constantiaberg through to the Kalk Bay Mountains. South of the Fish Hoek gap, it is limited to the eastern (False Bay) side of the Peninsula from Simon's Bay to Smitswinkel Bay, with a few small patches between Fish Hoek and Ocean View. Altitude 0–450 m. 100% of this vegetation type occurs within the City and 65% is transformed.

Vegetation & Landscape Features: Steep to gentle slopes below the sandstone mountain slopes, and undulating hills on the western edge of the Cape Flats. Medium dense to open trees in tall, dense proteoid shrubland. A diverse type, dominated by asteraceous and proteoid fynbos, but with patches of Restio and ericaceous fynbos in wetter areas. Waboomveld is extensive in the north and heavily encroached by

afrotemperate forest in places. South of Hout Bay, the dwarf form of *Protea nitida* is dominant, so that there are no emergent proteoids. Groves of Silver Trees (*Leucadendron argenteum*) occur on the wetter slopes.

Geology & Soils: Deep loamy, sandy soils, red-yellow apedal or Glenrosa and Mispah forms, derived from Cape Peninsula Pluton of the Cape Granite Suite.

Climate: Typical winter-rainfall climate peaking from May to August. MAP 590–1 320 mm (mean: 960 mm). Mean daily maximum and minimum temperatures 26.0°C and 7.2°C for February and July, respectively. Frost incidence 2 or 3 days per year. The climate of this unit is almost identical to that of Boland Granite Fynbos, but shows a far stronger maritime influence.

Endemic Taxa: Low Shrubs*: Cliffortia carinata, Gnidia parvula, Hermannia micrantha, Leucadendron grandiflorum.* Succulent Shrubs*: Erepsia patula, Lampranthus curvifolius. Herb: Polycarena silenoides.* Geophytic Herb*: Aristea pauciflora.* Graminoid*: Willdenowia affinis.*

Conservation: Endangered. Target 30%. Conserved in the Table Mountain National Park as well as on the premises of the Kirstenbosch National Botanical Garden. However, much of the conserved fynbos has been transformed into Afrotemperate Forest due to fire protection policies at Orangekloof and Kirstenbosch and a reluctance to use fire in green belts and on the urban fringe. The effective fynbos area conserved is thus much lower. A total of 56% transformed, mostly Cape Town urban areas (40%) on low-lying flat areas, including vineyards and pine plantations (13%). The most common alien woody species include *Acacia melanoxylon*, *Pinus pinaster* and numerous other more localised invasive alien species, reflecting the long history of colonisation and the relatively fertile soils.

Peninsula Sandstone Fynbos

(Mesic Mountain Fynbos)

Distribution: Endemic to the City of Cape Town: Confined to the Cape Peninsula, from the tip of Lion's Head and Table Mountain (Cape Town) to Cape Point and Cape of Good Hope and including Constantiaberg and Swartkopsberge. Altitude range 20–1 086 m at Maclear's Beacon on Table Mountain. 100% of this vegetation type occurs within the City and it is 3% transformed.

Vegetation & Landscape Features: Gentle to steep slopes, with cliffs in the north, over a 50 km long peninsula. Vegetation is a medium dense, tall proteoid shrubland over a dense moderately tall, ericoid-leaved shrubland—mainly proteoid, ericaceous and restioid fynbos, with some asteraceous fynbos.

Geology & Soils: Acidic lithosol soils derived from Ordovician sandstones of the Table Mountain Group (Cape Supergroup), Lamotte forms prominent.

Climate: MAP 520–1 690 mm (mean: 780 mm), peaking May to August. Mean daily maximum and minimum temperatures 25.0°C and 7.2°C for February and July, respectively. Frost incidence 2 or 3 days per year. Southeasterly cloud (the famous 'Table Cloth'), accompanied by high wind, brings heavy mist precipitation at higher altitudes to southern and eastern slopes in summer. The region is under strong maritime influence—no part is more than 7 km from the sea.

Endemic Taxa: Extremely rich in endemic species (146); e.g.: Small Tree*: Mimetes fimbriifolius.* Tall Shrubs: *Erica caterviflora, Leucadendron macowanii, L. strobilinum, Liparia laevigata.*

Conservation: Endangered as it contains 65 Red Data species. Target 30%. Statutorily well conserved (90%) in the Table Mountain National Park. About 25% transformed (urban sprawl, pine plantations). *Acacia melanoxylon* and *Pinus pinaster* are occasional woody aliens. Many local patches of alien vegetation are very dense.

