INTEGRATED
RESERVE MANAGEMENT PLAN

BLAAUWBERG NATURE RESERVE

June 2011

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AUTHORIZATION PAGE

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Biodiversity Management Branch

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City of Cape Town

Blaauwberg Nature Reserve

June 2011

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List of abbreviations used

APO	**annual plan of operations**
BCA	**Blaauwberg Conservation Area (proclamation name of 2007)**
BotSoc	**Botanical Society of South Africa**
C.A.P.E	**Cape Action for People and the Environment**
CDF	**Conservation Development Framework**
CEPF	**Critical Ecosystem Partnership Fund**
CFR	**Cape Floristic Region**
CIZ	**conservation interface zone**
CWAC	**coordinated waterbird counts**
CWCBR	**Cape West Coast Biosphere Reserve**
FoBCA	**Friends of Blaauwberg Conservation Area**
ICC	**Implementation Coordination Committee**
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**
PCZ	**primary conservation zone**
RPC	**Reserve Planning Committee**
SAHRA	**South African Heritage Resource Agency**
SANBI	**South African National Biodiversity Institute**
TMF	**Table Mountain Fund**
TOR	**terms of reference**
WESSA	**Wildlife and Environment Society of South Africa**

PART 1

DESCRIPTION

1. INTRODUCTION

Blaauwberg Nature Reserve was proclaimed a local and provincial nature reserve in 2007. The reserve has a spectacular view down fynbos slopes, across the city, to seven kilometres of rocky and sandy coastline and the ocean and beyond. The reserve presents itself as one of the few viewpoints in the world from where you can see two proclaimed world heritage sites, namely Table Mountain and Robben Island.

Blaauwberg Nature Reserve conserves three threatened vegetation types: Cape Flats dune strandveld (endangered), Swartland shale renosterveld (critically endangered) and Cape Flats sand fynbos (critically endangered). The rich biodiversity embraces a wetland, 559 plant species, 42 mammal species (including whales, dolphins and seals), 140 bird species, 28 reptile species and four amphibians. The reserve is one of the only City of Cape Town nature reserves where you can still find *Mystromys albicaudatus* (White-tailed Mouse) and *Orycteropus afer* (Aardvark).

The holotype of *Scelotes montispectus* (Blaauwberg Dwarf Burrowing Skink) was collected within Blaauwberg Nature Reserve. There is also a healthy population of *Mystromys albicaudatus* (white-tailed mouse) listed as endangered in the latest Red List of mammals of South Africa, as well as a total of eight Red List fauna species.

Within the current 1 445 ha, there is evidence of early human occupation, with shell middens dating back approximately 15 000 years. The reserve also conserves the site of the 1806 Battle of Blaauwberg, when the British took possession of the Cape from the Dutch for the second time and retained ownership until South Africa's independance. On Blaauwberg Hill, several buildings were constructed during World War II, including a radar station, a lookout and a mess room.

Since the then Blaauwberg Conservation Area's (BCA) inception, conservation in the area has progressed rapidly. Simple bollards in the coastal parking areas have stopped 4x4s from accessing and ultimately driving on the beach, and, already, the endangered vegetation has recovered and the *Haematopus moquini* (African black oystercatcher) has since returned. Illegal vehicles had not only endangered the vegetation and *Haematopus moquini*, but had destroyed a number of the shell middens.

Partners of Blaauwberg Nature Reserve include, but are not limited to, CapeNature, the Western Cape Provincial Government, the Cape West Coast Biosphere Reserve (CWCBR), the Table Mountain Fund (TMF), the Botanical Society of South Africa (BotSoc), the South African Heritage Resource Agency (SAHRA), the Critical Ecosystem Partnership Fund (CEPF), Cape Action for People and the Environment (C.A.P.E), the Wildlife and Environment Society of South Africa (WESSA) and the Friends of Blaauwberg Conservation Area (FoBCA).

The strategic management planning process – resulting in the development of an Integrated Reserve Management Plan (IRMP) for Blaauwberg 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 the 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 Blaauwberg 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 Blaauwberg 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 (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 Blaauwberg Nature Reserve is supported by a State of Biodiversity report, operational guidelines as well as the monitoring and evaluation framework to ensure ongoing implementation and review of the protected-area management activities (figure 1).

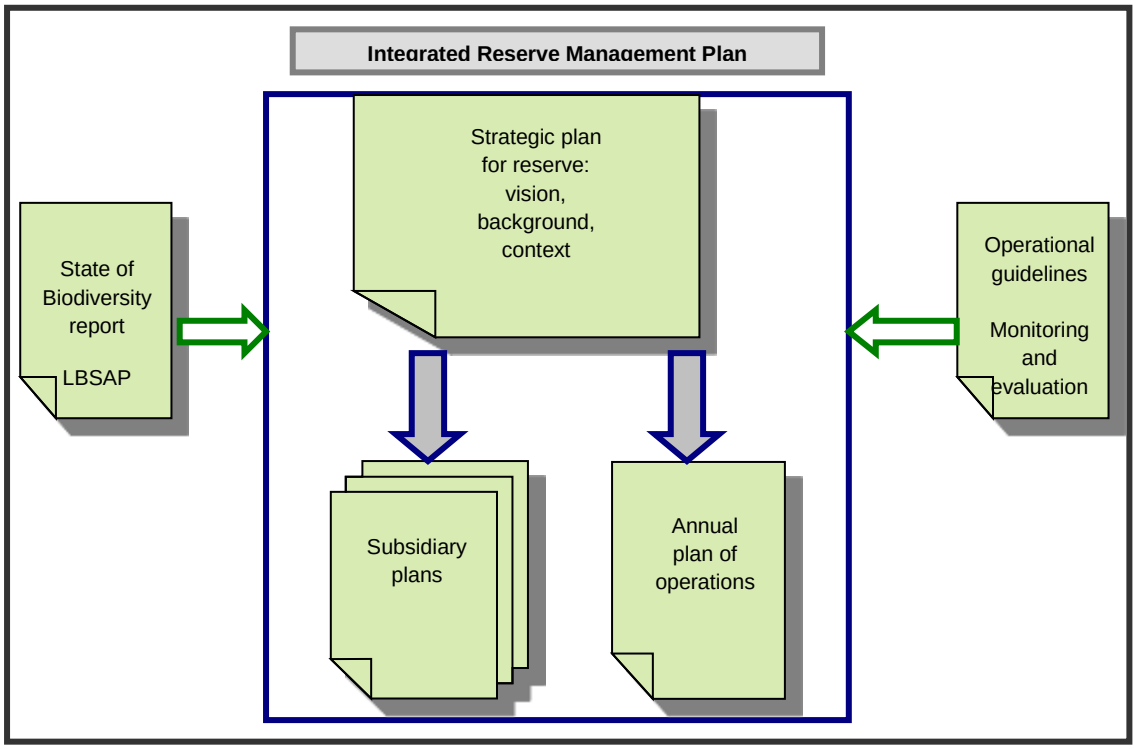


Figure 1: The elements of the IRMP

The IRMP for Blaauwberg 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).

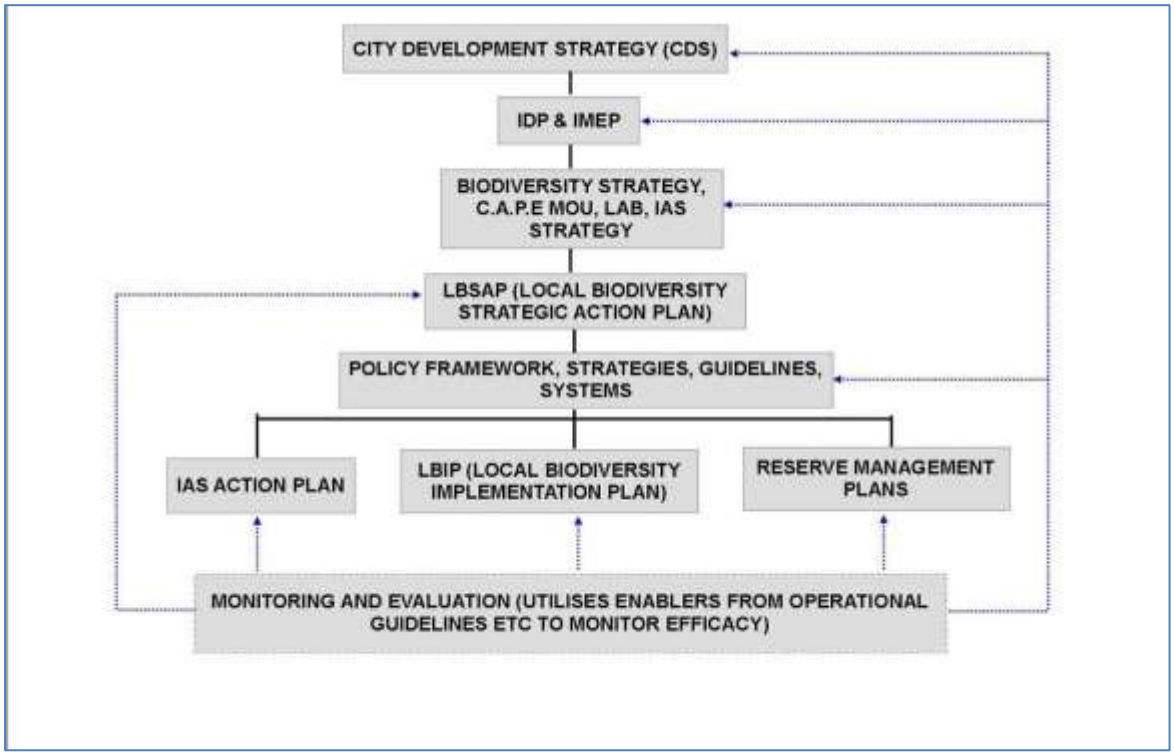


Figure 2: Legal and planning framework for the IRMP

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 intervention 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 manager, 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.

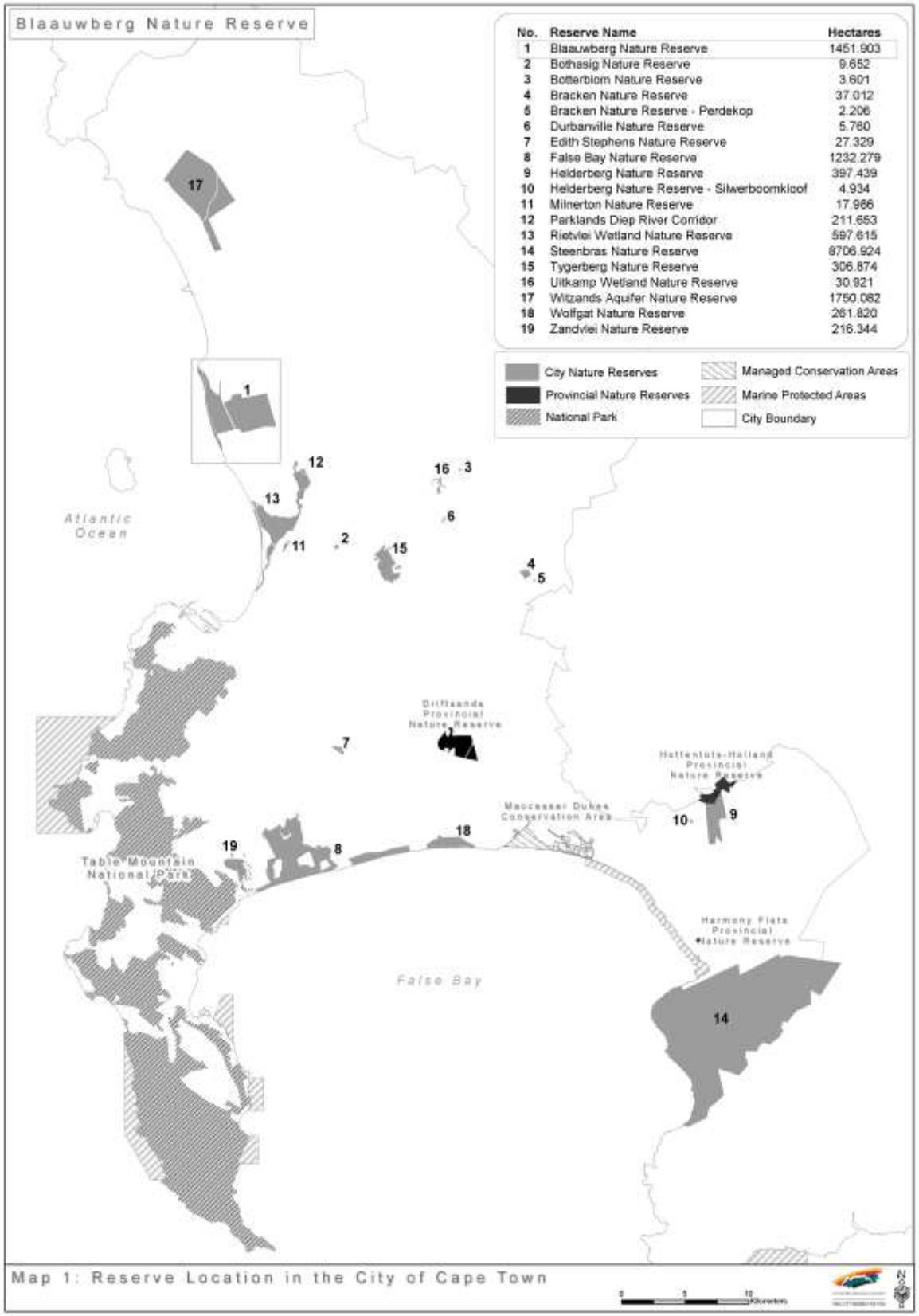
Pre-engagement workshops were held with community partners from March to May 2010. This afforded key community partners an opportunity to give their input at an early stage. Where practically possible, the ideas and outputs from the workshops have been incorporated into the IRMP.

1.2 Location and extent

Blaauwberg Nature Reserve is located about 25 km from the city centre of Cape Town, on the West Coast, between Big Bay, Bloubergstrand and Melkbosstrand, and inland from the R27 (grid references 33°47'21.34"S, 18°27'13.92"E; 33°43'54.74"S, 18°26'6.81"E; 33°45'4.26"S, 18°29'37.66"E; 33°46'24.91"S, 18°30'1.43"E) (see map 1). Land acquisition is the main strategy for land consolidation in the reserve, and, currently, 1 445 ha of the envisaged 2 000 ha of the proposed primary conservation zone (PCZ) are in public ownership. Blaauwberg Nature Reserve forms part of the southern area of the Cape West Coast Biosphere Reserve. The development and management plan sets out the draft plan for Blaauwberg Nature Reserve, with a PCZ serving as the core, and a conservation interface zone (CIZ) serving as a buffer around the core area.

Over the years, numerous reports have been prepared that proposed suitable activities and facilities for Blaauwberg Nature Reserve. Of significance to the reserve is the fact that it was one of the pilot projects for the implementation of the CEPF grants as part of the C.A.P.E programme, whose primary objective is conservation of the flora of the Cape Floristic Region (CFR).

On a local scale, Blaauwberg Nature Reserve possesses diverse habitats as well as ecological corridors: the fynbos corridor linking the Diep River and south-eastern section of Blaauwberg Nature Reserve; the existing north-south powerline servitude; the northern corridor linking Blaauwberg Nature Reserve with Koeberg Nature Reserve, and the open space corridor along the R27 that links up with other related habitats nearby, thus ensuring a seamless flow of ecological processes in the area. The CIZ resembles a buffer zone around the PCZ, potentially filtering harmful development activities, and preventing these from affecting the conservation-worthy zone in the core.


Blaauwberg 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 17.966
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
Table Mountain National Park
Driftsands Provincial Nature Reserve
Macassar Dunes Conservation Area
Hottentots-Holland Provincial Nature Reserve
Harmony Flats Provincial Nature Reserve
False Bay
Map 1: Reserve Location in the City of Cape Town

2. DESCRIPTION OF LANDHOLDINGS AND OWNERSHIP

2.1 Property details and title deed information

Table 1: Erf numbers for the Blaauwberg Nature Reserve

Property name	Blaauwberg Nature Reserve (see map 2 & 3)	
Erf numbers	CA1141-0, CA147-0, CA99-0, CA144-1, CA145-1, 41-385, & 42-3295, 11-431, 10-432	City of Cape Town
	41-268-1, 41-268-2, 41-418	Provincial Government of the Western Cape
Landowner and management:	City of Cape Town/Provincial Government of the Western Cape, and managed by the City of Cape Town (part proclaimed as provincial nature reserve)	
Area	1 445 ha	
Vegetation types (SA veg map 2004)	Cape Flats dune strandveld (endangered) Swartland shale renosterveld (critically endangered) Cape Flats sand fynbos (critically endangered)	

Appendix 2 contains the Surveyor-General's diagrams for the various portions of property.

Map 2: Reserve Boundary


Blaauwberg Nature Reserve
41-419
42-3256
CA59-0
CA145-1
CA144-1
CA1161-0
11-431
41-268-1
41-268-2
CA147-0
10-431
41-385
Atlantic Ocean
WEST COAST ROAD
41-645
102-1-1
Nature Reserve
Coastline
Roads
Property
Map 3: Reserve Erven

2.2 Landscape perspective

Blaauwberg Nature Reserve falls within the CFR, the smallest and yet richest of the world's six floral regions, and the only one to be found entirely within one country. This rich biodiversity is under serious threat for a variety of reasons, including conversion of natural habitat to permanent agriculture land, inappropriate fire management, rapid and insensitive development, overexploitation of water resources, and infestation by alien species. The region has been identified as one of the worlds 'hottest' biodiversity hot spots (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 the 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 region. This resulted in a spatial plan, identifying areas that need to be conserved and a series of broad programme activities that need to take place over a 20-year period. Based on the situation assessment and analysis of threats, three overarching, mutually complementing and reinforcing themes were developed:

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

The C.A.P.E partnership was formed and 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).

Blaauwberg Nature Reserve is a key node of the City of Cape Town's biodiversity network, and also occurs within the Cape West Coast Biosphere Reserve (CWCBR) planning domain, and will become designated as one of the core areas in the near future. Negotiations with the CWCBR in this respect are ongoing.

Blaauwberg Nature Reserve will be bordered by residential areas (on the south and east), which will be inhabited by an estimated 500 000 people in the foreseeable future (the next 10 to 20 years). While the reserve does share certain characteristics with other City of Cape Town nature reserves, its urban context will be a good testing ground for the concept of sustainable development, where environmental conservation and development activities co-exist sustainably.

The reserve was identified as a node in the City of Cape Town biodiversity network study. The future linkages with Table Bay Nature Reserve and Tygerberg Nature Reserve to the south-east are a priority for the City of Cape Town, as these form part of the City's biodiversity network, which uses corridors to join larger protected areas and nature reserves to enable unrestricted species movement.

Blaauwberg Nature Reserve contains three threatened vegetation types. These are Cape Flats Dune Strandveld (endangered); Cape Flats Sand Fynbos (critically endangered) and Swartland Shale Renosterveld (critically endangered). C.A.P.E classified the natural habitat (the broad habitat units) on-site as 100% irreplaceable. Previous on-site botanical work also indicated that the site (the entire reserve) is home to at least 47 Red List or threatened plants (according to the new threatened species list from the South African National Biodiversity Institute, or SANBI).

The reserve is one of the core remnant sites according to the renosterveld lowland fine-scale study, and was classified as a Core Flora Conservation Site in the study conducted by the Botanical Society for the Cape Metropolitan Council. The reserve also forms part of a functional coastal-interior gradient, serving as a corridor for ecological processes from the coast to acidic flats east of Blaauwberg Hill. Furthermore, the area contains a diversity of habitats and ecotones that significantly contribute to regional diversity on a landscape scale.

2.3 Physical environment

2.3.1 Climate

The area has a warm, temperate, Mediterranean-type climate, with dry, hot summers and cool, wet winters. The average summer temperatures rise to about 28 °C, while average winter temperatures reach 17 °C (Marshall & Mommsen 1994). The hottest time of the year is between January and March, although these summer temperatures are tempered by the cold Atlantic water and the frequent summer fog. The lowest temperatures occur in July, but frost remains rare in the area (Marshall & Mommsen 1994).

The West Coast is a winter rainfall area, with about 75% of the annual rainfall occurring between April and September. Summers are generally very dry. The rainfall is mainly cyclonic as a result of cold fronts moving from the South Atlantic Ocean, and decreases rapidly as one moves north-west up the coast. This is due to the presence of the cold Benguela current, which inhibits cloud development (Marshall & Mommsen 1994).

Fog out at sea regularly drifts inland for up to 3 km. This occurs mostly in summer, when south-easterly winds cause an upwelling of cold water along the coast. The moisture supplied by the fog, together with that from heavy dew, compensates somewhat for the lack of summer rainfall. The frequency of the fog increases from south to north, and has a moderating effect on summer temperatures (Marshall & Mommsen 1994).