Peninsula Shale Renosterveld

(West Coast Renosterveld)

Distribution: Endemic to City of Cape Town: Signal Hill and on the lower northern slopes of Table Mountain and Devil's Peak; approximately centred on the city bowl of Cape Town. Altitude 0–350 m. 100% of this vegetation type occurs within the City and it is 89% transformed.

Vegetation & Landscape Features: Gentle to steep lower slopes with tall, open shrubland and grassland, typically with renosterbos not appearing very prominent. This vegetation is very grassy due to frequent fires

and lack of grazing. On Devil's Peak these 'renosterveld grasslands' are frequently mowed for grazing. On south-facing slopes and upper slopes this unit merges into fynbos. The early successional stages are dominated by *Asparagus capensis*, *Hyparrhenia hirta*, *Haemanthus sanguineus*, various *Oxalis* species and resprouting *Rhus lucida*, after which tussock grasses, shrubs and ferns emerge. After only 12 months the reseeding species start to become more obvious.

Geology & Soils: Clay soils derived from shale of the Tygerberg Formation, Malmesbury Group; Glenrosa, Mispah and Lamotte forms prominent.

Climate: MAP 480–870 mm (mean: 720 mm), peaking markedly from May to August. This is the wettest renosterveld type by far. Mean daily maximum and minimum temperatures 26.7°C and 7.8°C for February and July, respectively. Frost incidence 2 or 3 days per year.

Endemic Taxa: None.

Conservation: Critically endangered vegetation unit. Target of 26% is unattainable since 89% of the area has been totally transformed (urban sprawl, cultivation and building of road infrastructure). It is statutorily conserved in the Table Mountain National Park (10%). A fair proportion of the conserved area on Devil's Peak is covered by pine and gum parkland. These should be restored to renosterveld as soon as possible. Notable aliens include various species of *Acacia* (especially *A. melanoxylon*).

Southern Afrotemperate Forest

(Afromontane Forest)

Distribution: W Cape & E Cape, largest complex in southern Cape (Knysna-Tsitsikamma). 0.4% of this vegetation type occurs within and 99.6% outside the City. Higher transformation rates occur nationally (21%) than inside City borders (1%).

Vegetation & landscape: Tall multilayered afrotemperate forests dominated by yellowwoods, *Ocotea bullata*, *Olea capensis* and others. The emergent tree species have a subtropical affinity and are mostly widespread throughout South Africa. Tree species which occur in Cape Town Southern Afrotemperate Forest patches include *Podocarpus latifolius*, *Rapanea menaphloeos*, *Cunonia capensis*, *Curtisia dentata* and *Kiggelaria africana*. Well developed shrub understorey and herb layers.

Geology & soils: vary from shallow forms to sandy humic forms derived from TMG sandstones and shales of Cape Supergroup & partly also from Cape Granite.

Endemic taxa: Tall Tree: *Platylophus trifoliatus*; small trees: *Apodytes geldenhuysii*, *Cryptocarya angustifolia*, *Virgilia oroboides* subsp. *ferruginea*, *V. oroboides* subsp. o*roboides*. Megaherb: *Strelitzia alba*; geophytic herbs: *Amauropelta knysnaensis*, *Clivia mirabilis*, *Freesia sparrmannii*, *Polystichum incongruum*. Graminoid: *Schoenoxiphum altum*.

Conservation: Least concern. Target 34%. More than half of extant forest enjoys statutory conservation in Garden Route. Virtually all Southern Afrotemperate Forest in Cape Town is conserved in the Table Mountain National Park.

Swartland Alluvium Fynbos

Distribution: Western Cape Province: Swartland lowlands at west-facing piedmonts of the Groot Winterhoekberge near Porterville, Saronberg, Elandskloofberge to the Limietberge near Wellington; broad valley bottoms of the Paarl, Drakenstein, Franschhoek and Banhoek Valleys, with some extensions west of Paarl Mountain and to Klapmuts. Altitude 60–250 m, rarely reaching 350 m. 3.7% of this vegetation type occurs within and 96.3% outside the City. Lower rates of transformation occurred nationally (73%) than inside City borders (95%).

Vegetation & Landscape Features: Moderately undulating plains, adjacent mountains and in river basins. The vegetation is a matrix of low, evergreen shrubland with emergent sparse, moderately tall shrubs and a

conspicuous graminoid layer. Proteoid, restioid and asteraceous fynbos types are dominant, with closed-scrub fynbos common along the river courses. Ericaceous and restioid fynbos found in seeps.

Geology & Soils: Alluvial gravel and cobble fields typically resting over Malmesbury Group schists and phyllites (in the northern part of the area) as well as over Cape Suite granites (in Drakenstein Valley from Wellington to Franschhoek) and on Malmesbury Group sandstones from Simondium to Klipheuwel.

Climate: Seasonal, winter-rainfall regime, peaking from May to August. MAP (mean: 655 mm) varies broadly from 320–980 mm (close to foot of mountains). Mean daily maximum and minimum temperatures 29.5°C and 6.0°C for February and July, respectively. Frost an infrequent phenomenon. This is the wettest and hottest alluvium fynbos type.

Endemic Taxa: Low Shrubs: *Diastella buekii, Erica alexandri, E. bakeri, Marasmodes duemmeri, M. undulata, Phylica stenopetala, Protea mucronifolia.* Succulent Shrub: *Lampranthus schlechteri*. Geophytic Herbs: *Brunsvigia elandsmontana, Bulbine monophylla, Geissorhiza furva, Moraea villosa subsp. elandsmontana, Watsonia dubia.*

Conservation: Critically endangered. Target 30%. Nearly 10% conserved in the Waterval Nature Reserve, Winterhoek (mountain catchment area) and private reserves such as Elandsberg, Langerug and Wiesenhof Wildpark. More than 75% already transformed for vineyards, olive orchards, pine plantations, urban settlements and by building of the Voëlvlei and Wemmershoek Dams. Alien *Acacia saligna* and *Hakea sericea* are prominent in places.

Swartland Alluvium Renosterveld

(West Coast Renosterveld)

National conservation target = 26%; National status = Vulnerable; 40% transformed.

Swartland Granite Renosterveld

(West Coast Renosterveld)

Distribution: Western Cape Province: Discrete areas in the Swartland: largest patch centred on Darling from Ratelberg in the north to Dassenberg near Mamre and Pella; several centred on Malmesbury from Darmstadt in the north to the lower slopes of the Perdeberg (and small patches to the west towards Atlantis); east of Wellington from Micha to Valencia, lower surroundings of Paarl Mountain; Joostenberg, Muldersvlei, Bottelaryberg, Papegaaiberg (Stellenbosch West), to Firgrove and northern Somerset West. Altitude 50–350 m. 6.8% of this vegetation type occurs within the City and 93.2% outside the City. Lower rates of transformation occurred nationally (75%) than inside City borders (86%).

Vegetation & Landscape Features: Moderate foot slopes and undulating plains supporting a mosaic of grasslands/herblands and medium dense, microphyllous shrublands dominated by renosterbos. Groups of small trees and tall shrubs are associated with heuweltjies and rock outcrops.

Geology & Soils: Coarse sandy to loamy soils of a variety of forms ranging from Glenrosa and Mispah, to prismacutanic and pedocutanic diagnostic horizons to red-yellow apedal soils all derived from Cape Granite. The soils can contain a considerable volume of moisture in winter and spring.

Climate: MAP 360–790 mm (mean: 520 mm), peaking from May to August. Mists common in winter. This is the wettest renosterveld unit. Mean daily maximum and minimum temperatures 27.7°C and 6.7°C for February and July, respectively. Frost incidence about 3 days per year.