Acording to Marshall and Mommsen (1994), wind is a characteristic feature of the West Coast, and is often very strong. In summer, the prevailing wind is south/south-east, while in winter, the north-westerly predominates. Wind is an important factor influencing the nature of the coastal vegetation. In summer, the hot and dry offshore winds cause the plants to dry out, while the salt-laden on-shore winds constantly stunt the new growth of the coastal shrubs, resulting in the characteristic 'wind-pruned' effect.

2.3.2 Geology, geomorphology, soils and land types

Blaauwberg Nature Reserve consists of a series of hills, including Grootberg, Kleinberg as well as a third outcrop that lies to the east of the other two. These hills form part of a family of Malmesbury rock landforms in the Table Bay area (OvP Associates, Landscape Architects & Environmental Planners 2000). Largely surrounded by relatively flat coastal plains and low-growing vegetation, the hills define the landscape in the region, and are the most prominent landform on the southern West Coast. From Grootberg, at an elevation of 231 m above sea level, one has exceptional panoramic vistas of Table Bay, Table Mountain, Signal Hill, Tygerberg Hills and Robben Island (OvP Associates, Landscape Architects & Environmental Planners 2000). The topography of the area is a result of geological structure and climatic weathering processes. Changes in sea level have also played a role in further shaping the landscape. Several studies suggest that, during certain geological periods, Robben Island would have been linked to Blaauwberg Hill by dry land.

The area is underlain by the shales and greywackes of the Malmesbury group that outcrop at Bloubergstrand, Melkbosstrand, Kreeftebaai and on the Blaauwberg. These include the oldest rock in the Cape metropolitan area, and have been covered in places by more recent

sands and wind-erodable dunes along the coast (OvP Associates, Landscape Architects & Environmental Planners 2000).

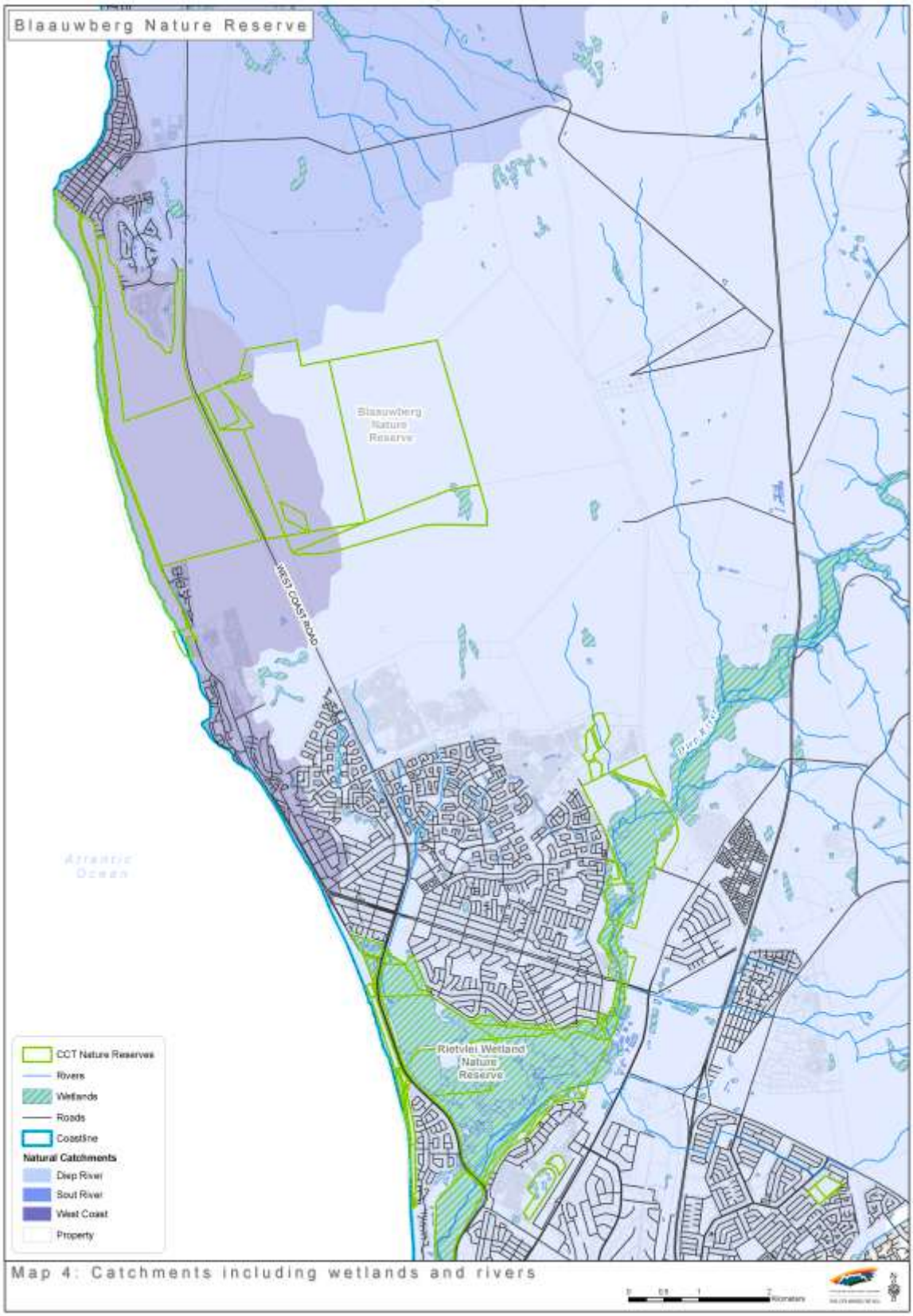
Due to the deposition of Aeolian sands in recent times, a series of dune ridges, some older than others, have been formed parallel to the coast as well as inland around the western foot of Blaauwberg Hill. The younger dunes are less compacted, more unstable, and therefore prone to wind erosion. Stability of these dunes is therefore dependent on the maintenance of the vegetation cover and the management of indiscriminate vehicular and pedestrian movements. These dunes form an integral part of the reserve ecosystem (OvP Associates, Landscape Architects & Environmental Planners 2000).

There are varied mixes of underlying geology and surface deposits, which form a complex mosaic of soil types within the reserve, thus playing a key role in the occurrence and distribution of a wide variety of vegetation types. Some 30 soil profiles occur within the area. Shale soils found in the area tend to be fertile and mildly acidic, with a loamy to clayey texture. Most tend to be shallow and even stony, particularly on the higher slopes of the hill. At the coast, these are calcareous, becoming less so as one moves inland, with a corresponding rise in acidity. The soils here are still classified as infertile, losing much of their calcium and phosphorus in the leaching process. The most fertile soils are the sands on the plain to the east and north-east of Blaauwberg Hill, where maximum leaching and therefore highest acidity levels are encountered.

2.3.3 Hydrology and aquatic systems

2.3.3.1 Catchments

Two wetlands are found in Blaauwberg Nature Reserve (see map 4). Blaauwberg Vlei, located in the south-eastern corner of Blaauwberg Nature Reserve, is a natural vlei system in the critically endangered Cape Flats Sand Fynbos. The artificially created Melkbos pan is located on Birkenhead Drive, just north of the Atlantic Beach golf estate. Water from Blaauwberg Hill and Klein Melkbosch farm seeps into and collects in the Melkbos pan. During winter months when the rainfall is high, water from this pan backs up on the opposite side of Birkenhead Drive at Atlantic Beach golf estate due to the high water level in the area and poor drainage qualities of the ground. A third seepage area has been identified just below the eastern slope of Kleinberg.



Map 4: Catchments including wetlands and rivers

2.4 Biological environment

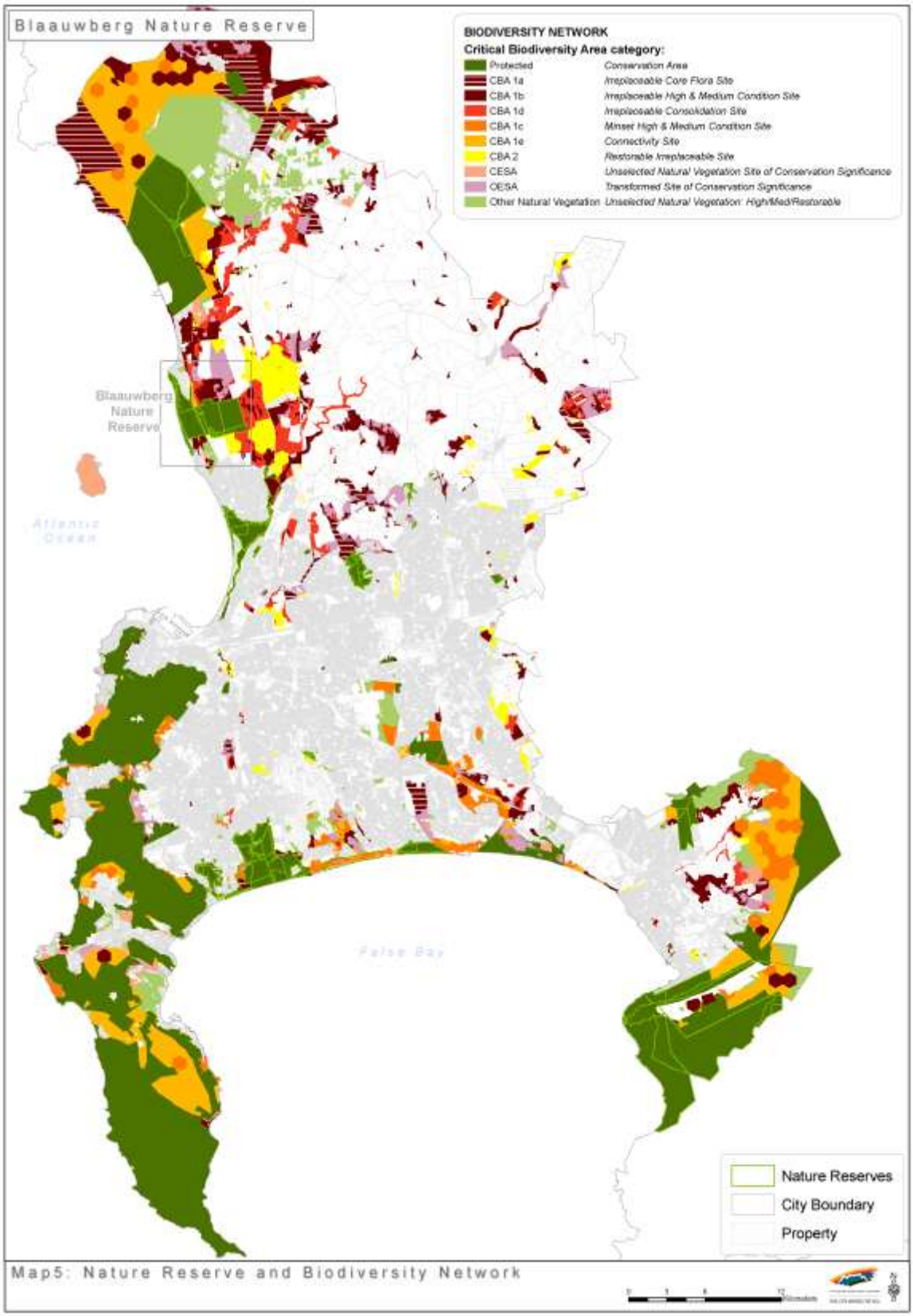
2.4.1 Vegetation

Three major vegetation types are found in Blaauwberg Nature Reserve, each corresponding to a specific geological substratum. Cape Flats Dune Strandveld occupies the coastal calcareous sands, in general between Blaauwberg Hill and the high-water mark. Two major plant formations are recognised, namely tall thicket on the higher dunes, with deep sand and dwarf thicket on the shallow sand over limestone, largely near the coast. The latter form of dune thicket is unique to the area. Vegetation is dominated by broad-leaved shrubs and small trees such as *Rhus sp.* (taaibos) and *Euclea racemosa* (sea guarrie), with a fair degree of succulents. Annuals and bulbs are a prominent feature in spring.

A vegetation type restricted to the more fertile shale soils of the Western Cape is Swartland Shale Renosterveld, which is found on Blaauwberg Hill and Kleinberg. Although severely affected by agriculture, there still are remnant stands of the vegetation type in the area, particularly on the upper slopes and crown of the hill. Although similarities between Swartland shale renosterveld and dune thicket have been recorded, particularly in the form of thicket clumps species and succulents, the former is far grassier and contains a higher proportion of bulbs. Annuals are also prominent. Along the tip of the crown one also finds a patch of low succulent shrubs, which are related to the vegetation of the Little Karoo. However, it is considered too small to be mapped as a vegetation type of this area.

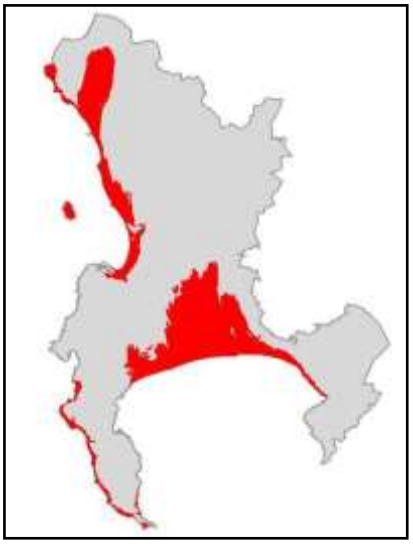
The third vegetation type is also dependent on sand, namely the acidic sand on the eastern side of Blaauwberg Hill. This is termed Cape Flats Sand Fynbos, and is typified by the presence of characteristic fynbos families such as *Proteaceae*, *Ericaceae*, *Restionaceae* (reeds) and boegoes. The vegetation comprises short to medium-high shrubs, interspersed with reeds. Succulents and broad-leaved shrubs are not prominent. Fynbos in the study area is largely confined to small remnants on Joyce's Dairy Farm, having been greatly reduced through agriculture and extensive *Acacia sp*. infestations. Uncontrolled fires have also had a considerable impact. However, these areas are restorable.

A composite vegetation map was compiled from a number of earlier studies of the area, and 12 major plant communities were recognised in the analysis (see map 5). All of these, with the exception of Swartland Shale Renosterveld on flats, are still to be found in natural remnant patches. Also see appendix 3 for a comprehensive plant species list of Blaauwberg Nature Reserve.



Map5: Nature Reserve and Biodiversity Network

2.4.1.1 Cape Flats Dune Strandveld (Dune Thicket) (Rebelo, Boucher, Helme, Mucina & Rutherford 2006)



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

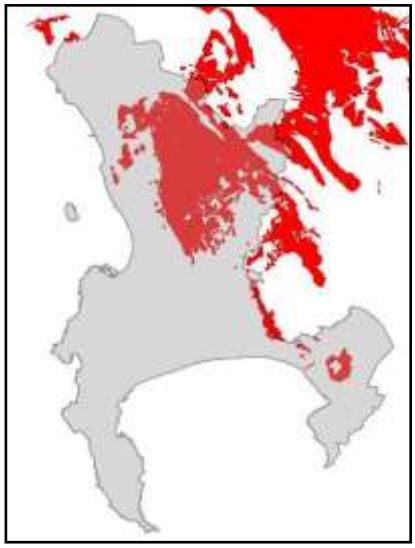
Vegetation and landscape features: Flat to slightly undulating dune field landscape, covered by tall, evergreen, hard-leaved shrubland, with abundant grasses and annual herbs in gaps. Structurally, strandveld is a tall, evergreen, hard-leaved shrubland, with abundant grasses, annual herbs and succulents 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. All of this vegetation type occurs within the City of Cape Town's jurisdiction, and 56% is transformed.

Geology and soil: Tertiary to recent calcareous sand of marine origin; outcrops of limestone found on the False Bay coast

Climate: Mean annual rainfall of 350 mm in north, to 560 mm in south

Conservation: Endangered; target 24%; conserved 6%
Cape Flats Dune Strandveld historically covered an area of 401 km² within Cape Town. Today, only 180 km² of this vegetation type remains, of which 64 km² is conserved under formal conservation management.

2.4.1.2 Swartland Shale Renosterveld (West Coast Renosterveld) (Rebelo *et al.* 2006)



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 Olifantsrivier Mountains, 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. Approximately 9,8% of this vegetation type occurs within and 90,2% outside Cape Town. Similar transformation rates occur nationally (92%) and within Cape Town's borders (91%).

Vegetation and 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' (little hills) 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* (Bermuda grass/grazing lawns) also occur in abundance.

Geology and 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: Mediterranean-type climate, with dry, hot summers and cool, wet winters with a mean annual precipitation of 270–670 mm (mean: 430 mm), peaking from May to August. The average summer temperatures rise to about 28 °C, while average winter temperatures reach 17 °C (Marshall & Mommsen 1994). The hottest time of the year is between January and March, although these summer temperatures are tempered by the cold Atlantic water and the frequent summer fog. The lowest temperatures occur in July, but frost remains rare in the area (Marshall & Mommsen 1994). Frost occurs three or four days per year. Mists are common in winter.

Swartland Shale Renosterveld endemic taxa that occur in Blaauwberg Nature Reserve are as follows:

Low shrubs: *Leucadendron verticillatum, Aspalathus acanthophylla, A. horizontalis, A. pinguis subsp. longissima, A. pinguis subsp. occidentalis, A. puberula, A. rectistyla, Cliffortia acockii, Lotononis complanata* and *Serruria incrassata*

Succulent shrubs: *Erepsia ramosa, Ruschia patens* and *R. pauciflora*

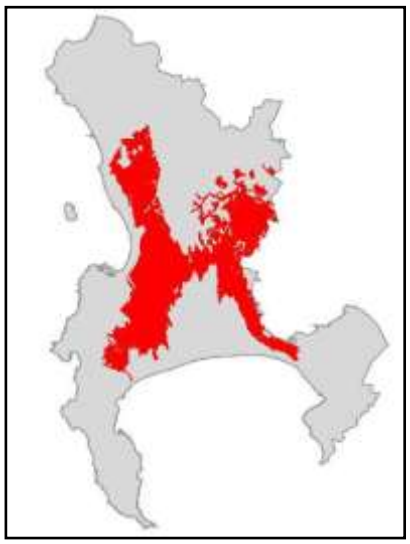
Herb: *Indigofera triquetra*

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* and *Pelargonium viciifolium*

Conservation: This is a critically endangered vegetation unit. The minimum national target has been set at 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 (such as Elandsberg and Paardenberg).

Swartland shale renostervled historically covered an area of 464 km² in Cape Town. Today, only 40 km² of this vegetation type remains within the City of Cape Town's municipal boundaries, and, of that, only 3 km² is conserved or formally managed for conservation.

2.4.1.3 Cape Flats Sand Fynbos (Sand Plain Fynbos) (Rebelo *et al.* 2006)



Distribution: Largely endemic to Cape Town; Cape Flats from Blaauwberg and Koeberg Hills west of 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 south-west of Bottelary Hills to Macassar and Firgrove in the south. Altitude 20–200 m. Nearly 100% of this vegetation type occurs within Cape Town, and 85% is transformed.

Vegetation and landscape features: Moderately undulating and flat plains, with dense, moderately tall, ericoid shrubland, containing scattered emergent tall shrubs. Proteoid and

restioid fynbos is dominant, with asteraceous and ericaceous fynbos occurring in drier and wetter areas respectively.

Geology and soils: Acidic, tertiary, deep, grey regic sands, usually white, often Lamotte form.

Climate: Mediterranean-type climate, with dry, hot summers and cool, wet winters with a mean annual precipitation of 580–980 mm (mean: 575 mm. The average summer temperatures rise to about 28 °C, while average winter temperatures reach 17 °C (Marshall & Mommsen 1994). The hottest time of the year is between January and March, although these summer temperatures are tempered by the cold Atlantic water and the frequent summer fog. The lowest temperatures occur in July, but frost remains rare in the area (Marshall & Mommsen 1994). Frost occurs three or four days per year. Mists are common in winter. This is the wettest and coolest of the West Coast sand fynbos types.

Cape Flats Sand Fynbos endemic taxa that occur in Blaauwberg Nature Reserve are as follows:
Low shrubs: *Erica margaritacea, Aspalathus variegata* (probably extinct)*, Athanasia capitata, Cliffortia ericifolia, Erica pyramidalis, E. turgida, E. verticillata, Leucadendron levisanus, Liparia graminifolia, Serruria aemula, S. foeniculacea* and *S. furcellata*
Succulent shrubs*: Lampranthus stenus*
Geophytic herbs: *Ixia versicolor*
Graminoids: *Tetraria variabilis* and *Trianoptiles solitaria*

Conservation: Critically Endangered; target 30%; less than 1% statutorily conserved as small patches in 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 by urban sprawl (Cape Town metropolitan area) and cultivation. Hence, the conservation target remains unattainable. Most remaining patches are small pockets surrounded by urban areas, for example Rondevlei, Kenilworth, Milnerton, 6 BOD, Plattekloof and Rondebosch Common. Most of these patches have been identified as ‘core conservation sites’, and are mismanaged with regard to mowing, fire protection and alien plant invasion. Mowing eliminates serotinous and taller species, while fire protection results in a few common thicket species (e.g. *Carpobrotus edulis*a and *Chrysanthemoides monilifera*) replacing the rich fynbos species. Alien woody species include *Acacia saligna*, *A. cyclops* and species of *Pinus* and *Eucalyptus*. The dumping and spread of alien grasses, both annual and kikuyu (*Pennisetum clandestinum*), are another major problem. Alien acacias result in elevated

nutrient levels and a conversion to *Eragrostiscurvula* grassland and near-annual fires. Some 94 Red List sand fynbos plant species occur on the remnants within Cape Town. The endemics include six species listed as extinct in the wild, some of which are being re-introduced from botanical gardens.

Cape Flats sand fynbos historically covered an area of 547 km² within Cape Town. Today, only 77 km² of this vegetation remains, of which only 5 km² is conserved or formally managed for conservation.

2.4.2 Mammals

The Cape Flats Dune Strandveld is known for its exceptional concentrations of certain faunal groups, and is also recognised as one of the hot spots of species richness and endemism of national vertebrate and insect groups (OvP Associates, Landscape Architects & Environmental Planners 2000). Specialist studies on flora assume that in the process of protecting diverse natural vegetation, one will, by definition, also protect a diversity of fauna through conserving their habitat. Providing a diverse habitat would also promote the area's educational value and appeal to the general public.

Blaauwberg Nature Reserve contains three vegetation types as well as the ecotones between them. This has resulted in incredibly high species diversity. Fauna groups are well represented, with 42 mammal species having been recorded (see appendix 4). These include the Endangered *Mystromys albicaudatus (*White-tailed Mouse). A management plan with management guidelines for larger wildlife and their habitats has been compiled by Ken Coetzee in 2008 (see appendix 5). The plan gives an overview of the historical incidence of larger mammals, a description of their habitats and habitat conditions, suitable species for introduction and species review, habitat and game introduction management implications, and wildlife management and monitoring. This IRMP should therefore be read in conjunction with the wildlife management plan.

It is the future vision of Blaauwberg Nature Reserve to introduce larger wildlife species suitable to the area, to enhance the management of the vegetation cover and ecological processes. Species earmarked for re-introduction include *Taurotragus oryx* (Eland), *Alcelaphus buselaphus* (Red hartebeest) and *Pelea capreolus* (Grey Rhebok) (Coetzee 2008).

Key indicator species in the reserve must be indentified and monitored according the Biodiversity Management Branch's protocols and monitoring techniques. Emphasis has

been placed on establishing habitat monitoring systems, consisting of fixed-point photographic sites, vegetation condition transects, exclosures, browse monitoring sites and rainfall recording. Habitat monitoring is done annually.

The reserve has an extensive stretch of coastline, covering 7–8 km of rocky and sandy shores that provide habitat to *Arctocephalus pusillus* (Cape Fur Seal)*, Balaena glacialis* (Southern Right Whale)*, Cephalorhynchus heavisidii* (Heaviside's Dolphin)*, Lagenorhynchus obscurus* (Dusky Dolphin)*, Megaptera novaeangliae* (Humpback Whale), *Aonyx capensis* (Cape Clawless Otter) and *Atilax paludinosus* (Water Mongoose).

2.4.3 Birds

Over 140 bird species have been recorded in Blaauwberg Nature Reserve (see appendix 6). These include, but are not limited to, *Bubo africanus* (Spotted Eagle-Owl)*, Buteo rufofuscus* (Jackal Buzzard)*, Buteo vulpinus* (Steppe Buzzard), *Falco peregrinus (*Peregrine Falcon*), Haematopus moquini* (African Black Oystercatcher) and *Merops apiaster* (European Bee-eater). Sightings of species are recorded monthly and submitted on the South African Biodiversity Database. Planned coordinated waterbird counts (CWACs) are done quarterly and Black Oystercatcher censuses are done bimonthly between the months of October to March.

2.4.4 Reptiles

Thirty-four reptile species have been recorded (see appendix 7). Common species include *Acontias meleagris* (Cape Legless Skink), *Bradypodion pumilum* (Cape Dwarf Chameleon), *Chersina angulata* (Angulate Tortoise)*, Cordylus cordylus* (Cape Girdled Lizard), *Dasypeltis scabra* (Common Eggeater), *Lamprophis inornatus* (Olive House Snake), *Naja nivea* (Cape Cobra), *Psammophylax rhombeatus* (Rhombic Skaapsteker), *Pseudaspis cana* (Mole Snake), *Trachylepis capensis* (Cape Skink) and the rarer *Scelotes montispectus* (Blaauwberg Dwarf Burrowing Skink). Key indicator species need to be identified and an ongoing monitoring programme implemented.

2.4.5 Amphibians

Four amphibian species have been recorded. These are *Breviceps namaquensis* (Namaqua Rain Frog), *Breviceps rosei* (Sand Rain Frog), *Strongylopus grayii* (Clicking Stream Frog) and *Vandijkophrynus angusticeps* (Sand Toad) (see appendix 8).

2.4.6 Invertebrates

An extensive survey of invertebrates in Blaauwberg Nature Reserve still needs to be done to indentify key indicator species and inform habitat management.

2.4.7 Fish

Blaauwberg Nature Reserve has limited freshwater habitat. No survey of marine fish species has been undertaken as yet.

2.5 Socio-political context

2.5.1 History

Blaauwberg Nature Reserve has been a concept since the 1980s. In 1996, conservation area status was conferred on public-owned portions of land, as well as a section of private land comprising the site of the Battle of Blaauwberg, in terms of the National Monuments Act (Act 28 of 1969). A proposed boundary for the reserve was also gazetted. In 2000, the BCA development and management plan and its recommendations were approved by the then Cape Metropolitan Council and Blaauwberg Municipality, which enabled budgets to be allocated and programmes to be implemented, which were to lead to the establishment of the BCA, as envisaged. One example of such a programme is the Land Consolidation Programme, which has resulted in three of the five private landholdings having been incorporated into Blaauwberg Nature Reserve. The new landholdings were brought into the reserve in 2002, 2005 and 2010 respectively, and the programme is ongoing. Of special note is the 462 km² that were donated to the reserve by Garden Cities.

It was only in late 2003 when on-site management was established in Blaauwberg Nature Reserve. The transfer of a reserve manager to the reserve by the City of Cape Town coincided with, and was made possible by, the receipt of CEPF funding via the C.A.P.E programme.

In 2006, the Western Cape Member of the Executive Council for Environmental Affairs and Development Planning granted approval for the establishment of the BCA local nature reserve in P.N. 345/2006 dated 27 October 2006. The provincially owned portions of the reserve were proclaimed as Blaauwberg Provincial Nature Reserve by means of P.N. 06/2007 dated 2 March 2007. The City of Cape Town manages both its own and the provincially-owned land as a single entity, called Blaauwberg Nature Reserve.

The archaeological, historical and cultural heritage of the reserve is both rich and varied. Regarded as an area of historical and cultural significance, more than 25 sites have been recorded and mapped within and adjacent to the reserve. The rich cultural and historical tapestry of the area spans various periods of history, as described below:

Stone Age – Late Stone Age deflated sites with Stone Age tools, pottery and ostrich egg shells were found east of Blaauwberg Hill on Joyce's Dairy Farm (OvP Associates, Landscape Architects & Environmental Planners 2000).

Khoisan – Shell middens and archaeological remains along the coastline as well as to the east of Blaauwberg Hill are testament to the indigenous Khoikhoi communities who once inhabited this landscape. Small caves located in the vegetated kloofs of Blaauwberg Hill apparently served as lookout points to the Khoikhoi, to alert them to ships coming into Table Bay (OvP Associates, Landscape Architects & Environmental Planners 2000).

Early maritime history of Cape Town – Shipwrecks on the bottom of the Atlantic Ocean in Table Bay dating back to the mid-17th century represent an important period of the early maritime history of South Africa and Europe. A number of forts and trading outposts were established during the Dutch East India Company period. The Riet Valley outpost was also used as a camp for the Khoikhoi regiment during the first British occupation of the Cape (1795–1803). Blaauwberg Vlei is an historic 'outspan' and stopover on the old wagon route between Cape Town and the West Coast (OvP Associates, Landscape Architects & Environmental Planners 2000).

Battle of Blaauwberg (1806) – The site of the Battle of Blaauwberg (1806) is located on the farm Blaauwbergsvlei, to the east of Kleinberg. Gazetted on 26 January 1996, the National Monuments Act (Act 28 of 1969) designated the Blaauwberg battlefield site and adjacent subsections of land as conservation area. The battle marked the start of the second British occupation of the Cape and the end of final Dutch rule. Casualties of war were buried in the dunes in grave sites yet to be located (OvP Associates, Landscape Architects & Environmental Planners 2000).

World War II – The World War II buildings on top of Blaauwberg Hill still stand and are of historical significance. In addition to an artillery post, diesel station, accommodation and mess building, South Africa's first radar station can be seen here (OvP Associates, Landscape Architects & Environmental Planners 2000).

This archaeological and historical heritage is a sensitive, fragile and non-renewable cultural resource. Large-scale development between Table Bay and Melkbosstrand has already resulted in the loss of many archaeological and historical sites, including shell middens, forts and trading outposts.

Land use in Blaauwberg Nature Reserve must therefore be controlled in order to minimise further destruction and damage to cultural resources. The resources must however also be managed to optimise their educational and tourism opportunities. These objectives can be achieved by integrating protective measures with the planning and development policies for the reserve, as well as active public participation. The reserve managers of Blaauwberg Nature Reserve (originally the BCA) have been as follows:

2003–2005 Clifford Dorse
2005–2007 Adele Pretorius
2007–2009 Lizanne Langeveld (born Engelbrecht)
2009–present Ettienne Jacques Küyler

2.5.2 Socio-economic context

The Implementation Coordination Committee (ICC) for the reserve, comprising representatives from government and civil-society organisations, has been tasked with overseeing the establishment of Blaauwberg Nature Reserve, and identifying activities that are compatible with the vision and primary objectives of the reserve. The preparation of a business framework and business plan for the reserve was a move in that direction (see appendix 1).

2.6 Protected-area expansion

The consolidation of important biodiversity, cultural and heritage land into Blaauwberg Nature Reserve is one of the reserve's key management objectives. An active land consolidation programme has been implemented, which has resulted in three of the five private landholdings having been incorporated into the reserve in 2002, 2005 and 2010 respectively. The programme is ongoing.

Protected-area expansion of Blaauwberg Nature Reserve includes the following:

Redevelopment of Eerstesteen as the southern gateway to the reserve, to provide the following visitor/tourism facilities:

- Reserve management and administrative facilities

- A visitor orientation/information and interpretative centre
- A kiosk/food and beverage facility
- Restrooms
- Parking facilities
- Formal trading outlets
- Informal trading outlets
- A multi-functional conference facility
- An educational facility
- Mobile food and beverage operators that will provide refreshments at the various beaches in Blaauwberg Nature Reserve
- Guided hiking trails

Establishment of a northern gateway and other facilities, which will include the following:

- A new Northern Gateway to Blaauwberg Nature Reserve
- A visitor centre/tourist information centre
- An entrance gate
- A multi-purpose interpretative centre, including displays on Blaauwberg Nature Reserve's fauna and flora, and the Battle of Blaauwberg
- A fully commercial restaurant, serving breakfast, lunch and dinner, outsourced to a reputable restaurant operator. The restaurant will be themed according to the unique selling points of the area.
- A kiosk that will be incorporated into the restaurant buildings, and will be operated in conjunction with the restaurant
- Formal trading outlets that will be outsourced to private operators
- Informal trading outlets that will be outsourced to private operators at a minimal fee
- Restrooms
- Parking
- Maintenance workshop, fuel store and fire store
- Nature reserve offices for five to six people
- A manager's house with three bedrooms
- Student/staff accommodation for five people
- Garages for three vehicles
- Lodge accommodation on Blaauwberg Hill, housed in existing structures converted for this purpose and offering a scenic view of Table Mountain and Robben Island. The

facility will be themed according to the reserve's unique selling points, and will incorporate sound environmental design principles.

The development of the northern gateway itself depends on negotiations with private landowners.

Establishment of the eastern gateway to Blaauwberg Nature Reserve, which will include the following:

- A multi-purpose visitor centre
- An entrance gate and guard house
- A small food and beverage facility
- Restrooms
- Parking areas
- Formal trading outlets
- Informal trading outlets

The establishment of an eastern gateway is justifiable only if the road access is improved. The key proposal in this regard is the extension of the east-west arterial road.

3. PURPOSE, VISION/MISSION, SIGNIFICANCE/VALUE

3.1 Purpose of the protected area

Blaauwberg 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 purposes of a protected area are described in chapter 3, section 17 of the National Environmental Management: Protected Areas Act.

The purposes of declaring protected areas are:

- to protect ecologically viable areas representative of South Africa's biological diversity, its natural landscapes and seascapes in a system of 30 protected areas;
- to preserve 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;
- to manage the interrelationship between the natural environment and people.

3.2 Vision and mission

3.2.1 Vision

Integrated Development Plan vision

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

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

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

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

C.A.P.E vision

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

Environmental Resource Management Department vision

To ensure that sustainable and equitable development is combined with sound environmental practice for a healthy local environment that sustains people and nature, provides protection for our unique resources, and results in an enhanced quality of life for all.

City of Cape Town biodiversity strategy vision

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.

Blaauwberg Nature Reserve vision

To conserve, protect and enhance the unique diversity of natural, historical and cultural resources of this area for the sustainable enjoyment and development of present and future generations through education.

3.2.2 Mission

City of Cape Town biodiversity strategy 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 Cape Town

Blaauwberg Nature Reserve mission

Through judicious land acquisition and the development of economically viable conservation and education-related facilities and activities, we aim to secure the protection of the entire area and ensure its long-term sustainability based on sound ecological and cultural values.

3.3 Significance of property (biodiversity, heritage and social)

Blaauwberg Nature Reserve contains three threatened vegetation types, namely Cape Flats Dune Strandveld (endangered); Cape Flats Sand Fynbos (critically endangered) and Swartland Shale Renosterveld (critically endangered), together with their corresponding ecotones. The vegetation types in the reserve are classified as 100% irreplaceable (C.A.P.E Project Team 2000). A unique feature of the reserve is its functional marine-to-interior transition, which serves as a corridor for ecological processes from the coast to acidic flats east of Blaauwberg Hill. The culture-historical attributes of international significance add immensely to the value of Blaauwberg Nature Reserve and its contribution to regional diversity on a landscape scale.

Previous on-site botanical work indicated that the site (the entire reserve) is home to at least 47 Red List or threatened plants (according to the new threatened species list from SANBI).

Blaauwberg Nature Reserve falls in the CWCBR, and could be designated as one of the core sites in the near future. Negotiations in this respect are ongoing with the CWCBR coordinators. The nature reserve will be bordered by residential development (on the south and east), which will be inhabited by close to 500 000 people in the foreseeable future (in the next 10 to 20 years). Because of its urban context, the reserve will be a good testing ground for the concept of sustainable development, where environmental conservation and development activities co-exist sustainably.

Blaauwberg Nature Reserve is one of the core remnant sites according to the renosterveld lowland fine-scale study. The reserve was classified as a Core Flora Conservation Site in the study conducted by the Botanical Society for the Cape Metropolitan Council. Furthermore, the reserve forms part of a functional coastal-interior gradient, serving as a corridor for ecological processes from the coast to acidic flats east of Blaauwberg Hill. The site was also identified as a node in the City of Cape Town's biodiversity network study, as it contains a diversity of habitats and ecotones that contribute immensely to regional diversity on a landscape scale. The holotype of *Scelotes montispectus* (Blaauwberg Dwarf Burrowing Skink) was collected within Blaauwberg Nature Reserve. There is also a healthy population of *Mystromys albicaudatus* (White-tailed Mouse), listed as endangered in the latest Red List of mammals of South Africa. Finally, a total of eight Red Data fauna species are known to occur in Blaauwberg Nature Reserve.

PART 2

MANAGEMENT POLICY FRAMEWORK

4. ADMINISTRATIVE AND LEGAL FRAMEWORK FOR THE MANAGEMENT AUTHORITY

4.1 Legal framework

Table 2: 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

Blaauwberg Nature 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. The reserve is located in the northern region, and falls under the oversight of the regional manager. Blaauwberg Nature Reserve is the management responsibility of an area manager, assisted by ten operational staff members (see figure 3). The operational management of the reserve is supported by various other City of Cape Town departments, including, but not limited to, Law Enforcement, Bulk Water, Water and Sanitation, City Parks, Roads and Stormwater, Human Resources and Finance.

The Blaauwberg Nature Reserve ICC, comprising representatives from government and civil-society organisations, has been tasked with overseeing the establishment of the reserve, and identifying activities that are compatible with the reserve's vision and primary objectives. The preparation of a business framework and business plan for the reserve was a move in that direction.

Currently, the regionally based administrative officer operates from the Maitland Old Abattoir, as does the regional manager. The senior people and conservation officer is responsible for the implementation of a regional environmental education and community development strategy, and currently operates from Blaauwberg Nature Reserve.

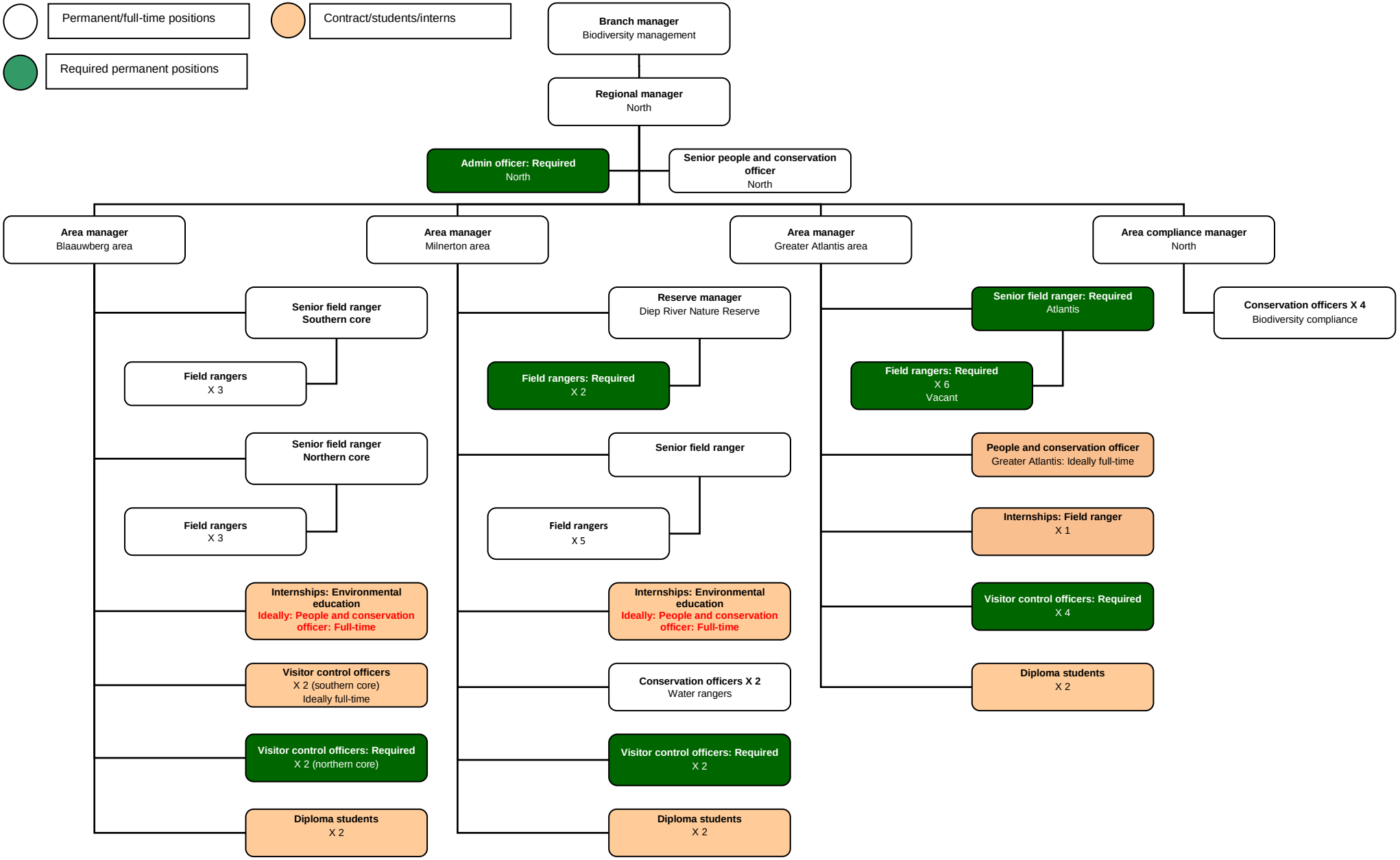


Figure 3: Northern-region organogram

5. PROTECTED-AREA POLICY FRAMEWORK & GUIDING MANAGEMENT PRINCIPLES

5.1 Management objectives

5.1.1 Biodiversity and heritage objectives

The following table lists the management objectives for Blaauwberg Nature Reserve:

Table 3: Management objectives for Blaauwberg Nature Reserve

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 Blaauwberg Nature Reserve, and to re-introduce missing elements, where possible	**Consolidation and expansion of land areas** Consolidation of protected areas, focusing on underrepresented ecosystems, functional linkages and processes	(1) Identify underrepresented habitats/ecosystems (2) Consolidate reserve boundaries (3) Incorporate untransformed fynbos (4) Establish corridors linking Blaauwberg Nature Reserve with the Diep River fynbos corridor, Tygerberg Nature Reserve and Koeberg Nature Reserve	Reserve expansion plan (needs to be developed)
		Reintroduction of biota Re-establishment, where possible, of locally extinct or depleted biodiversity components and populations in accordance with principles and guidelines of the International Union for Conservation of Nature	(1) Re-establish indigenous herbivore complement within constraints of reserve size and urban setting	Faunal management plan (management guidelines for larger wildlife and their habitats)
		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 (veldfire management plan Mamre-Table View unit)

		Threatened biota Maintain viable populations of threatened species in order to meet obligations in terms of international agreements and conventions	(1) Maintain viable populations of rare/threatened plant and animal species (identify, locate and monitor populations of priority species)	Threatened-biota plan (needs to be developed)
		Monitoring plan Implement and maintain an approved monitoring plan for the reserve	(1) Implement and maintain a biological monitoring programme for the reserve	Monitoring plan (exists in part)
	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	**Vegetation** Re-establishment of physical, chemical and biological processes in degraded vegetation areas	(1) Rehabilitate all old, degraded sites	Vegetation rehabilitation plan (needs to be developed in consultation with biospecialist)
		Alien plants and other alien 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; APO (exist)

MITIGATE INTERNAL and EXTERNAL PRESSURES To reduce threats and pressures and limit environmental impacts resulting from non-biodiversity management aspects and operations on surrounding land and resource use	**Reconciling biodiversity with other reserve objectives** To ensure that non-biodiversity management aspects of reserve operations (revenue generation, 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 developments** Minimise the impacts associated with the development of visitor and reserve management infrastructure, and ensure that such developments do not compromise biodiversity objectives	(1) Reserve zoning (2) Develop and implement Conservation Development Framework (CDF) (3) Developments in accordance with 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	CDF (exists in part)
		Internal activities Minimise the impacts associated with visitor and reserve management activities, and ensure that such activities do not compromise biodiversity objectives		
		Extractive resource use Minimise the impacts of extractive resource use, and ensure that such activities are aligned with corporate guidelines, are within management capacity constraints, and do not compromise biodiversity objectives	(1) Quantify current extractive resource activities (2) Define opportunities and constraints in line with corporate guidelines (3) Regulate resource use according to adaptive management process	Sustainable resource use management plan (needs to be developed) Note: This is a long-term process, as research into sustainable yields needs to be conducted first.
	Reconciling biodiversity with external threats To reduce external threats and pressures, and limit impacts of surrounding land and resource use on biodiversity conservation within the reserve	**External developments** Minimise the impacts associated with inappropriate developments outside the reserve	(1) Engage regional land management authorities, including IDPs and Spatial Development Frameworks at local and regional level (2) Align with bioregional planning, including explicitly identified areas for the maintenance of important biodiversity patterns and processes, with appropriate land use guidelines (3) Provide input into planning and	Branch-wide communication strategy and action plan

			decision-making process for external development that may compromise reserve and biodiversity network objectives (4) Negotiate to ensure that external developments are not visually obtrusive or out of character with the reserve	
		External activities Negotiate to ensure that external resource and land use does not detrimentally affect ecological processes within the 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	Oil spill contingency plan (cooperative governance and communication plan) (Environmental Resource Management Department plan)
		Illegal harvesting of resources Prevent the illegal collection, removal and destruction of physical and biological resources	(1) Public liaison (2) Law enforcement	Reserve protection plan, safety and security plan/programme (safety & security plan)
WILDNESS/REMOTENESS To maintain and restore wildness/remoteness in Blaauwberg Nature Reserve so that the spiritual and experiential qualities of wildness are maintained, enhanced or, where necessary, restored	**Range of experiences** Provide a range of visitor experiences		(1) Reserve zoning (2) Develop CDF and sensitivity-value analysis	(1) CDF (2) Reserve expansion plan (3) Invasive alien plant management plan (draft invasive-species management plan)
	Sense of place Maintain or restore appropriate sense of place		(1) Implement and update CDF (2) Establish and apply appropriate visitor carrying capacity (3) Negotiate to ensure that external developments are not visually obtrusive or out of character with	

			the reserve	
CULTURAL HERITAGE MANAGEMENT To investigate and manage all cultural assets	Conserve and manage cultural heritage assets	N/A	(1) Develop a database of all tangible and intangible cultural assets, including inventory, maps and relevant 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 the reserve	Cultural heritage management plan (needs to be developed in consultation with Heritage)

5.1.2 Socio-economic objectives

Table 4: Socio-economic objectives for Blaauwberg Nature Reserve

High-level objective	*Objective*	*Sub-objective (where required)*	*Initiative*	*Low-level plan*
Nurture productive and mutually beneficial partnerships that result in gains in economic and/or biodiversity equity	Enhance socio-economic benefits to local communities	Developing partnerships with external and internal stakeholders, such as Tourism, Local Economic Development, Working for Water/Fire, to facilitate opportunities	(1) Contribute to local community development by supporting the Expanded Public Works Programme/poverty Relief projects (2) Contribute to local skills development by supporting the skills and learnership programmes (3) Identify and facilitate the creation of business opportunities in association with the reserve (4) Support community-based social development initiatives	Local socio-economic development plan (branch-wide plan to be developed)
	Increase environmental awareness and encourage participation in conservation initiatives	Inspire visitors and communities to consider the environment as an interrelated and interdependent system, of which they are an integral part Educate learners, educators and other community focus groups to be able to take environmental action	(1) Develop and implement an interpretation plan that feeds into both the education and zoning plans (2) Implement environmental education and youth development programmes suited to the needs of each focus group (i.e. tailor-made programmes for each focus group)	Education development plan (northern region's to be developed)

		Support educators and community leaders with resource and information materials	(1) Establish and market an environmental resource centre and outdoor classrooms with a range of interpretive and information resources	
Support cooperative governance that will build custodianship	Maintain good reserve/community/stakeholder relations	N/A	(1) Identify and involve all relevant stakeholders for participation in the reserve advisory forum (2) Develop effective communication mechanisms and responsibilities for representatives (3) Actively support the ongoing involvement of the FoBCA	Stakeholder relations plan (a branch-wide plan to be developed)
	Effective cooperative governance	Minimise degrading impact and consequences of inappropriate development in and around the reserve	(1) Establish and maintain good working relationship with relevant government departments as well as internal City of Cape Town departments	
		Ensure support/buy-in for management decisions through participatory decision-making processes	(1) Define roles and responsibilities with stakeholder groups, partnerships and government through written agreements/terms of reference (TORs) and MOUs	
Become the nature-based visitor destination of choice	To develop, manage and enhance a		(1) Design customer satisfaction survey (2) Analyse current product usage, and identify opportunities	Visitor plan

in the region	range of sustainable visitor products		(1) Plan for visitor infrastructure and facilities, as identified by the CDF and business framework and plan (2) Develop and implement the infrastructure management plan (in compliance with State of Infrastructure report) (3) Compile a State of Infrastructure report	Infrastructure programme
	Conserve and manage cultural heritage assets		(1) Develop a database of all tangible and intangible cultural assets, including inventory, maps and relevant documentation (2) Develop management plans for each cultural heritage site, with monitoring systems in place for management priorities and prescriptions (3) Facilitate appropriate interpretation of cultural heritage associated with the reserve	Cultural heritage management plan (to be developed in conjunction with the Environmental Heritage Branch)
Grow the domestic visitor profile to be representative of South African society	Grow the domestic visitor profile of the reserve to be representative of regional demographics	N/A	(1) Promote and manage access to the reserve (2) Develop and support dedicated access programmes, or incorporate a 'dedicated access' element into existing programmes (3) Actively market reserve resources and services	Marketing plan (a branch-wide plan to be developed)

Enhance the City of Cape Town's reputation	Enhance the reserve's reputation	N/A	(1) Develop and implement a communication plan to promote reserve activities	Communication strategy and action plan (branch-wide)
Advance strategic human resource management	To ensure good human resource management	N/A	(1) Implement and support learnerships and volunteer programmes (2) Ensure all staff have access to training initiatives, as per the Workplace Skills Plan (3) Ensure all corporate human resource policies are adhered to	Staff capacity-building programme/institutional development and staff capacity-building programme
Financial management	To ensure sound financial management practices are applied to and underpin the reserve	N/A	(1) Manage cost spending appropriately (2) Ensure that adequate budgets are apportioned to the reserve in light of the developments required to ensure it is a destination of choice	Financial sustainability programme
Achieve good corporate governance management	Effective management of risk profile	N/A	Conduct a legal review	Risk management programme

5.2 SWOT analysis

Strengths

- Blaauwberg Nature Reserve is regarded as a strategic project of the City of Cape Town, and is specifically mentioned in the IDP (2007/8–2011/12).
- The reserve has strong partnerships with other City of Cape Town departments and external government departments and agencies.
- Ongoing budget allocations for capital and strategic interventions
- There is an existing multi-stakeholder advisory body, namely the Blaauwberg Nature Reserve ICC, which has been functional for years.
- Local knowledge and expertise of areas under the reserve's jurisdiction
- Proclaimed as a local authority and provincial nature reserve
- Staff buy-in, and positive attitude of neighbouring landowners
- Strong community involvement
- Active Friends group
- Good two-way radio and telephonic communication systems in place
- Good information technology infrastructure and communications platform
- Management commitment to compiling and implementing management plans 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
- Reserve entry and exit are controlled by visitor access booms and gates.
- Defensible boundaries
- Access to specialist services and databases
- Well-resourced reserve in terms of staff, infrastructure and equipment
- Staff determination and will to succeed
- Existing, fully functional ecosystems
- Biological monitoring systems are implemented and monitored regularly.
- Free public access to most of the coastal section via five parking areas
- Iconic views of Table Mountain, Robben Island, Table Bay and Cape Town

Weaknesses

- Insufficient appropriately trained staff, such as a basic field ranger and law enforcement, to ensure that all biodiversity and cultural heritage objectives are met
- Limited knowledge of security threats within the reserve
- Few patrols during the day, and none after hours
- Operational budget needs review with a view to additional funding
- 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
- Lack of suitable public access to Blaauwberg Hill and inland section of the reserve, thus hampering tourism/visitor development of the reserve, with a concomitant lack of economic development
- Lack of consolidation of all the land identified for inclusion in the reserve

Opportunities

- Aesthetic beauty of the reserve attracts many visitors per annum
- Creating buy-in among key stakeholders and role players
- Community constituency building
- Increased sense of community ownership
- Creation of job opportunities, and career succession and planning
- Accessing funds for Expanded Public Works/Sustainable Livelihoods programmes to assist in job creation, reserve infrastructure maintenance and development
- Proactively engaging communities bordering the reserve, and recognising their needs
- Continuous liaison with Friends groups and continued support
- Linking up with surrounding landowners, sharing knowledge and resources in order to manage the biodiversity network effectively
- Land consolidation
- Promoting the reserve as a destination for outdoor eco-activities
- Implementation of opportunities, as identified in the business framework and plan, to make Blaauwberg Nature Reserve sustainable in its management activities
- Local economic development through tourism visitation at the reserve
- Use as a destination for visitors and as a 'springboard' to other visitor attractions in the area such as Mamre
- Unique destination, with appeal to various niche markets as well as general visitors
- A key component of a military history route for Cape Town
- Increased environmental education opportunities

- Strategic project that could attract external funding, given asset base
- Linking the reserve's tourism opportunities with those of Table Mountain and Robben Island

Threats

- Unemployment leads to rising crime levels
- Threats and intimidation to conservation staff when enforcing legislation
- 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
- Loss of biodiversity due to inappropriate fire, invasive alien species, illegal activities and bad land use practices
- Change in local government political structures
- Urbanisation pressures on the reserve, such as stormwater runoff
- Increased population on immediate boundaries into the future
- Potential island effect if corridor development to north and east fails
- Lack of funding for infrastructure required to ensure that the reserve becomes the visitor/tourist destination it should be
- Expectations of private landowners regarding future development potential of land parcels identified for inclusion in Blaauwberg Nature Reserve

5.3 Protected-area management policy framework and guiding principles

5.3.1 Community participation

Blaauwberg Nature Reserve is to become the focus of community and tourist-centred programmes directed at the sustainable long-term conservation and use of its unique ecological, historical and cultural landscape and associated infrastructure.

For conservation actions to be viable and to succeed in the absence of substantial public funding, mutually beneficial relationships need to be pursued with investors in appropriate developments. Both public and private sector may find it in their best interest to work together to realise the benefits of the symbiosis of environmental quality, community support and economic viability.

5.3.2 Safety and security

In wishing to ensure the safety of visitors and staff at City of Cape Town reserves, a comprehensive safety and security assessment was commissioned (see appendix 9). This was undertaken by Plan-It, in collaboration with Thorn-Ex, in March 2010. Owing to budgetary constraints, only 12 priority nature reserves were selected for the assessment, one of them being Blaauwberg Nature Reserve.

The need for the assessment was based on the following assumptions:

- That the areas are poorly managed
- That security agencies are inefficient in their operations
- That there is a lack of tools to measure management effectiveness
- That the safety and security of visitors as well as personnel are threatened

Plan-It, in collaboration with Thorn-Ex and Titan Security, agreed to undertake the project.

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 results from the audit identified Blaauwberg Nature Reserve as having a medium threat level, with the largest threat being posed by illegal access/trespassing, mainly due to a lack of patrol coverage (Plan-It & Thorn-Ex 2010).

Currently, Blaauwberg Nature Reserve security is managed by conservation staff based at the Eerstesteen resort office. Access to the inland section of the reserve is difficult due to its relative inaccessibility and the time it takes to get there from Eerstesteen. Daytime security at the resort's gate is provided on contract by a private security firm (Comwezi). The resort (1,5 ha) is zoned as a liquor-free zone and is fenced off, but is open to the beach, and two visitor controller officers oversee the resort between 08:00 and 19:00. During peak holiday

periods and public holidays, the resort attracts high visitor numbers. The regional 'enforcement officers' have issued various warnings related to a variety of transgressions, mainly with regard to the public amenities at Eerstesteen resort.

The coastal frontage increases risk through the illegal, organised extraction of *Haliotis midae* (abalone). This matter was also raised by the law enforcement staff, who indicated that they have noticed an increase in activity, although their working hours do not overlap with the active time for *Haliotis midae* (abalone) poaching (Plan-It & Thorn-Ex 2010).

The law enforcement staff complete detailed security reports. These reports primarily list a variety of minor crimes, such as indecent behaviour, petty theft, vandalism to Council property, and trespassing (Plan-It & Thorn-Ex 2010).

Evidence has been found of woodcutting west of the R27, and frequent poaching with dogs east of the R27, which is outside Blaauwberg Nature Reserve. Snares have also been found in the same area and along the railway tract. Reserve staff believe that the informal settlement Du Noon, approximately 5 km away along the N7, is the source of poaching activities. The infrequent patrols along the eastern boundary as well as the encroaching informal settlement development pose an increasing security risk to the reserve. The nearest police station is at Melkbosstrand, with Big Bay Law Enforcement Security being available from Big Bay. This company is part of the City of Cape Town's Safety and Security Branch.

The Eskom servitude east of the R27 provides easy illegal access to quad bikes and 4x4s. Problems of illegal access by joggers along the firebreaks are also cited, causing erosion problems along the residential areas.

After having gone through this exercise, it was recommended that the reserve staff complement be increased by two three-member bush ranger teams. Ideally, these teams should be stationed strategically within the reserve, and should conduct patrols and monitor visitor activities along the coast. In addition, two permanent visitor control officers, with private security company support, should address the Eerstesteen resort challenges (Plan-It & Thorn-Ex 2010).

It is recommended that all law enforcement staff be appointed as fisheries control officers and peace officers so that they can issue fines as well (Plan-It & Thorn-Ex 2010). Furthermore, the duties of the law enforcement staff should be expanded to cover specific hot spots within the area as a whole, coordinated on a regional basis. In addition, the

effectiveness and necessity of having a contingent on duty every night are questioned. It is therefore suggested that, as a more productive option, both teams conduct their patrols on a daily basis across the region. Specific, ad hoc night-time activities could then be scheduled and coordinated with other law enforcement agencies to coincide with specific threats, darkmoon periods or holiday seasons (Plan-It & Thorn-Ex 2010).

The nature of Blaauwberg Nature Reserve lends itself to being fenced in the traditional sense. Fencing of the reserve's eastern boundaries and along the provincial roads is imperative, with the R27 being a priority (Plan-It & Thorn-Ex 2010).

The present office alarm system should be linked to a security service provider. Given the nature and frequency of incidents at the Eerstesteen resort, it is recommended that a day/night camera be mounted on the elevated education centre, which overlooks the main resort area. The recording equipment could be situated within the building, so as to ensure that reserve staff have access in the event of incidents. It is further suggested that a monitor be provided for staff to monitor activities during peak periods. With regard to signage, it is suggested that roadside signage be erected at regular intervals, indicating the presence of the reserve while also displaying rules, warnings and contact numbers (in case members of the public should observe anything suspicious).

The provision of basic equipment to field staff will aid in the execution of their duties. Such equipment may include binoculars, a mace, baton, cuffs and a bullet-proof vest. The nature of law enforcement in the area also requires staff to have night-sight equipment for the efficient execution of their duties (Plan-It & Thorn-Ex 2010).

5.3.3 Culture-historical, archaeological and paleontological management

The archaeological, historical and cultural heritage of Blaauwberg Nature Reserve is both rich and varied. Regarded as an area of archaeological significance, more than 25 sites have been recorded and mapped. The rich cultural and historical tapestry of the area spans various periods of history, as described below (OvP Associates, Landscape Architects & Environmental Planners May 2000):

Stone Age - Late Stone Age (LSA) deflated sites with Stone Age tools, pottery and ostrich egg shells were found east of Blaauwberg Hill on Joyce's Diary Farm.

Khoisan - Shell middens and archaeological remains along the coastline, as well as to the east of Blaauwberg Hill, are testament to the indigenous Khoi communities who once

inhabited this landscape. Small caves located in the vegetated kloofs of Blaauwberg Hill served, apparently, as lookout points to the Khoi, to alert them to ships coming into Table Bay.

Early Maritime History of Cape Town - Shipwrecks beneath the Atlantic Ocean in Table Bay dating back to the mid-17th century, represent an important period of the early maritime history of South Africa and Europe.A number of forts and trading outposts were established during the Dutch East India Company (VOC) period. The Riet Valley outpost was also used as a camp for the Khoi regiment during the first British occupation of the Cape (1795-1803).Blaauwbergsvlei is an historic 'outspan' and stopover on the old wagon route between Cape Town and the West Coast.

Battle of Blaauwberg (1806) - The site of the Battle of Blaauwberg (1806) is located on the farm Blaauwbergsvlei, to the east of Kleinberg. Gazetted on 26 January 1996, the National Monuments Act (No 28 of 1969) designated the site of Blaauwberg Battlefield and adjacent subsections of land as Conservation Area. The battle marked the start of the second British occupation of the Cape and the end of final Dutch rule. Casualties of war were buried in the dunes in grave sites yet to be located.

World War II - The World War II buildings on top of Blaauwberg Hill are still in existence and of historical significance. In addition to an artillery post, diesel station, accommodation and mess building, the first radar station to be built in South Africa is to be seen.

This archaeological and historical heritage is a sensitive, fragile and non-renewable cultural resource. Large-scale development between Table Bay and Melkbosstrand has already resulted in the loss of many archaeological and historical sites, including shell middens, forts and trading outposts.