Endemic Taxa: Low Shrubs*: Agathosma hispida, A. latipetala, Aspalathus glabrata, A. rycroftii.* Succulent Shrubs*: Antimima menniei, Erepsia hallii, Lampranthus citrinus, L. scaber, Phyllobolus suffruticosus, Ruschia klipbergensis.* Herbs*: Arctopus dregei, Oncosiphon glabratum*. Geophytic Herbs*: Babiana pygmaea, B. regia, B. rubrocyanea, Geissorhiza darlingensis, G. eurystigma, G. malmesburiensis, G. mathewsii, G. radians, Haemanthus pumilio, Ixia aurea, I. curta, Lachenalia purpureo-caerulea, Moraea amissa, Oxalis stictocheila, Watsonia humilis.*

Conservation: This is a critically endangered vegetation unit of which almost 80% has already been transformed due to prime quality of the land for agriculture (vineyards, olive orchards, pastures) and also by urban sprawl. Hence the conservation target of 26% remains unattainable. Only very small portions (0.5%) enjoy statutory protection in the Paarl Mountain Nature Reserve and Pella Research Site, and also (2%) in the Paardenberg and Tienie Versveld Flower Reserve near Darling. Alien grasses are particularly pervasive, the most important being *Lolium multiflorum*, *Avena fatua* and *Bromus diandrus*. Alien woody species include *Acacia saligna*, *Pinus pinaster* as well as various species of *Eucalyptus*.

Swartland Shale Renosterveld

(West Coast Renosterveld)

Distribution: Western Cape Province: Large, generally continuous areas of the Swartland and the Boland on the West Coast lowlands, from Het Kruis in the north, southwards between the Piketberg and Olifantsrivierberge, widening appreciably in the region around Moorreesburg between Gouda and Hopefield, and encompassing Riebeek-Kasteel, Klipheuwel, Philadelphia, Durbanville, Stellenbosch to the south and Sir Lowry's Pass Village near Gordon's Bay. Altitude 50–350 m. 9.8% of this vegetation type occurs within and 90.2% outside the City. Similar transformation rates occur nationally (92%) and inside City borders (91%).

Vegetation & Landscape Features: Moderately undulating plains and valleys supporting low to moderately tall leptophyllous shrubland of varying canopy cover as well as low, open shrubland dominated by renosterbos. Heuweltjies are a very prominent local feature of the environment, forming 'hummockveld' near Piketberg and giving the Tygerberg Hills their name. Stunted trees and thicket are often associated with the heuweltjies. Disturbed areas are dominated by *Athanasia trifurcata* and *Otholobium hirtum*. Patches of *Cynodon dactylon* 'grazing lawns' also occur in abundance.

Geology & Soils: Clay soils derived from Malmesbury Group shales (specifically the Porterville Formation in the north and east and the Moorreesburg Formation in the west). The soils contain prismacutanic and pedocutanic diagnostic horizons and Glenrosa and Mispah forms are predominant.

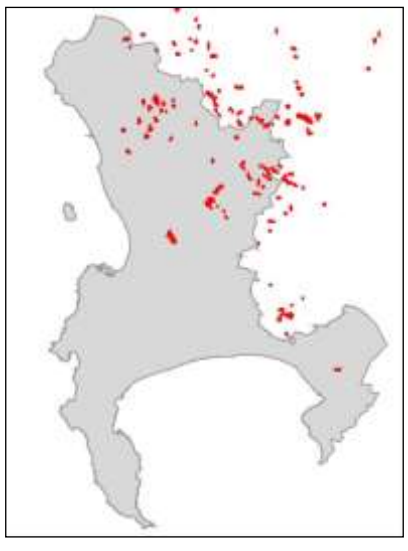
Climate: Winter-rainfall regime, with MAP 270–670 mm (mean: 430 mm), peaking from May to August. Mean daily maximum and minimum temperatures 29.6°C and 6.3°C for February and July, respectively. Frost incidence 3 or 4 days per year. Mists are common in winter.

Endemic Taxa: Low Shrubs: *Leucadendron verticillatum, Aspalathus acanthophylla, A. horizontalis, A. pinguis subsp. longissima, A. pinguis subsp. occidentalis, A. puberula, A. rectistyla, Cliffortia acockii, Lotononis complanata, Serruria incrassata.* Succulent Shrubs: *Erepsia ramosa, Ruschia patens, R. pauciflora.* Herb: *Indigofera triquetra.* Geophytic Herbs*: Aristea lugens, Babiana angustifolia, B. latifolia, B. odorata, B. secunda, Hesperantha pallescens, H. spicata subsp. fistulosa, Lachenalia liliflora, L. mediana var. rogersii, L. orthopetala, Lapeirousia fastigiata, Moraea gigandra, M. tulbaghensis, Oxalis fragilis, O. involuta, O. leptocalyx, O. levis, O. macra, O. perineson, O. strigosa, Pelargonium viciifolium.*