Land use in Blaauwberg Nature Reserve must therefore be controlled in order to minimise further destruction and damage to cultural resources by integrating protective measures with the planning and development policies as well as by active public participation.

The effective management and conservation of the cultural, historical, archaeological and paleontological heritage are essential to conserve the historical character and characteristics of the area for future generations. This will be achieved through mapping, evaluating and establishing guiding principles in terms of area usage. It is recommended that a

comprehensive culture-historical, archaeological and paleontological management plan be drawn up by relevant specialists in this field.

5.3.4 Tourism development and management

Tourism is now widely recognised as the industry with the greatest potential for economic growth and job creation. The Western Cape, in particular, is experiencing rapid tourism growth.

World trends indicate that adventure, cultural, heritage and eco-tourism as well as all nature-related forms of tourism exhibit a higher-than-average growth rate. Given the inherent attraction of the reserve, the creation of a protected nature reserve that responds to world trends would clearly augment the tourist resource base of the Western Cape, and will enhance the profile of this destination area.

Indeed, it has been proposed that the site should become a model protected environment, with sustainable tourism facilities adhering to the Green Globe programme. Green Globe is a world-wide environmental management and awareness programme for the travel and tourism industry, with the prime objective of providing the low-cost, practical means for all tourism companies to improve their environmental performance.

With the parameters of the Green Globe programme and the overall objective to improve the quality of life of local and surrounding communities, the following amenities have been proposed to stimulate job-intensive tourism growth:

- Information and visitor centre
- Education centres and a museum
- Curio shops, and arts and crafts stalls
- Restaurant, kiosks and restrooms
- Walking trails, bridle paths, bicycle trails
- Camp sites, and picnic and braai areas
- Coastal lodge, overnight huts

Other opportunities that are compatible with, sympathetic to, and supportive of Blaauwberg Nature Reserve are not excluded, but will be assessed on merit as the reserve evolves.

The City of Cape Town's tourism spatial framework (2003) recognises Blaauwberg Nature Reserve as an important destination for tourists, as well as a springboard to other destinations in the region. It is, for example, an ideal gateway location between Cape Town and the West Coast.

The tourism departments of both the City of Cape Town and the Provincial Government of the Western Cape support the establishment of Blaauwberg Nature Reserve as an important reserve with significant tourism opportunities.

Blaauwberg Nature Reserve's proximity to recreational beaches, the Atlantic Beach golf estate, the Koeberg nuclear power station's visitor centre and the Melkbos cultural centre serves to enhance its position as an important 'edutainment' hub on the West Coast.

5.3.5 Infrastructure management

In a nature reserve, infrastructure is essential for effective management as well as for use by visitors. Such infrastructure needs to be managed in such a way that it has no negative impact on the environment or on the experience of the visitors, through regular maintenance of roads, routes, parking areas and the like.

From the planning issues identified and concept scenarios explored, certain broad principles have emerged to formulate a vision for Blaauwberg Nature Reserve. These principles are as follows:

- Blaauwberg Nature Reserve is to become the focus for community and tourist-centred programmes directed at the sustainable use of natural resources.
- The reserve is focused on preserving, protecting and enhancing the unique and significant natural, historical and agricultural landscape, while accommodating human settlements and tourist amenities that are compatible with the overall ecological and cultural values of the area.

Infrastructure development in Blaauwberg Nature Reserve has been premised on a nodal concept, where visitor/special recreational facilities and amenities are clustered at specific locations, using, where appropriate, the gateway concept. The use of brownfields sites (previously disturbed areas) is a key principle in the sighting of nodes. Three gateways are proposed for Blaauwberg Nature Reserve, namely the southern (coastal) gateway at Eerstesteen, a northern gateway, and an eastern gateway (Sunningdale management block). Establishment of these gateways depends on land ownership as well as regional

infrastructural links. A key node is Blaauwberg Hill, where limited development associated with the World War II structures is proposed, and has to some extent already taken place.

A comprehensive master plan has already been prepared for the southern (coastal) gateway, and comprises reserve management and administrative facilities, environmental education facilities and a visitor complex. The other two gateways will provide for a similar mix of facilities appropriate to their location and desired scale.

An internal circulation network of roads and pathways will also need to be constructed and maintained for reserve management and appropriate visitor use.

The Blaauwberg Nature Reserve draft plan has been formulated within the broader context of other planning initiatives. After having considered the planning informants, site sensitivities resulted in the revision of the previously designated boundaries.

Two distinct but integral conservation zones are proposed: the PCZ, surrounded by a transition zone referred to as the CIZ, which will form a buffer to the core area (OvP Associates, Landscape Architects & Environmental Planners 2000).

The PCZ

This zone is considered the core conservation area, and its initial boundaries are demarcated by earlier guide plans for the area and supported by the National Monuments Council. The PCZ extends east from the coast, and includes Blaauwberg Hill as well as transitionary areas of botanical importance, and sites of archaeological, historical and cultural significance.

Within this area, the visitor will experience both the natural and cultural resources the reserve has to offer. To ensure its sustainability, the development of the area will provide for a multi-purpose conservation facility, comprising visitor, educational and related amenities and, where appropriate, undisturbed conservation areas.

It is essential that the development and management of Blaauwberg Nature Reserve be directed towards financial self-sufficiency, without compromising core conservation objectives. The PCZ offers a range of opportunities to generate income (and jobs) through land leases, joint ventures, and tourist amenities operated by the private sector.

Components and opportunities that inform a draft plan framework may include the following:

Gateways give a first impression, establish a sense of arrival, and allow investment to be accommodated/clustered in mutually reinforcing and beneficial ways.

Two vehicular entrances are envisaged. The Klein Melkbosch farmstead has an established presence and could form the northern gateway to the reserve. A second entrance, the eastern gateway, may be located east of Blaauwberg Hill, gaining access from the future Atlantis corridor, with its integrated transport systems.

An integral vehicular route along the eastern edge and at the back of Grootberg will provide a link between the two gateways.

Entry points establish nodes for visitor facilities, and each may include a visitors' orientation and information centre, a museum or interpretative centre, kiosk, restrooms and parking areas.

Formal trading outlets selling products related to the tourist experience will tend to locate where large numbers of visitors pass, such as gateway nodes. Here, local arts and crafts can be promoted, offering opportunities for the small-business sector and emerging entrepreneurs.

Informal traders can be encouraged to locate within the formalised precincts, contributing to the authenticity of the visitor's experience.

An interpretative centre and outdoor museum will be located in and around the existing World War II structures and the site of the Battle of Blaauwberg.

The CIZ

The surrounding areas to the north, east and south of the core area provide a macro setting for the PCZ of Blaauwberg Nature Reserve, and are integral to the larger conservation framework. The rural character is to be enhanced by incorporating viable natural vegetation areas, encouraging the continuation of agricultural activities, and guiding eco-friendly urban development. This will be underpinned by the principles of sustainable conservation, sustainable development, and biodiversity.

Development in the interface zone may provide opportunities for urban settlements, such as eco-villages, recreation, and education and tourism amenities. Alternative lifestyles and support systems, such as solar energy, must also be explored. Agricultural use must be based on sound ecological practices, and uncultivated land must revert to its earlier natural state through active rehabilitation and restoration efforts.

Broadly, the PCZ is interfaced by four distinct zones. The southern, eastern and northern zones are land-bound, while the Atlantic coast forms the western edge.

Southern edge – The southern edge provides a defined urban edge to urban metropolitan expansion. Its configuration is largely determined by the future primary road network. There is a need to relieve the existing and expected future traffic pressures on Otto du Plessis Drive by creating two east-west link roads connecting Bloubergstrand with the West Coast road. The nature of these roads would reflect different road hierarchies.

Further south, an activity street is proposed, with higher-density mixed-use development on either side. The street would inter alia accommodate slow recreational traffic, with a strong pedestrian emphasis. Precincts for generating urban village developments alongside would optimise access from the activity street. The other road would be an arterial route, accommodating fast through traffic.

Eastern edge – Similarly, future road links will shape the eastern edge. The Metropolitan Spatial Development Framework identifies a north-south activity corridor along the N7, to be extended to Koeberg Road towards Atlantis, forming an impetus for mixed-use urban growth along an important public transport corridor.

A proposed north-south arterial limits westward expansion of the corridor. This will provide an eastern edge to the CIZ. Structure plans for this area indicate sports fields and a cemetery within this rural landscape, while the most fertile land is to be retained for agriculture. Other activities will be limited to conservation and tourism-related uses.

The second entrance to Blaauwberg Nature Reserve, located on the eastern boundary of the PCZ, will be aligned so as to provide easy access to the railway station and, therefore, to public transport.

Northern edge – Moving closer to the Koeberg sphere of influence, the northern interface would remain rural, with the emphasis on encouraging ecologically responsible agricultural

activities. The southwards extension of the West Coast Biosphere Reserve is also envisaged so as to include the Salt River flood plain and Blaauwberg Nature Reserve.

While urban expansion opportunities for Melkbosstrand cannot be denied, it is vital to retain the rural character of the area to the east.

Western edge – The coastal interface with the Atlantic Ocean adds to the uniqueness of Blaauwberg Nature Reserve. While exceptionally sensitive to any intervention, the coastal zone is under constant pressure due to user and development appeal. As a consequence, the Bloubergstrand and Melkbosstrand local structure plans proposed:

- the re-alignment of Otto du Plessis Drive around Big Bay to release land for resort-type development;
- the integrated development of Eerstesteen/Tweedesteen as a mass recreation node, with environmental authorisation already having been obtained for the redevelopment of the site. The Eerstesteen/Tweedesteen node will be redeveloped to include reserve management and administration facilities, an environmental education centre, a restaurant and kiosk, formal and informal trading areas, public ablutions, and a visitor centre with a wheelchair boardwalk; and
- the upgrade of the smaller nodes (Holbaai, Haakgat, Derdesteen and Kreeftebaai) as low-key recreational opportunities with limited amenities.

5.3.6 Biodiversity conservation management

5.3.6.1 Community-based natural resource management

The harvesting of natural resources within Blaauwberg Nature Reserve is currently not permitted. Research on the amount of illegal harvesting and the species harvested across the city is currently under way. Although some investigations as to the types and extent of harvesting in the reserve have been started, there is not yet any detailed or conclusive information to determine where these 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 fynbos species. Fire is crucial to the long-term conservation of species within the reserve, and is therefore considered an important component of nature 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 fire is excluded from the area, encroachment may result in species losses. Conversely, if vegetation is allowed to burn too frequently, the area becomes degraded, and alien species, especially grasses, could invade. Grasses maintain a shorter fire cycle, and permanently change the area's vegetation structure and biodiversity value.

The fire management programme for Blaauwberg 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. In the case of human-induced fire that would simulate a natural fire, the same management responses would apply. Natural fires are limited in spread within the constraints of ecological, project and public safety requirements. All possible actions are taken to prevent the spread of fire onto the adjacent properties. All unnatural fires that threaten the reserve ecologically, or pose a threat to infrastructure and/or public safety, are controlled (Hanekom 2006).

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 would assist 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 nature 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. Legally required firebreaks and other fire control measures will be implemented where necessary and feasible (Hanekom 2006).

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 the 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 another important component of the reserve's fire management approach.

Fire management implementation in Blaauwberg 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.

See appendix 10 for the fire management plan of the Mamre-Table View veldfire management unit.

5.3.6.3 Soil erosion and control

Within Blaauwberg 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 Blaauwberg Nature Reserve includes:

- the identification and recording of all soil erosion sighted, 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
- the 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 within Blaauwberg Nature Reserve. Alien biota need to be controlled and, where possible, eliminated in order to facilitate the re-establishment of natural biodiversity and processes in invaded areas.

The term 'invasive species' refers to animals and plants occurring outside their natural distribution ranges, establishing themselves, spreading, and outcompeting and replacing indigenous species. Not all alien species are invasive, and not all invasive species are alien. Alien species are species introduced to areas outside their natural distribution range – they are thus alien to a country or region. Invasive alien species are introduced species, alien to the country/region, which have established, spread, and are outcompeting/replacing indigenous species.

Invasive and alien-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 Working for Water and Working for Wetlands. Invasive alien plant species could spread rapidly should management fail to continue implementing a properly planned and coordinated programme.

Until recently, the emphasis of invasive-species management was placed on woody alien plant species, such as *Acacia saligna* and *Acacia cyclops*. Herbacious weeds were largely ignored. Recent monitoring and the development of an extensive herbaceous weed and grass species for the 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:

- The prioritisation of areas for alien removal, focusing on biodiversity restoration
- The implementation of removal programmes for priority species and areas (see appendix 11)
- The development and implementation of an invasive and alien management plan as well as a management plan for alien biota

Section 76 of the National Environmental Management: Biodiversity Act refers to the need for an invasive-species control and eradication strategy. It reads as follows:

“(1) The management authority of a protected area preparing a management plan for the area in terms of the Protected Areas Act must incorporate into the management plan an invasive species control and eradication strategy.”

The definition of invasive species should be noted. An invasive species means any species that establishes and spreads outside its natural distribution range.

The Act goes on as follows:

“(4) An invasive species monitoring, control and eradication plan must include:
(a) a detailed list and description of any listed invasive species occurring on the relevant land;
(b) a description of the parts of that land that are infested with such listed invasive species;
(c) an assessment of the extent of such infestation;
(d) a status report on the efficacy of previous control and eradication measures;
(e) the current measures to monitor, control and eradicate such invasive species; and
(f) measurable indicators of progress and success, and indicators of when the control plan is to be completed.”

The eradication of invasive and alien faunal species is also carried out in the reserve. Formal plans outlining the monitoring of the removal of identified species are however required.

5.3.6.5 Species introduction

The possibility of the re-introduction of species historically indigenous to the Blaauwberg area, and for which suitable habitat and eco-niches are available, does exist. Several fauna species that had previously occurred in the area are down to very small numbers or are no longer present.

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. The re-introduction of potentially dangerous and 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 Flora and 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

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 required to build the environmental knowledge base.

CapeNature has numerous manuals on monitoring and baseline data collection for further reference and guidance.

5.4 Sensitivity analysis of Blaauwberg Nature Reserve

Blaauwberg 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 Blaauwberg Nature 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 National Environmental Management: Biodiversity Act of 2004, and seeks to comply with the spatial planning requirements of the Act. The CDF ensures that best practice and sustainable development principles are integrated with spatial planning in protected areas.

The sensitivity-value analysis is the landscape analysis portion of the broader CDF. It is a multi-criteria decision-support tool for spatial planning, designed to present the best available information in a format that enables defensible and transparent decision making. 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 that site's value (arising from the site's biodiversity, heritage, aesthetic or other values) and its sensitivity or vulnerability to a variety of disturbances (Holness 2005).

The sensitivity-value analysis, the CDF and the associated zoning plan should form part of an adaptive management system. They will grow and change over time as the understanding of the landscapes and ecosystems improves. These documents, however, do not replace the need for detailed site and precinct planning and environmental impact assessment compliance at site level.

The methodology used for both the sensitivity-value analysis and the zoning process was adapted from Holness and Skowno (2008) and SRK Consulting (2008) (Purves 2010). All geographical information work was carried out in ESRI's ArcMap Version 9.3.1 geographic information system, using the ArcInfo licence level, with Spatial Analyst and 3D Analyst extensions (see appendix 12).

5.5 Zoning plan of Blaauwberg Nature Reserve

5.5.1 Zoning informants

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 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 wherever possible, the zoning process is essentially a compromise between environment and development. In particular, the identified high-value sites are often the key biodiversity assets that need to be made available to the eco-tourism market in an appropriate manner. Direct links between the biodiversity layers and the spatial management of the reserve are made when special management areas are identified. Even within broad high tourist use zones, certain areas may be subject to very tight conservation controls (potentially requiring the complete exclusion of human impact from an area).

<u>Underlying decision-making rules used in the zoning process</u>

- The zoning process is aimed at striking a balance between environmental protection and the development required to meet the broader economic and social objectives of the reserve.
- The zoning process takes into account existing development footprints and tourism access routes.

- 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 would not be possible to shut down existing tourism sites that compromise the reserve's development objectives.
- Where existing development nodes, tourist sites and access routes occur in areas with high sensitivity-value, the broad use zoning aims to keep the development footprint as small as 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 should, where possible, be located outside the conservation area.
- The designation of a broad use zone does not imply that all sites within that zone would be suitable for all the development types anticipated. Detailed site-level planning is still required, and many sites may prove to be unsuitable at a site/precinct/environmental impact assessment level of planning.
- Special management areas/overlays need to be formalised and linked to the management plans.

5.5.2 Zoning definitions and descriptions

The zoning definitions and descriptions were workshopped with area and regional managers. Four categories were decided on, namely the primary conservation zone, the conservation zone, the low-intensity leisure zone and the high-intensity leisure zone. Map 6 outlines the zoning for Blaauwberg Nature Reserve. The process is still linked to the zoning used for CapeNature reserves (Holness 2008), as there should be general alignment of the broader use zones to enable comparison and integration if provincial documents so require.

Map 6: Nature reserve zoning

6. DEVELOPMENT PLAN

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

7. COSTING PLAN

Table 5: Broad costing management plan for the reserve

Management action	Funding source	Approximate costs 2011–2012	Approximate costs 2012–2013	Approximate costs 2013–2014	Approximate costs 2014–2015	Approximate costs 2015–2016
1. Invasive alien plant programme						
• Clearing of important invasive aliens 1–15	Grant funding	R667 418	R86 844,33	R59 802,93	R62 935,32	R366 711,44
2. Fire management						
• Maintenance of fire belts	Operating	R35 000	R36 750	R38 587	R40 516	R42 542
• Planned ecological burn		-	R15 000	-	-	R20 000
3. Road and trail maintenance						
• Road repairs	Grant funding	R90 000	-	-	-	-
	Operating	R4 750	R5 000	R5 250	R5 512	R5 788
• Footpath maintenance	Operating	R5 000	R5 250	R5 512	R5 788	R6 077
• Parking area maintenance	Operating	-	R10 000	-	R15 000	-
4. Fencing	Operating					
• Repairs and maintenance		-	R15 000	-	-	R17 000
• New fence reserve development	Capital expenditure	-	R1 017 040	-	-	-
• Fence and associated: Sunningdale management block	Capital expenditure	R1 200 000				
5. Infrastructure development						
• Redevelopment of Eerstesteen	Capital expenditure	R10 000 000 (City) R10 000 000 (Public/Private Partner)	R10 000 000 R2 500 000	R10 000 000 R2 500 000		
• Access road						
6. Human resources						
• Direct human resource costs	Operating	R1 950 000	R2 106 000	R2 274 480	R2 456 438	R2 652 953
7. General expenses						
• General operating costs	Operating	R200 000	R210 000	R220 500	R231 525	R243 101
8. Special projects						
• Land consolidation progamme		R17 000 000				

Note:
Human resource costs are escalated at 8% per annum.
Operating expenditure is escalated at 5% per annum.

PART 3

MONITORING & AUDITING

8. MONITORING & AUDITING

8.1 Annual audit procedure

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

The METT-SA is a rapid, site-level assessment tool adapted from the World Bank and 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 Blaauwberg Nature Reserve was undertaken in 2007, and the results are presented in appendix 13. The METT-SA will be repeated in approximately September 2011.

8.1.2 Protected-area review

The protected-area review is an internal review conducted annually to assist managers in reviewing their sites, and to allow for adaptive management actions to take place 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 Blaauwberg 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 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.

- Executing annual quarterly CWACs and bimonthly black oystercatcher censuses between the months of October and March
- Continuous monitoring of faunal species within Blaauwberg Nature Reserve
- Continuous monitoring and updating of the Blaauwberg Nature Reserve invasive-species management programme
- Monthly rainfall data collection
- All baseline data captured on the South African Biodiversity Database
- Implementation of fixed-point photographic monitoring of vegetation structure, coupled with long-term permanent vegetation monitoring blocks
- Fixing of photographic stands within the reserve's coastal zone area

PART 4

REFERENCES

9. REFERENCES

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PART 5

10. APPENDICES

3. APPENDICES

A: Legal agreements

APPENDIX 1 – BUSINESS FRAMEWORK AND BUSINESS PLAN FOR THE BLAAUWBERG NATURE RESERVE






City of Cape Town

BUSINESS FRAMEWORK &

BUSINESS PLAN FOR THE

BLAAUWBERG

EXECUTIVE SUMMARY

FOR INTERNAL USE ONLY

Report J-005(OU)-07 **September 2007**

Grant Thornton

Environmental Services

Ophilayo Umhlaba

Grant Thornton

Environmental Services

Ophilayo Umhlaba

City of Cape Town

BUSINESS PLAN AND BUSINESS FRAMEWORK FOR THE BLAAUWBERG CONSERVATION AREA

REPORT NUMBER J-005(OU)-07
September 2007

Compiled by:

Martin Jansen van Vuuren MSc (Economics) M-J MORRIS Pr Sci Nat

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Ophilayo Umhlaba

J-005OU-07 September

2007

BUSINESS FRAMEWORK AND BUSINESS PLAN FOR THE BLAAUWBERG CONSERVATION AREA

Executive Summary

The Blaauwberg Conservation Area (BCA) is situated on the west coast of the City of Cape Town and is an important element of the City's biodiversity network. This area is recognised as providing tourism development opportunities in the Integrated Development Plan (IDP) and the Tourism Strategy. In particular, the BCA has been acknowledged as presenting economic development opportunities Development Directions for the next five years, in Chapter 7 of the IDP.

A phased establishment of the BCA has been underway for the past few years, which is being overseen by the City of Cape Town together with the BCA Implementation Co-ordinating Committee. The City decided to initiate a study to develop a business framework and business plan for the BCA, the key objective being to determine the financial model required for the BCA to be financially sustainable, whilst maintaining its ecological integrity and conservation value.

OU Environmental Services and Grant Thornton were commissioned to complete the business framework and business plan. The following aspects were considered:

1. The existing development and management plan (DMP) for the BCA was reviewed and adjusted to take account of various developments such as those in respect of land ownership, trends in the tourism market and economic growth factors (e.g. hosting of the 2010 World Cup).

2. Since tourism related activities offer the most opportunity for the BCA to become self sufficient, relevant information on the tourism market was researched and the target markets and opportunities for BCA identified.

3. A financial model was developed for the BCA which was informed by the DMP, details on income streams and visitor number from municipal reserves (which was limited) and by data on the tourism market. Various financial scenarios were considered (base case, pessimistic and optimistic).

4. The options for institutional arrangements, which would also influence how development of the BCA would be funded, were assessed.

5. A marketing strategy has been formulated.

The Market

The key target markets for the BCA have been identified based on the tourism products and tourism product elements that the BCA will offer, based on the re-formulated DMP. These tourism products are:

- Nature:
  - Fauna and Flora (e.g. birdwatching, flower season);
  - Coastline / various beaches;
  - Scenery (e.g. views from Blaauwberg Hill and along the coast).
- Military History:
  - Early maritime history;
  - Battle of Blaauwberg;
  - World War 2 structures.
- Culture and Heritage:
  - Khoisan middens
- Accommodation;
  - Planned lodge and tented accommodation;
- Conference and educational facilities;
- Leisure / recreational activities:
  - Walking and hiking;
  - Picnicking and braaing.

Based on these tourism products and tourism product elements the key target markets have been identified as:

Foreign	Domestic
• Leisure – Organised Tour • Leisure – FIT (Foreign Independent Traveller) • VFR (Visiting Friends and Relatives) • Special interest – Nature • Special interest – Military History	• Leisure – Day visitors • Leisure – Overnight • Leisure – Longer stay • VFR (Visiting Friends and Relatives) • Conference & meetings • Special interest – Nature • Special interest – Military History • Educational institutions

The projected market demand i.e. number of visitors to BCA is shown in the table below.

Projected Visitor Demand for the BCA

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Northern Gateway	-	-	20 000	20 600	21 218	21 855	22 510	23 185	23 881	24 597
Eastern Gateway	-	-	-	-	5 000	5 150	5 305	5 464	5 628	5 796
Southern Gateway	15 000	15 450	15 914	16 391	16 883	17 389	17 911	18 448	19 002	19 572
Total Visitors	15 000	15 450	35 914	36 991	43 101	44 394	45 725	47 097	48 510	49 965

The elements that have the potential to set the BCA apart from other competing developments/attractions are:

- Maritime and battlefield history;
- Scenic views.

Development Concept

Based on the review of the DMP, the ideal investment case for the establishment of the BCA was structured into three phases. Each phase is centred on the establishment of a gateway to the BCA, which are located in the interface zone. In addition, there are particular opportunities within the BCA that have been identified within the various phases.

Phase 1: Re-launching of Eerstesteen as the Southern Gateway to the BCA to include the following:

1. Re-development of Eerstesteen to provide the following visitor/tourism facilities:
   - A visitor orientation/information and interpretative centre which will be designed as a multi-purpose space that could be used for a variety of purposes;
   - A kiosk/food and beverage facility which will be open during BCA hours only. The facility will be themed according to the BCA's unique selling points. This facility will be outsourced to a reputable restaurant operator;
   - Rest rooms;

- Parking facilities;
- Formal trading outlets that could include a nursery outlet and an outlet for military memorabilia. The formal trading outlets will be leased to private operators;
- Informal trading outlets that could include local arts and crafts. The informal trading outlets will be leased at a nominal fee to private operators;
- A multi-functional conference facility able to accommodate 75 people. The facility will be used for a variety of events including lectures and functions.

2. An educational facility where learners can undertake educational trips regarding the environment. The facility will include lecture rooms.

3. Mobile food and beverage operators that will provide refreshments at the various beaches in the BCA. These mobile outlets will consist of converted vans or trailers. Reputable operators will be sourced to provide this service.

4. Guided hiking trails that will consist of guides taking groups of visitors on guided trails throughout the BCA. These guided hiking trails will not be outsourced and will be conducted by trained BCA employees.

5. Overnight hiking trails that will consist of guided trails with one nights accommodation in the BCA in converted existing structures. The number of people on overnight hiking trails will be restricted due to the capacity constraints of existing buildings that could be converted to overnight hiking accommodation. The operation of the overnight hiking trails will not be outsourced and will be conducted by trained BCA guides.

6. Interpretive signage that will be erected throughout BCA on the roads, hiking trails and points of interest to provide information and interpretation.

7. Annual events, which will consist of events such as the annual recreation of the Battle of Blaauwberg. These events will contribute to the revenue streams of BCA and continuously raise the awareness of BCA.

Various activities can be initiated in the short-term to market the BCA and generate income (e.g. gate fees). In terms of facility development, of the items listed under Phase 1, those for visitors/tourists should be of priority, with the objective of re-developing Eerstesteen to take advantage of the 2010 World Cup. The other elements of the Phase 1 development can be implemented over a period of time (i.e. after 2010). Besides the 2010 World Cup factor, the re-development of Eerstesteen has been selected as a priority in the establishment of the BCA, as it is not dependent on external factors such as obtaining private land or access over private land. The property concerned is public land and within the portion of the BCA that

has been declared as a Local Nature Reserve. Furthermore, it is well-located from an access point of view, being on Otto du Plessis. Finally, due its position on the coast, Eerstesteen offers magnificent views of Table Mountain and of the general seashore environment.

Phase 2: This phase is centred on the establishment of a Northern Gateway and other facilities within the BCA itself. Ideally, the Northern Gateway should be launched at the beginning of 2012. Phase 2 will include:

1. A new Northern Gateway to BCA, including:
   - A visitor centre/tourist information centre;
   - An entrance gate;
   - A multi-purpose interpretative centre including displays on the BCA's fauna and flora, the Battle of Blaauwberg, etc. The space will also be used for functions;
   - A restaurant which will be fully commercial serving breakfast, lunch and dinner and outsourced to a reputable restaurant operator. The restaurant will be themed according to the unique selling points of the BCA;
   - A kiosk which will be incorporated in the restaurant buildings and which will be operated in conjunction with the restaurant;
   - Formal trading outlets that will be outsourced to private operators;
   - Informal trading outlets that will be outsourced at a minimal fee to private operators;
   - Rest rooms;
   - Parking;
   - Maintenance workshop, fuel store and fire store;
   - Reserve offices for 5 to 6 people;
   - A manager's house with 3-bedrooms;
   - Student/staff accommodation for 5 people;
   - Garages for 3 vehicles.

2. A Tearoom on Blaauwberg Hill, housed in existing structures converted for this purpose and offering a scenic view of Table Mountain and Robben Island. The Tearoom will be themed according to the BCA's unique selling points. The Tearoom will be outsourced to a reputable operator and will serve lunch, sell picnic baskets and offer sundowners. Work on restoring the building in which the Tearoom will be located may be undertaken during the 2007/08 budget period.

3. A transport service to the Tearoom, which is envisaged as having a military theme, with possibly old military vehicles being used. This service will be outsourced to a reputable operator.

4. Lodge accommodation consisting of up-market accommodation in 12 exclusive chalets. This facility will incorporate sound environmental design principles. The lodge accommodation will be outsourced to a reputable operator.

5. Tented accommodation consisting of a military themed campsite. The tented accommodation will include 10 tents, food and beverage facilities and meeting facilities for 25 people. This facility will be outsourced to a reputable operator.

The development of the Northern Gateway itself is dependent on negotiations with private land owners. There are other elements of Phase 2 that could be progressed, if the land issue in relation to the Northern Gateway itself is not resolved timeously. For example, the tearoom on Blaauwberg Hill and the associated transport could go ahead, with access being organised via the Southern Gateway (i.e. Eerstesteen). Similarly, arrangements for access to hiking trails, both overnight and day trails on Blaauwberg Hill, would have to be arranged via the Southern Gateway.

Phase 3: The focus of Phase 3 is the establishment of the Eastern Gateway to the BCA, which is to be launched the beginning of 2014. This phase will include:

1. A multi-purpose visitor centre;
2. An entrance gate and guard house;
3. A small food and beverage facility consisting of a jointly operated restaurant and kiosk, which will be outsourced. The facility will be themed according to the unique selling points of the BCA;
4. Rest rooms;
5. Parking areas;
6. Formal trading outlets that will be outsourced to private operators; and
7. Informal trading outlets that will be outsourced at a minimum fee to private operators.

The establishment of an Eastern Gateway is only justifiable if the road access is improved, the key proposal in this regard being the extension of the east-west arterial road. If access is not resolved, it would be appropriate to undertake a down-scaled version of Phase 3, comprising a small visitor centre that is focused on the military history, particularly the Battle of Blaauwberg.

Main Constraints

The main constraints for the establishment of the BCA have been identified as:

- Securing of funding from the City of Cape Town and other sources;
- The consolidation of land that is privately owned, with acquisition of or access through private land being particularly critical;
- Access to the eastern part of the BCA through the construction of the east-west arterial road;
- Securing of a suitable entity to manage commercial opportunities;
- Securing of reputable operators for the various concessions in the BCA; and

- ♦ Timeframes as proposed may be difficult to achieve given the budget approval and tender procedures required.

Financial Analysis

Detailed financial projections have been completed for the various development elements in the BCA and a base case, pessimistic case, optimistic case and minimum investment case have been projected. All the development elements are projected to achieve a net profit by the third year of operation, apart from the Lodge and the Southern Gateway Restaurant. The Lodge is projected to achieve a net profit in the fifth year of operation and the Southern Gateway Restaurant by the ninth year of operation.

It should be kept in mind that net losses in the first two to three years of any operation is expected in the business world and that net losses recorded are accounting losses due to capital charges being written off, such as depreciation. What this means is that although a net loss is shown, the business is still viable as long as a positive net cash flow is maintained.

Institutional Structure

Having clarified the requirements for the establishment of the BCA in terms of facilities and opportunities to generate income, the most appropriate institutional structure needs to be considered. Based on the analyses of various institutional structures, it is recommended that the City of Cape Town issue a competitive tender for the management of the commercial opportunities in the BCA.
A private entity could then be contracted to manage the commercial opportunities in the BCA and through a service level agreement between the entity and the City of Cape Town ensure that profits made from the commercial opportunities are utilised for maintenance and conservation at the BCA.

Funding and Costs

Preliminary estimates of the cost for the establishment of BCA, based on the re-formulated DMP is around R95 million, but the concessioning of accommodation establishments on a build-to-operate basis will reduce this funding requirement to R45 million.

It is recommended that funding be obtained from the City of Cape Town and grants from the Department of Environmental Affairs and Tourism and the Department of Public Works, as well as private sources through sponsorship and donations.

Marketing Strategy

In order to develop an effective marketing strategy, an analysis of the strengths, weaknesses, opportunities and threats (SWOT) for the establishment of the BCA was undertaken as shown below.

SWOT Analysis for the Establishment of the BCA

1.1 STRENGTHS	**1.2 WEAKNESSES**
• Proximity to markets in the greater Cape Town area • Proximity to other attractions in the greater Cape Town area • Fauna and Flora / unique biodiversity	• Access to portions of the BCA dependant is dependent on new road infrastructure • Private land will need to be purchased

• Conservation value / protected area • Scenic beauty • Various beaches • Military history • Cultural resources / strandloper history • Good access	• Tourism seasonality, particularly in the foreign market • Lack of existing development • Lack of public access (currently) to Blaauwberg Hill
Opportunities • Military history • Scenic views • Various beaches • Nature experience • Development of accommodation • Development of low-impact activities (e.g. walking, bird watching, hiking, horse riding)	**Threats** • Lack of growth in tourism to the Western Cape • Natural disasters such as fires • Degradation of biodiversity resources due to over utilisation / development • No road infrastructure to facilitate access to the BCA via the Eastern Gateway • Key land parcels are privately owned, particularly in the Northern gateway area • Lack of or limited committed funding from the City of Cape Town

We recommend that the BCA utilise its unique selling points (USPs) of military history, scenic views, biodiversity and various beaches to target the identified key markets. Marketing initiatives should be conducted in conjunction with the marketing initiatives of the City of Cape Town and Cape Town Routes Unlimited. The following marketing tools are recommended:

- Public relations;
- Direct mail;
- Trade shows;
- Sales visits, workshops and familiarization trips;
- Brochure;
- Website; and
- Events program.

The Way Forward

We consider that the best way forward is for the City of Cape Town adopt the BCA business plan and to assign responsibility and provide funding for the development of the required facilities. With the securing of an entity to manage the commercial opportunities, funds can be generated for the continued maintenance and development of the BCA, a cost which would otherwise have been borne in full by the City of Cape Town. We recommend that the City of Cape Town show its commitment to this process by initiating the institutional structures required and contributing to the funding of the project. This commitment will facilitate the securing of a reputable private entity.

Neil Spencer & Associates - cape town (ref: 1634)

SIDES Metres		ANGLES OF DIRECTION		CO-ORDINATES System WG 19° Y	X
		Constant		+ 0,00	+ 3700000,00
AB	2401,48	248 20 43	A	+ 48941,20	+ 39166,26
BC	408,33	260 44 20	B	+ 46709,20	+ 38280,09
CD	397,14	343 46 50	C	+ 46306,19	+ 38214,37
DE	196,02	1 14 00	D	+ 46195,26	+ 38595,70
EF	696,25	91 14 00	E	+ 46199,49	+ 38791,67
FG	212,16	85 07 00	F	+ 46895,57	+ 38776,69
GH	1196,06	73 43 30	G	+ 47106,96	+ 38794,75
HJ	195,51	75 41 30	H	+ 48255,09	+ 39129,93
JK	50,65	87 11 00	J	+ 48444,54	+ 39178,25
KL	50,57	75 50 20	K	+ 48495,13	+ 39180,74
LM	343,65	88 15 50	L	+ 48544,17	+ 39193,11
MA	65,23	124 50 10	M	+ 48887,66	+ 39203,52
		22 CB25	⊕	+ 50452,61	+ 34492,27
		4 CD5	⊕	+ 49145,07	+ 39398,04

S.G. No.
1204/2010
Approved
for Surveyor-General
2010.04.21
SHEET 1 OF 2 SHEETS

EXEMPT FROM PROVISIONS OF CHAPTER III OF ORD. 15/1986 Transferred to L.A

EXEMPT FROM PROVISIONS OF ACT 70 OF 1970 SECTION Transferred to L.A 20

APPROVED IN TERMS OF SECT 25 OF ORD. 15/1985 REF. SD 4314/02 DATE 2010-03-03

Beacon Descriptions

B : Iron Standard
All others are 20mm iron pegs

Servitude Note:

The broken lines mn and pq represent the centre line of an Electric Power Transmission Servitude as shown vide S.G. dgm. No. 4908/1990 ; D/S K 249/1992[S]

The figure A B C D E F G H J K L M represents 87,2646 hectares of land, being

PORTION 10 (a portion of Portion 1) OF THE FARM VAN. NO. 431

situate in the City of Cape Town
Administrative District of Cape
Province of Western Cape
Surveyed in December 2008 & March 2010
by us,

S.J. Richardson
PLS 1190 Professional Land Surveyor

N.W.D. Spencer
PLS 0855 Professional Land Surveyor

This diagram is annexed to	The original diagram is	File No. Cape 431
No.	No. 8233/1965	S.R. No. E 527/2010
Dated	annexed to	Comp. BH-7BBB (3736)
i.f.o.	Transfer	LPI. C0160000
Registrar of Deeds	No. 1966 - 184 - 9157	

431/10

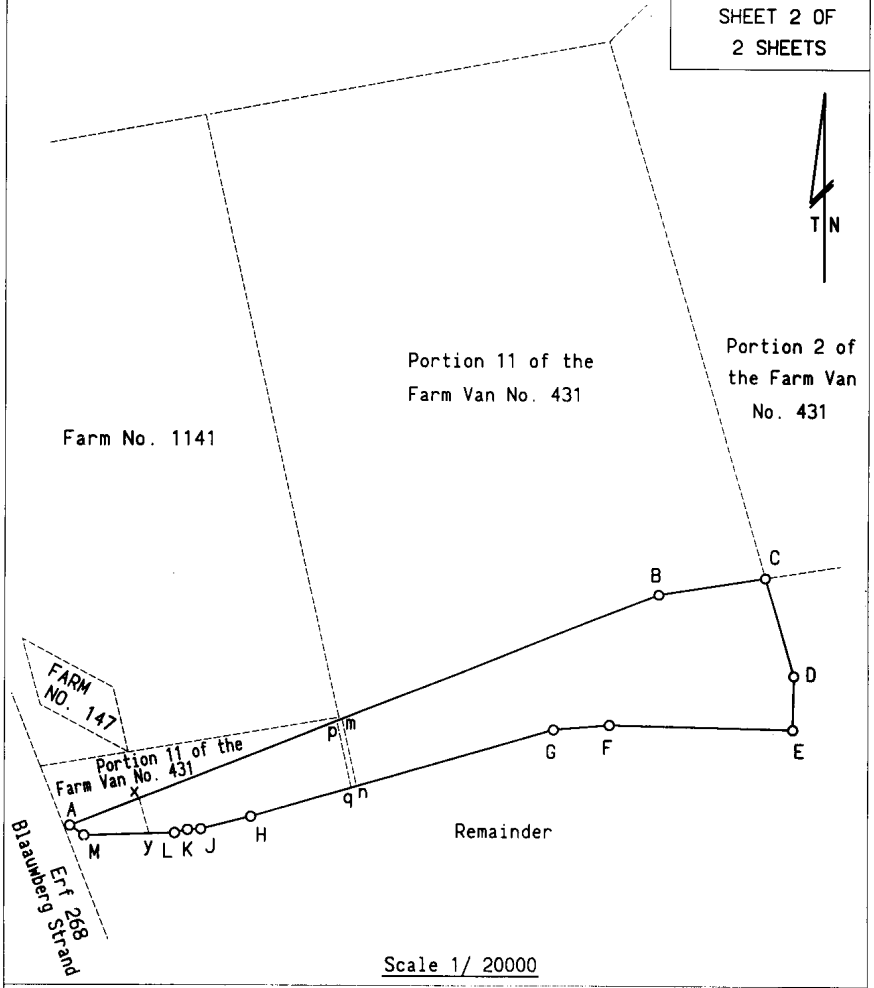
Neil Spencer & Associates - cape town (ref: 1634)

PORTION 10 OF THE FARM VAN. NO. 431

Administrative District of Cape

S.G. No.
1204/2010
Approved.
for Surveyor-General
2010.04.21

SHEET 2 OF 2 SHEETS



Scale 1/ 20000

Surveyed in December 2008 & March 2010 by us,

S.J. Richardson
PLS 1190 Professional Land Surveyor

N.W.D. Spencer
PLS 0855 Professional Land Surveyor

431/10

Neil Spencer & Associates - cape town (ref: 1634)

SIDES Metres		ANGLES OF DIRECTION		CO-ORDINATES Y System WG 19° X		S.G. No. 1205/2010
		Constant		+ 0,00	+ 3700000,00	Approved for Surveyor-General 2010.04.21
AB	1558,97	259 21 42	A	+ 48434,37	+ 36453,30	
BC	2133,80	343 46 50	B	+ 46902,19	+ 36165,50	
CD	408,33	80 44 20	C	+ 46306,19	+ 38214,37	
DE	2424,31	68 20 43	D	+ 46709,20	+ 38280,09	
EF	252,01	158 28 40	E	+ 48962,42	+ 39174,69	
FG	1148,99	260 29 30	F	+ 49054,87	+ 38940,24	SHEET 1 OF 2 SHEETS
GA	2353,66	167 25 05	G	+ 47921,66	+ 38750,44	
		22 CB25	⊕	+ 50452,61	+ 34492,27	
		4 CD5	⊕	+ 49145,07	+ 39398,04	