Conservation: This is a critically endangered vegetation unit. Target 26%, but since 90% of the area has been totally transformed (mainly for cropland), the target remains unattainable. The remnants are found in isolated pockets, usually on steeper ground. So far only a few patches have been included in conservation schemes (e.g. Elandsberg, Paardenberg). Aliens include *Acacia saligna* (very scattered over 65%), *A. mearns*ii (very scattered over 62%) as well as several species of *Prosopis* and *Eucalyptus*. Alien annual grasses (species of *Anagallis*, *Avena*, *Briza*, *Bromus*, *Lolium*, *Phalaris* and *Vulpia*) are a primary problem in remnant patches. Other serious aliens include herbs such as *Erodium cicutarium*, *E. moschatum*, *Echium plantagineum* and *Petrorhagia prolifera*.

Swartland Silcrete Renosterveld

(West Coast Renosterveld)



Distribution: Western Cape Province: A highly fragmented type, scattered in form of small patches throughout the Swartland from near Firgrove and Kuils River in the south to Eendekuil to Piketberg in the north. Mostly embedded within Swartland Shale Renosterveld followed by Swartland Granite Renosterveld. The largest patch is at Oupas between Moorreesburg and Mamre. Altitude 40–220 m. 14.8% of this vegetation type occurs within the City and 85.2% outside the City. However transformation rates are higher nationally (92%) than inside City borders (81%).

Vegetation & Landscape Features: Moderately undulating lowlands, often on elevated areas. An open, low, cupressoid- and small-leaved, low to moderately tall shrubland with many succulents, dominated by renosterbos.

Geology & Soils: Remnants of silcrete layers over Malmesbury Group Shale and Cape Granite. Soils with prismacutanic and/or pedocutanic diagnostic horizons or plinthic catena are dominant.

Climate: MAP 250–650 mm (mean: 425 mm), peaking from May to August. Mists common in winter. Mean daily maximum and minimum temperatures 28.7°C and 6.8°C for February and July, respectively. Frost incidence 3 or 4 days per year.

Endemic Taxa: Low Shrub*: Marasmodes oligocephala.* Succulent Shrubs*: Lampranthus dilutus, Ruschia serrulata.* Geophytic Herb*: Babiana longiflora.*

Conservation: Critically endangered and the conservation target of 26% remains unattainable due to total transformation of 90% (mainly turned into agricultural land). Small patches (about 1%) are statutorily conserved in the Pella Research Site, and additionally in Paardenberg and Elandsberg. Remaining patches undergo transformation by overgrazing, fire protection, and spraying with herbicides and insecticides. Alien *Acacia saligna*, *A. mearnsii*, *Prosopis* and *Eucalyptus* are also problem in places.

Western Coastal Shale Band Vegetation

(Mesic Mountain Fynbos)

Distribution: Western Cape Province: Embedded within the mountain ranges of Elandskloof, Limietberge, Wellington Sneeukop, Slanghoek, Du Toitsberge, Klein Drakenstein, Wemmershoek, Stettyns, Franschhoek (including Victoria Peak and Emerald Dome), Groenland, Hottentots Holland (including Triplets and Somerset Sneeukop), and Kogelberg. These bands extend eastwards through the Kleinrivierberge, Caledon Swartberg and Bredasdorpberge. Also included are the shale bands of the Riviersonderend Mountains and of Potberg. Altitude 50–1 800 m. 2.5% of this vegetation type occurs within and 97.5% outside the City. Transformation is low: nationally (4%) and inside City borders (<1%).

Vegetation & Landscape Features: A narrow 80–200 m linear feature (up to 1 km wide in a few places and also forming rings on some ‘Sneeukop’ peaks), smooth and flat in profile compared to surrounding areas. The band supports diverse renosterveld and fynbos shrublands of all structural types including waboomveld at lower altitudes.

Geology & Soils: Clays derived from shale of the Cedarberg Formation.

Climate: MAP 280–2 000 mm (mean: 1 070 mm), peaking from May to August. Southeasterly cloud brings heavy mist precipitation at higher altitudes in summer. Mean daily maximum and minimum temperatures 24.3°C and 5.0°C for February and July, respectively. Frost incidence 2–10 days per year.