EXEMPT FROM PROVISIONS OF CHAPTER III OF ORD. 15/1985 Transferred to LA

EXEMPT FROM PROVISIONS OF ACT 70 OF 1970 SECTION 2(a) transferred to LA

APPROVED IN TERMS OF SECT 25 OF ORD. 15/1985 REF. SD 431/1.2 DATE 2010-03-03

Beacon Descriptions

A D : Iron Standard
G : 18mm iron peg
B C E F : 20mm iron peg

Servitude Note:

1) The broken line pq represents the Northern boundary of a servitude area 7 metres wide as shown vide S.G. dgm. No. 3121/1972 ; D/S No. K 326/1978^{S}

2) The broken lines hjk and lmn represent the Centre Line of an Electric Power Transmission Servitude as shown vide S.G. dgm. No. 4909/1990 ; D/S No. K249/1992^{S}

The figure A B C D E F G represents 374,7398 hectares of land, being

PORTION 11 (a portion of Portion 2) OF THE FARM VAN. NO. 431

situate in the City of Cape Town
Administrative District of Cape
Province of Western Cape
Surveyed in December 2008 & March 2010
by us,

S.J. Richardson
PLS 1190 Professional Land Surveyor

N.W.D. Spencer
PLS 0855 Professional Land Surveyor

This diagram is annexed to	The original diagram is	File No. Cape 431
No.	No. 3709/1970	S.R. No. E 527/2010
Dated	annexed to	Comp. BH-7BBB (3736)
i.f.o.	Transfer	LPI. C0160000
Registrar of Deeds	No. 1970 - 591 - 29535	

~~Ptn 11~~ 431/10

Neil Spencer & Associates - cape town (ref: 1634)

INSET 1
(Not to scale)

PORTION 11 OF THE FARM VAN. NO. 431

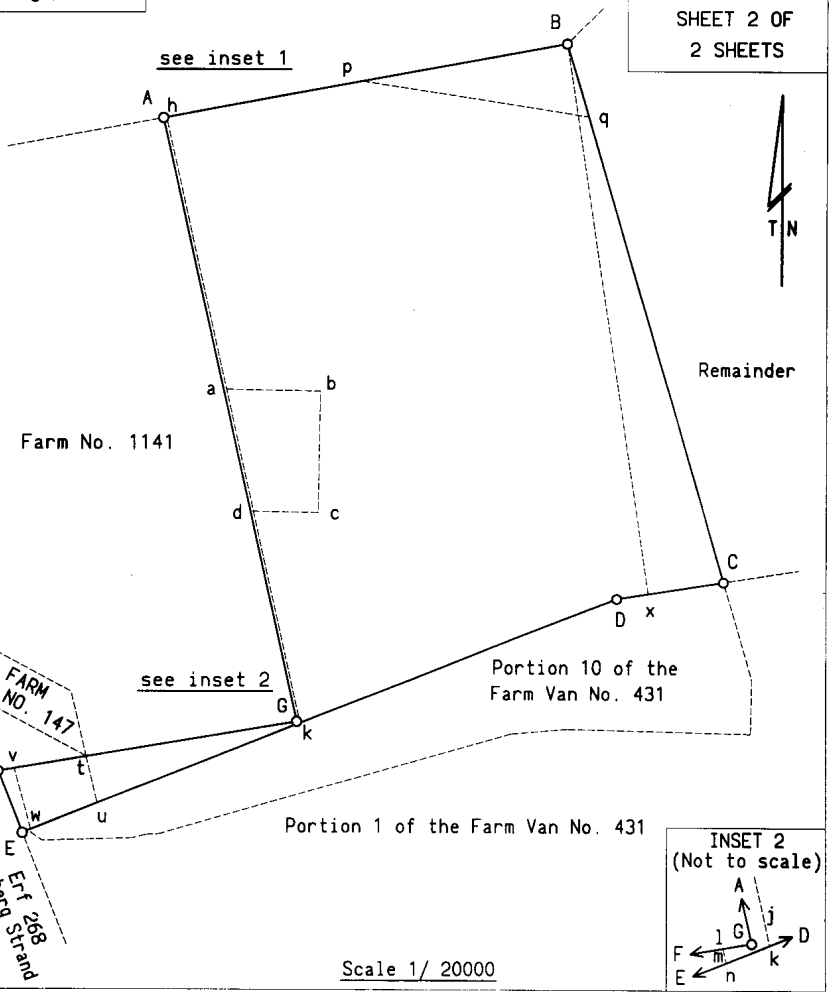
Administrative District of Cape

S.G. No.
1205/2010
Approved
for
Surveyor-General
2010.04.21

SHEET 2 OF
2 SHEETS

Farm No. 91

see inset 1



Remainder

Farm No. 1141

Portion 10 of the
Farm Van No. 431

Portion 1 of the Farm Van No. 431

INSET 2
(Not to scale)

Scale 1/ 20000

Surveyed in December 2008 & March 2010
by us,

S.J. Richardson
PLS 1190 Professional Land Surveyor

N.W.D. Spencer
PLS 0855 Professional Land Surveyor

431/10

B. Species checklists and plans

APPENDIX 3 – PLANT SPECIES LIST

Species Name	Common Name	Alien
Acacia cyclops	Rooikrans	Yes
Acacia saligna	Port Jackson	Yes
Adenogramma lichtensteiniana		No
Adromischus hemisphaericus		No
Agathosma capensis		No
Agathosma imbricata		No
Agathosma serpyllacea		No
Agrostis lachnantha var. lachnantha		No
Aizoon sarmentosum		No
Albuca cooperi		No
Albuca maxima		No
Albuca spiralis		No
Allium dregeanum		No
Aloe perfoliata		No
Amaryllis belladonna	March Lily	No
Amellus asteroides asteroides		No
Ammocharis longifolia		No
Amphithalea ericifolia		No
Androcymbium capense		No
Androcymbium eucomoides		No
Annesorhiza macrocarpa		No
Annesorhiza nuda		No
Anthospermum galioides~		No

Anthospermum prostratum		No
Anthospermum spathulatum spathulatum		No
Arctopus echinatus		No
Arctotheca calendula		No
Arctotheca populifolia		No
Arctotis acaulis		No
Arctotis hirsuta		No
Arctotis stoechadifolia		No
Aristea africana		No
Aristida junciformis~		No
Asclepias crispa~		No
Aspalathus acanthophylla		No
Aspalathus acuminata~		No
Aspalathus ericifolia~		No
Aspalathus hispida~		No
Aspalathus laricifolia canescens		No
Aspalathus puberula		No
Aspalathus spinescens spinescens		No
Aspalathus spinosa~		No
Aspalathus ternata		No
Asparagus aethiopicus		No
Asparagus asparagoides		No
Asparagus capensis		No
Asparagus declinatus		No
Asparagus exuvialis~		No
Asparagus fasciculatus		No
Asparagus lignosus		No

Asparagus retrofractus		No
Asparagus rubicundus		No
Asparagus undulatus		No
Athanasia trifurcata		No
Babiana ambigua		No
Babiana nana~		No
Babiana odorata		No
Babiana tubulosa		No
Baeometra uniflora		No
Bassia diffusa		No
Berkheya armata		No
Berkheya rigida		No
Berzelia lanuginosa		No
Brunsvigia orientalis	Candelabera Flower	No
Bulbine lagopus		No
Bulbinella nutans~		No
Bulbinella triquetra		No
Caesia contorta		No
Calopsis fruticosa		No
Calopsis impolita		No
Calopsis rigorata		No
Carpanthea pomeridiana		No
Carpobrotus acinaciformis		No
Carpobrotus edulis		No
Carpobrotus quadrifidus		No
Cassytha ciliolata		No
Centella macrocarpa~		No

Centella villosa~		No
Chaenostoma uncinatum		No
Chaetobromus involucratus dregeanus		No
Chasmanthe aethiopica	Suurkanol	No
Chasmanthe floribunda		No
Chironia baccifera		No
Chlorophytum triflorum		No
Chlorophytum undulatum		No
Chondropetalum nudum		No
Chrysanthemoides incana		No
Chrysanthemoides monilifera	Bitoubos	No
Chrysocoma ciliata		No
Cineraria geifolia		No
Cissampelos capensis		No
Cladoraphis cyperoides		No
Cliffortia falcata		No
Cliffortia polygonifolia~		No
Clutia alaternoides~		No
Clutia daphnoides		No
Coleonema album		No
Conicosia pugioniformis pugioniformis		No
Corycium crispum		No
Corycium orobanchoides		No
Cotula turbinata		No
Cotyledon orbiculata	Plakkies, Varkoor	No
Cotyledon orbiculata~		No
Crassula capensis~		No

Crassula ciliata		No
Crassula cymosa		No
Crassula dejecta		No
Crassula dichotoma		No
Crassula fascicularis		No
Crassula flava		No
Crassula glomerata		No
Crassula muscosa var. muscosa		No
Crassula nudicaulis~		No
Crassula saxifraga		No
Crassula tetragona tetragona		No
Crassula tomentosa~		No
Crassula vaillantii		No
Crossyne guttata		No
Cuscuta nitida		No
Cyanella hyacinthoides		No
Cyanella lutea		No
Cymbopogon marginatus		No
Cynanchum africanum		No
Cynanchum obtusifolium		No
Cynodon dactylon		No
Cyphia bulbosa~		No
Cyphia digitata~		No
Cysticapnos vesicaria		No
Dasispermum suffruticosum		No
Dianthus albens		No
Diascia capensis		No

Diascia diffusa		No
Diascia elongata		No
Diascia grantiana		No
Dicerothamnus rhinocerotis		No
Didelta carnosa var. tomentosa		No
Didelta carnosa~		No
Dimorphotheca pluvialis		No
Dimorphotheca sinuata		No
Diosma aspalathoides		No
Diosma demissa		No
Diosma dichotoma		No
Diosma oppositifolia		No
Dipogon lignosus		No
Disa bracteata		No
Disa draconis	Dragon Disa	No
Dischisma arenarium		No
Disparago anomala		No
Disperis villosa		No
Dolichos decumbens		No
Dorotheanthus bellidiformis bellidiformis		No
Drimia capensis		No
Drimia elata		No
Drimia sp.1		No
Drosanthemum candens		No
Drosanthemum floribundum		No
Drosanthemum hispifolium		No
Drosanthemum intermedium		No

Drosera cistiflora		No
Drosera trinervia		No
Ehrharta calycina		No
Ehrharta villosa~		No
Elegia microcarpa		No
Elegia recta		No
Elegia tectorum		No
Elytropappus glandulosus		No
Empodium plicatum		No
Erepsia sp.1		No
Erica axillaris		No
Erica ferrea		No
Erica imbricata		No
Erica lasciva		No
Erica mammosa		No
Erica paniculata		No
Erica plumosa		No
Erica similis		No
Eriocephalus africanus~		No
Eriocephalus racemosus~		No
Eriospermum capense~		No
Eriospermum lanceifolium		No
Eriospermum sp.1		No
Euclea racemosa		No
Euphorbia arceuthobioides		No
Euphorbia burmannii		No
Euphorbia mauritanica~		No

Euphorbia tuberosa		No
Euryops tenuissimus~		No
Euryops thunbergii		No
Eustegia minuta		No
Exomis microphylla~		No
Felicia tenella~		No
Ferraria crispa crispa		No
Ferraria divaricata		No
Ficinia bulbosa		No
Ficinia deusta		No
Ficinia dunensis		No
Ficinia indica		No
Ficinia oligantha		No
Ficinia secunda		No
Ficinia trichodes		No
Freesia viridis		No
Galenia africana		No
Galium tomentosum		No
Gazania krebsiana~		No
Gazania pectinata		No
Geissorhiza aspera		No
Geissorhiza exscapa		No
Geissorhiza juncea		No
Geissorhiza tenella		No
Geranium incanum~		No
Gethyllis afra		No
Gethyllis ciliaris		No

Gethyllis ciliaris longituba		No
Gethyllis ciliaris~		No
Gethyllis verticillata		No
Gladiolus alatus		No
Gladiolus brevifolius		No
Gladiolus carinatus	Blou Afrikaner	No
Gladiolus cunonius		No
Gladiolus gracilis		No
Gladiolus griseus		No
Gladiolus meliusculus		No
Gladiolus priorii		No
Gladiolus watsonius		No
Glia prolifera		No
Gnidia laxa		No
Gomphocarpus cancellatus		No
Grielum grandiflorum		No
Gymnodiscus capillaris		No
Gymnosporia buxifolia		No
Haemanthus coccineus		No
Haemanthus pubescens pubescens		No
Haemanthus sanguineus		No
Hakea drupacea		Yes
Harveya squamosa		No
Hebenstretia cordata		No
Hebenstretia repens		No
Helichrysum cochleariforme		No
Helichrysum cymosum~		No

Helichrysum dasyanthum		No
Helichrysum litorale		No
Helichrysum niveum		No
Helichrysum patulum		No
Helichrysum revolutum		No
Helichrysum teretifolium		No
Helichrysum tricostatum		No
Heliophila adpressa		No
Heliophila africana		No
Heliophila coronopifolia		No
Hellmuthia membranacea		No
Hemimeris racemosa		No
Hemimeris sabulosa		No
Hermannia alnifolia		No
Hermannia decumbens		No
Hermannia hyssopifolia		No
Hermannia pinnata		No
Hermannia procumbens procumbens		No
Hesperantha falcata		No
Hesperantha radiata		No
Holothrix villosa		No
Holothrix villosa~		No
Hydnora africana		No
Hyobanche sanguinea		No
Hypodiscus willdenowia		No
Indigofera angustifolia~		No
Indigofera brachystachya		No

Indigofera digitata		No
Indigofera heterophylla		No
Indigofera procumbens		No
Indigofera psoraloides		No
Indigofera sp.1		No
Ischyrolepis capensis		No
Ischyrolepis eleocharis		No
Isolepis antarctica		No
Ixia dubia		No
Ixia maculata var. maculata		No
Jordaaniella dubia		No
Juncus kraussii		No
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Koeleria capensis		No
Lachenalia bulbifera		No
Lachenalia hirta~		No
Lachenalia pallida		No
Lachenalia reflexa		No
Lachenalia rubida		No
Lachenalia unifolia~		No
Lachenalia variegata		No
Lachnaea capitata		No
Lachnaea grandiflora		No
Lampranthus aduncus		No
Lampranthus amoenus		No
Lampranthus aureus		No
Lampranthus emarginatus		No

Lampranthus explanatus		No
Lampranthus filicaulis		No
Lampranthus reptans		No
Lampranthus sociorum		No
Lampranthus spiniformis		No
Lapeirousia anceps		No
Leonotis leonurus		No
Leonotis ocymifolia		No
Leptospermum laevigatum		No
Lessertia argentea		No
Lessertia fruticosa		No
Leucadendron lanigerum var. lanigerum		No
Leucadendron levisanus	Cape Flats Conebush	No
Leucadendron salignum		No
Leucadendron thymifolium		No
Leucospermum hypophyllocarpodendron canaliculatum		No
Leucospermum tomentosum		No
Leysera gnaphalodes		No
Leysera tenella		No
Lichtensteinia obscura		No
Limeum africanum~		No
Limonium equisetinum		No
Linum quadrifolium		No
Liparia vestita		No
Lobelia erinus		No
Lobostemon fruticosus		No
Lobostemon glaucophyllus		No

Lycium afrum		No
Lycium ferocissimum		No
Lyperia lychnidea		No
Lyperia tristis		No
Macrostylis villosa		No
Manochlamys albicans		No
Manulea cheiranthus		No
Manulea thyrsiflora		No
Manulea tomentosa		No
Melasphaerula ramosa		No
Melolobium sp.1		No
Mesembryanthemum crystallinum		No
Metalasia densa		No
Metalasia muricata		No
Micranthus alopecuroides		No
Micranthus tubulosus		No
Microloma sagittatum		No
Mohria caffrorum		No
Monoculus monstrosus		No
Monopsis simplex		No
Montinia caryophyllacea		No
Moraea ciliata		No
Moraea flaccida		No
Moraea fugax		No
Moraea galaxia		No
Moraea gawleri		No
Moraea miniata		No

Moraea neglecta		No
Moraea tripetala		No
Moraea vegeta		No
Morella cordifolia		No
Morella quercifolia		No
Muraltia trinervia		No
Myrsine africana		No
Nemesia affinis		No
Nemesia barbata		No
Nemesia bicornis		No
Nemesia gracilis		No
Nylandtia spinosa	Skilpadbessie Bos, Tortoise Berry Bush	No
Olea europaea africana		No
Olea exasperata		No
Oncosiphon suffruticosum		No
Ornithogalum conicum~		No
Ornithogalum flaccida	Albuca flaccida	No
Ornithogalum suaveolens		No
Ornithogalum thyrsoides		No
Ornithoglossum viride		No
Orphium frutescens		No
Osteospermum spinosum var. spinosum		No
Osyris compressa		No
Otholobium bracteolatum		No
Otholobium hirtum		No
Otholobium virgatum		No
Othonna arborescens		No

Othonna coronopifolia		No
Othonna cylindrica		No
Othonna digitata		No
Othonna filicaulis		No
Othonna pinnata		No
Othonna quercifolia		No
Oxalis caprina		No
Oxalis compressa~		No
Oxalis eckloniana~		No
Oxalis flava		No
Oxalis hirta~		No
Oxalis livida~		No
Oxalis luteola		No
Oxalis obtusa		No
Oxalis pes-caprae~		No
Oxalis polyphylla~		No
Oxalis purpurea		No
Oxalis pusilla		No
Oxalis tomentosa		No
Oxalis versicolor~		No
Passerina corymbosa		No
Passerina ericoides		No
Passerina paleacea		No
Passerina rigida		No
Pauridia minuta		No
Pelargonium alchemilloides		No
Pelargonium betulinum		No

Pelargonium capitatum		No
Pelargonium carnosum		No
Pelargonium gibbosum		No
Pelargonium hirtum		No
Pelargonium lobatum		No
Pelargonium longicaule var. longicaule		No
Pelargonium longifolium		No
Pelargonium multiradiatum		No
Pelargonium myrrhifolium var. myrrhifolium		No
Pelargonium pinnatum		No
Pelargonium rapaceum		No
Pelargonium senecioides		No
Pelargonium tabulare		No
Pelargonium triste		No
Pentaschistis airoides~		No
Pentaschistis aspera		No
Pentaschistis pallida		No
Petrorhagia prolifera		No
Phalaris minor		No
Pharnaceum elongatum		No
Pharnaceum lanatum		No
Phylica cephalantha		No
Phylica ericoides~		No
Phylica parviflora		No
Phylica plumosa~		No
Phyllobolus canaliculatus		No
Phyllopodium phyllopodioides		No

Podalyria sericea		No
Polygala garcinii		No
Polygala refracta		No
Protea acaulos		No
Protea burchellii		No
Protea repens	Sugarbush, Suikerbos	No
Protea scolymocephala		No
Psoralea repens		No
Pterocelastrus tricuspidatus		No
Pteronia divaricata		No
Pteronia hirsuta		No
Pterygodium caffrum		No
Pterygodium catholicum		No
Pterygodium volucris		No
Putterlickia pyracantha		No
Rafnia angulata		No
Rhus crenata	Blink Taaibos, Turkeyberry	No
Rhus dissecta		No
Rhus glauca	Blou Taaibos	No
Rhus incisa~		No
Rhus laevigata		No
Rhus lucida~		No
Rhus rosmarinifolia		No
Robsonodendron maritimum		No
Romulea flava~		No
Romulea hirsuta~		No
Romulea rosea~		No

Romulea tabularis		No
Rumex sagittatus		No
Ruschia caroli		No
Ruschia diversifolia		No
Ruschia geminiflora		No
Ruschia indecora		No
Ruschia macowanii		No
Ruschia tecta		No
Ruschia umbellata		No
Salvia africana-caerulea		No
Salvia africana-lutea		No
Salvia lanceolata		No
Sarcocornia perennis~		No
Satyrium coriifolium		No
Satyrium odorum		No
Scabiosa columbaria		No
Sebaea aurea		No
Selago fruticosa		No
Senecio arenarius		No
Senecio burchellii		No
Senecio elegans		No
Senecio hastatus		No
Senecio littoreus~		No
Senecio pinifolius		No
Senecio sarcoides		No
Seriphium plumosum		No
Serruria aemula		No