Endemic Taxa: Tall Shrub: *Protea lacticolor.* Low Shrubs*: Prismatocarpus cliffortioides, Protea caespitosa.* Succulent Shrub*: Lampranthus walgateae.* Geophytic Herbs*: Bobartia lilacina, Moraea lilacina.* Graminoid*: Pentameris hirtiglumis.*

Conservation: Least concern. The target of 30% has been achieved since almost 45% of the unit is protected in statutory and local authority reserves such as Limietberg, Kogelberg, Riviersonderend, Hottentots Holland, Theewaters, De Hoop and Waterval, while an additional almost 30% is protected in mountain catchment areas such as Hawequas, Riviersonderend and Hottentots Holland. Small patches are protected in a number of private reserves. Some 6% transformed by pine plantations. Aliens *Pinus pinaster* and *Hakea sericea* scattered on about half of the area of the unit.

Table 1. Major national vegetation types in Cape Town and their status[1]

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*
Atlantis Sand Fynbos	278	39.8	166	4	CR
Boland Granite Fynbos	95	19.2	61	3	VU
Cape Flats Dune Strandveld	**401**	**100**	**180**	**64**	**EN**
Cape Flats Sand Fynbos	**547**	**100**	**77**	**5**	**CR**
Cape Winelands Shale Fynbos	41	37.5	22	18	VU
Elgin Shale Fynbos	2	0.9	2	<1	CR
Hangklip Sand Fynbos	34	41.8	21	14	VU
Kogelberg Sandstone Fynbos	107	11.7	106	75	CR
Lourensford Alluvium Fynbos	**48**	**100**	**3**	**2**	**CR**
Peninsula Granite Fynbos	**92**	**100**	**39**	**33**	**EN**
Peninsula Sandstone Fynbos	**215**	**100**	**209**	**202**	**EN**
Peninsula Shale Renosterveld	**24**	**100**	**3**	**0**	**CR**
Southern Afrotemperate Forest	3	0.4	3	3	LC
Swartland Alluvium Fynbos	17	3.7	<1	<1	CR
Swartland Granite Renosterveld	58	6.2	8	<1	CR
Swartland Shale Renosterveld	464	9.4	40	3	CR
Swartland Silcrete Renosterveld	10	10.1	2	2	CR
Western Coastal Shaleband Vegetn	3	3.0	3	2	LC
Azonal Vegetation Types					
Cape Inland Saltpans	2	3.0	2	2	LC
Cape Lowland Freshwater Wetlands	14	15.0	6	5	CR
Cape Seashore vegetation	3	4.0	3	2	LC

National vegetation types in **bold typeface are confined to Cape Town; CR = Critically Endangered, EN = Endangered, VU = Vulnerable, LC = Least Concern*

NB ADDITIONAL NATIONAL VEGETATION TYPES THAT OCCUR IN SMALL AREAS OF THE CITY

Terrestrial:

Southern Coastal Forest (147ha)

Swartland Alluvium Renosterveld (4ha)

Azonal:

Cape Coastal Lagoons (30ha)

Cape Inland Salt Pans (64ha)

Cape Seashore vegetation (173ha) – I would view as a community type within strandveld

Fresh Water lakes (82ha)

Cape Estuarine Salt Marshes (26ha)

Cape Inland Salt Pans. Excerpts from the "Vegetation of South Africa, Lesotho & Swaziland" (Strelitzia 19, pages 649-650, 2006).

Small depressions dominated by low succulent scrub composed of creeping chenopods and salt-tolerant herbs & 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 and remain mostly dry in summer.

Important taxa are: *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, Tribolium hispidum*.

Endemic taxa are *Disphyma dunsdonii, Drosanthemum salicola, Lampranthus salicola, Dymondia margaretae, Limonium anthericoides, Dorotheanthus clavatus, Pseudalthenia aschersoniana*.

Conservation status is Vulnerable. Target is 24%. Some 20% statutorily conserved in the Agulhas and West Coast National Parks as well as in the Soetendalsvlei and Rocherpan Nature Reserve. Almost 3% enjoys protection on private land (Rietvlei, Rhenosterkop). More than 20% has been transformed for cultivated land, mines or by urban sprawl. Alien Australian herbaceous *Atriplex* species show invasive behaviour in places.