Serruria decipiens		No
Serruria fasciflora		No
Serruria trilopha		No
Sideroxylon inerme~		No
Sisymbrium capense		No
Skiatophytum tripolium		No
Solanum guineense		No
Solanum linnaeanum		No
Sparaxis bulbifera		No
Sparaxis villosa		No
Spiloxene capensis		No
Spiloxene ovata		No
Spiloxene serrata		No
Sporobolus virginicus		No
Staavia radiata		No
Stachys aethiopica		No
Steirodiscus tagetes		No
Stenotaphrum secundatum	Buffalo Grass	No
Stoebe fusca		No
Struthiola ciliata		No
Struthiola striata		No
Stylapterus fruticulosus		No
Sutherlandia frutescens		No
Tetragonia decumbens		No
Tetragonia fruticosa		No
Tetragonia nigrescens		No
Thamnochortus erectus		No

Thamnochortus fruticosus		No
Thamnochortus punctatus		No
Thamnochortus spicigerus		No
Themeda triandra		No
Thesidium fragile		No
Thesium aggregatum		No
Thesium carinatum~		No
Thesium pubescens		No
Thesium virgatum		No
Thinopyrum distichum		No
Trachyandra brachypoda		No
Trachyandra ciliata		No
Trachyandra divaricata		No
Trachyandra hispida		No
Trachyandra muricata		No
Trachyandra revoluta		No
Trachyandra sabulosa		No
Trachyandra scabra		No
Trachyandra tabularis		No
Tribolium hispidum		No
Tribolium uniolae		No
Trichocephalus stipularis		No
Trichogyne ambigua		No
Trichogyne repens		No
Tulbaghia capensis		No
Tylecodon grandiflorus		No
Tylecodon paniculatus		No

Typha capensis	Bulrush, Papkuil	No
Ursinia anthemoides anthemoides		No
Ursinia anthemoides~		No
Viscum capense		No
Viscum rotundifolium		No
Wachendorfia multiflora		No
Wachendorfia paniculata		No
Wahlenbergia capensis		No
Wahlenbergia tenella var. tenella		No
Watsonia coccinea		No
Wiborgia obcordata		No
Willdenowia incurvata		No
Willdenowia teres		No
Wurmbea marginata		No
Xiphotheca reflexa		No
Zaluzianskya capensis		No
Zaluzianskya divaricata		No
Zaluzianskya villosa		No
Zantedeschia aethiopica		No
Zygophyllum flexuosum		No
Zygophyllum morgsana		No
Zygophyllum sessilifolium		No

APPENDIX 4 – MAMMAL SPECIES LIST

Species Name	Common Name	Red Book Status	Alien
Aonyx capensis	Cape Clawless Otter	Least Concern (LC)	No
Arctocephalus pusillus	Cape Fur Seal	Least Concern (LC)	No
Atilax paludinosus	Water Mongoose	Least Concern (LC)	No
Balaena glacialis	Southern Right Whale	Least Concern (LC)	No
Bathyergus suillus	Cape Dune Molerat	Least Concern (LC)	No
Canis lupus familiaris	Domestic dog		Yes
Cephalorhynchus heavisidii	Heaviside's Dolphin	Data Deficient (DDD)	No
Crocidura cyanea	Reddish-grey Musk Shrew	Data Deficient (DDD)	No
Cryptochloris asiatica	Cape Golden Mole	Data Deficient (DDD)	No
Cryptomys hottentotus	Common Molerat	Least Concern (LC)	No
Cynictis penicillata	Yellow Mongoose	Least Concern (LC)	No
Dendromus melanotis	Grey Climbing Mouse	Least Concern (LC)	No
Eptesicus capensis	Cape Serotine Bat	Least Concern (LC)	No
Felis caracal	Caracal	Least Concern (LC)	No
Felis lybica	African Wild Cat	Least Concern (LC)	No
Felis silvestris catus	Domestic cat		No
Galerella pulverulenta	Small Grey Mongoose	Least Concern (LC)	No
Genetta genetta	Smallspotted Genet	Least Concern (LC)	No
Genetta tigrina	Large-spotted Genet	Least Concern (LC)	No
Georychus capensis	Cape Molerat	Least Concern (LC)	No
Gerbillurus paeba	Hairyfooted Gerbil	Least Concern (LC)	No
Herpestes ichneumon	Large Grey Mongoose	Least Concern (LC)	No
Hystrix africaeaustralis	Porcupine	Least Concern (LC)	No

Ictonyx striatus	Striped Polecat	Least Concern (LC)	No
Lagenodelphis hosei	Fraser's Dolphin		No
Lagenorhynchus obscurus	Dusky Dolphin	Data Deficient (DDD)	No
Lepus capensis	Cape Hare	Least Concern (LC)	No
Lepus saxatilis	Scrub Hare	Least Concern (LC)	No
Megaptera novaeangliae	Humpback Whale	Near Threatened (NT)	No
Mellivora capensis	Honey Badger	Near Threatened (NT)	No
Mus minutoides	Pygmy Mouse	Least Concern (LC)	No
Mus musculus	House Mouse		Yes
Myosorex varius	Forest Shrew	Data Deficient (DDD)	No
Mystromys albicaudatus	Whitetailed Mouse	Endangered (EN)	No
Orycteropus afer	Aardvark	Least Concern (LC)	No
Otocyon megalotis	Bateared Fox	Least Concern (LC)	No
Otomys irroratus	Vlei Rat	Least Concern (LC)	No
Otomys unisulcatus	Bush Karoo Rat	Least Concern (LC)	No
Raphicerus campestris	Steenbok	Least Concern (LC)	No
Raphicerus melanotis	Cape Grysbok	Least Concern (LC)	No
Rhabdomys pumilio	Striped Mouse, Striped Field Mouse	Least Concern (LC)	No
Suncus varilla	Lesser Dwarf Shrew	Data Deficient (DDD)	No
Sylvicapra grimmia	Common Duiker	Least Concern (LC)	No
Tatera afra	Cape Gerbil	Least Concern (LC)	No
Tatera leucogaster	Bushveld Gerbil		No
Vulpes chama	Cape Fox	Least Concern (LC)	No
Ziphius cavirostris	Cuvier's Beaked Whale		No

BLAAUWBERG CONSERVATION AREA

MANAGEMENT GUIDELINES FOR

LARGER WILDLIFE AND THEIR HABITATS

PREPARED FOR

THE BIODIVERSITY MANAGEMENT BRANCH,

CITY OF CAPE TOWN

FEBRUARY 2008

CONSERVATION MANAGEMENTSERVICES – KEN COETZEE

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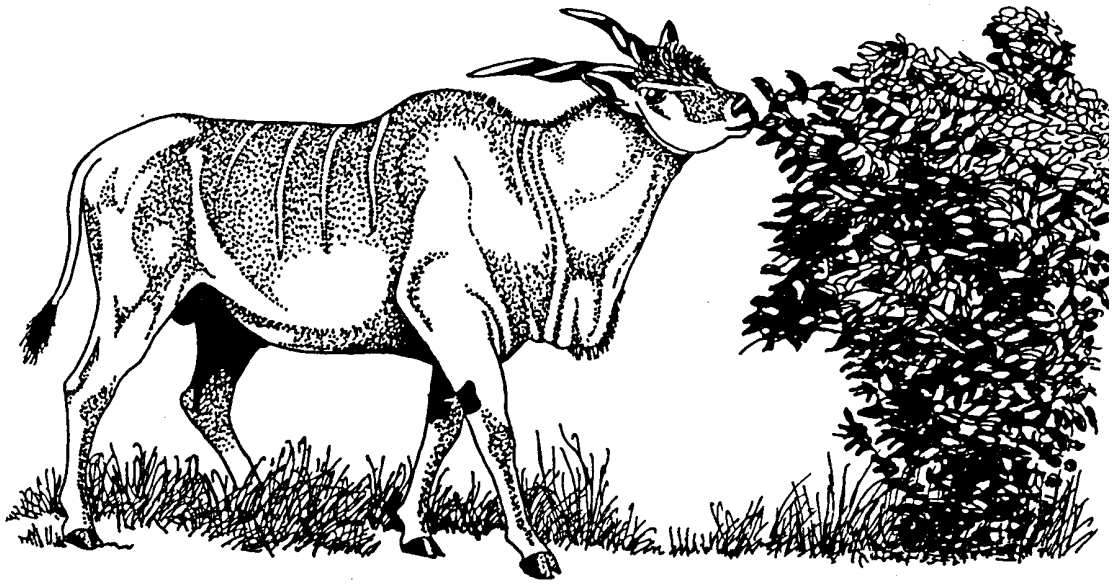
"What is Game Range? When the game manager asks himself whether a given piece of land is suitable for a given species of game, he must realize that he is asking no simple question, but rather he is facing one of the great enigmas of animate nature. An answer good enough for practical purposes is usually easy to get by the simple process of noting whether the species is there already, or whether it occurs on "similar" range nearby. But let him not be cocksure about what is "similar", for this involves the deeper questions of *why* a species occurs in one place and not in another, which is probably the same as why it persists at all. No living man can answer that question fully in even one single instance."

Aldo Leopold, 1932.



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1. INTRODUCTION

Ken Coetzee of *Conservation Management Services* was contracted on 14/12/2007 by Mrs J Jackson, representing the Environmental Resource Management Department of the city of Cape Town, to draw up veld and game management guidelines for the Blaauwberg Conservation Area (BCA). (See Figure 1).

The brief as approved by the Environmental Resource Management Department was a follows:

- A description of the vegetation, within broad habitats for wildlife, resulting in a wildlife habitat map.
- An evaluation of vegetation condition in terms of animal carrying capacity and a realistic stocking rate per game species.
- A wildlife management programme including historical incidence of animals, suitable species for introduction, evaluation of existing species, guidelines for introduction (group size, sex, age) ecologically suitable water provision, predator management, supplementary feeding, parasite control, wildlife monitoring and game census methods.
- Practical (and ecologically sensitive) road maintenance guidelines. (Where required).
- Assessment and management guidelines for soil erosion control. (Where required).
- Veld improvement guidelines.
- Assessment and management guidelines for selective alien vegetation control.
- Guidelines for rehabilitation requirements (ie old lands, opstalle, old roads, former alien plant-infested areas, kraals, etc).
- The design of a fixed-point vegetation monitoring system that will assist with the objective determination of veld condition and the management of wildlife populations.
- Recommendations regarding any other aspect of vegetation or wildlife that may require management guidelines. (Such as boundary and internal fencing, animal release sites, tree planting).
- Guidelines and design for road underpasses for wildlife.
- Prioritization of recommended management actions.
- Recommendations for regular wildlife and veld management audit.

Fieldwork was done between 15/01/2008 and 19/01/2008. During this period reserve, area and biodiversity staff provided the site information required, as well as all the relevant documentation.

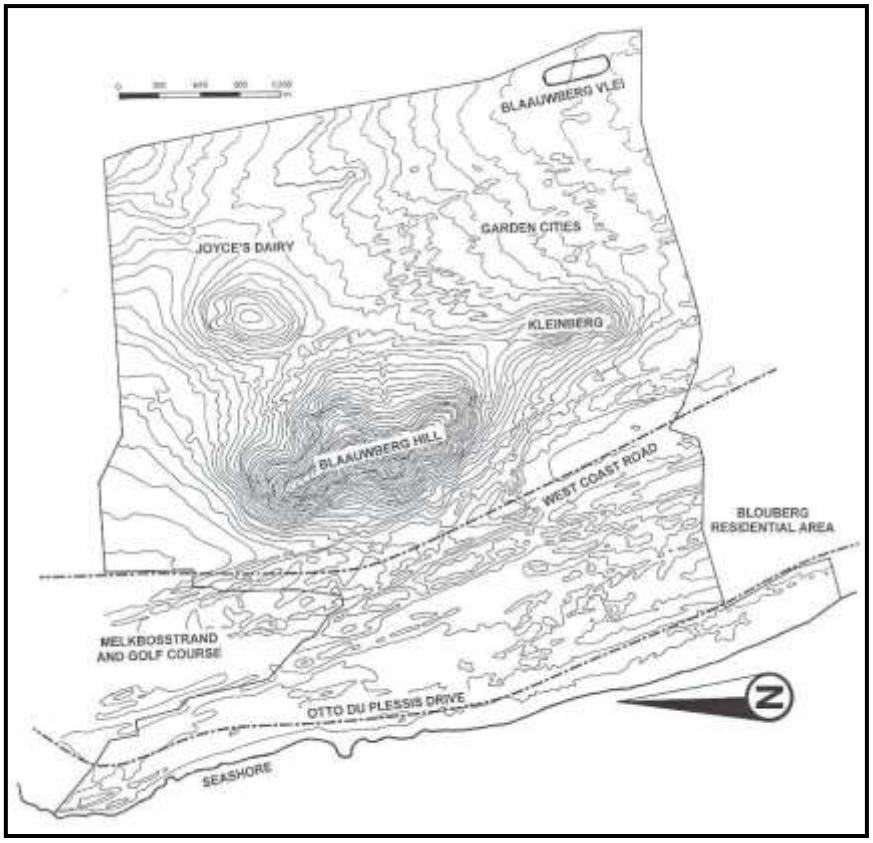


FIGURE 1: The Blaauwberg conservation area: Topography and landscape layout.

2. HISTORICAL INCIDENCE OF LARGER MAMMALS

In order to develop the best possible picture of wildlife potential for the BCA, a survey of historical large mammal incidence was done to determine what was known to occur in the general Cape and West Coast area. This information, together with the prevailing conditions on the BCA, will help determine wildlife species suitability for introduction.

It must be appreciated that early records were based on the observations of early travellers, hunters, settlers and adventurers and although useful, should not be seen as an accurate indication of past large mammal occurrence for a particular locality. For example, many records were made along the well-used wagon routes while vast areas of mountains, hills and bush nearby were seldom explored.

Similarly, the chronicles also show that subsequent observers often found completely different faunal assemblages to their predecessors at the same localities. This is because wildlife populations moved into and out of areas of their range following rainfall and subsequent availability of new grazing.

The historical observation of wildlife species in a particular district or area also does not mean that the species occurred at every locality within that area. The suitability of habitat, within the area, for the particular requirements of each different species is probably the most important determinant of local occurrence.

Table 1 shows the historical larger mammal incidence according to Skead (1980). From this list, it is clear that not all of the western Cape species occurred in the BCA and nor did all of the species recorded on the west coast occur in the BCA.

OCCURRED IN THE BLAAUWBERG AREA	**OCCURRED IN THE WEST COAST AREA TO THE NORTH**	**OCCURRED IN THE WESTERN CAPE (south, north and east of BCA)**
Black rhinoceros	Black rhinoceros	Black rhinoceros
Quagga (extinct)	Quagga (extinct)	Quagga (extinct)
-	-	Cape mountain zebra
-	Hippopotamus	Hippopotamus
Eland	Eland	Eland
Red hartebeest	Red hartebeest	Red hartebeest
-	Warthog	Warthog
-	-	Bushpig
-	-	Buffalo
Ostrich	Ostrich	Ostrich
-	Gemsbok	Gemsbok
-	-	Bontebok
-	Klipspringer	Klipspringer
-	-	Springbok

-	-	Blue duiker
Steenbok	Steenbok	Steenbok
Common duiker	Common duiker	Common duiker
Grysbok	Grysbok	Grysbok
Grey rhebok	Grey rhebok	Grey rhebok
-	-	Bushbuck

TABLE 1: Comparative historical incidence of the larger ungulate mammals in the BCA, West Coast and Western Cape areas according to Skead (1980).

In Table 2, the other larger mammals of southern Africa are listed, all of which are considered to be extralimital (alien) to the western Cape. An indication is given of the general ecological incompatibility of these species with BCA conditions. These are the species that are most often introduced into game farms and game ranches.

SPECIES	BROAD HABITAT PREFERENCE	INCOMPATIBILITY WITH BCA CONDITIONS
Blesbok	Bushveld, grassland, Karoo	Insufficient sustainable grazing; patch-selective; high impact
Giraffe	Bushveld, Savanna	Insufficient sustainable nitrogen-rich browse
Impala	Bushveld, Savanna	Insufficient sustainable browse; will out-compete smaller sensitive browsers; patch-selective; high impact
Kudu	Bushveld, thicket, Karoo	Insufficient sustainable browse and cover
Mountain reedbuck	Bushveld, Karoo, grassland	Requires climax mountain grassveld
Nyala	Bushveld	Will out-compete small sensitive browsers; insufficient cover

Reedbuck	Bushveld, thicket, grassland	Insufficient tall grass habitat
White rhinoceros	Bushveld, grassland	Insufficient sustainable grazing
Roan antelope	Bushveld	Insufficient climax grazing
Sable antelope	Bushveld	Insufficient climax grazing
Tsessebe	Bushveld	Insufficient sustainable grazing
Waterbuck	Bushveld	Insufficient sustainable grazing
Black wildebeest	Karoo, grassland	Insufficient sustainable grazing; patch-selective; high impact
Blue wildebeest	Bushveld, grassland	Insufficient sustainable grazing
Plains zebra	Bushveld, grassland	Insufficient sustainable grazing

TABLE 2: The larger mammals that are extralimital to the BCA and west Cape area.

From this brief assessment, it can be postulated that the historical large mammal incidence of the BCA was probably as follows:

Black rhinoceros

Quagga

Eland

Red hartebeest

Ostrich

Steenbok

Common duiker

Grysbok

Grey rhebok.

Elephant was also recorded in the area historically and aardvark, scrub hare, Cape hare and porcupine still do occur in the area.

3. DESCRIPTION OF HABITAT AND HABITAT CONDITION

The following is a very broad and general description of the habitats available for larger mammals on the BCA. It concentrates on the aspects of cover and forage (grazing and browsing), rather than plant communities or floristics, it is thus an evaluation of the habitat in terms of the basic needs of the ungulate mammal fauna.

The vegetation units described by Barrie-Low (2001) were used as a general guide (see Figure 2) to habitat description in this section. (The palatability of both grazing and browse is based on personal observation, particularly the palatability of the shrubs).

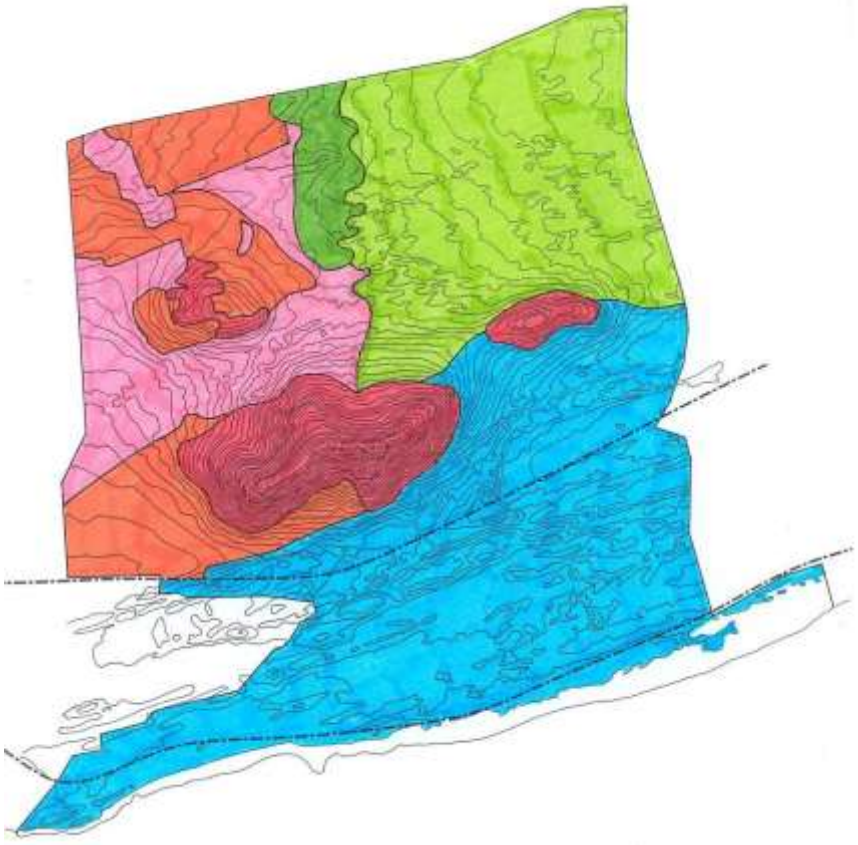


FIGURE 2: Vegetation habitats of the BCA (Barrie-Low, 2001)

Dune Thicket Types

Renosterveld

Sand Plain Fynbos

Transitional –Sand Plain Fynbos/Renosterveld

Transitional-Dune Thicket/Sand Plain Fynbos

Transformed areas

3.1 DUNE THICKET
(Coastal area west of Blaauwberg)

This area of relatively intact thicket types on calcrete or sand occurs roughly between Blaauwberg and the coast. It varies from a mosaic of dense thicket bushclumps and more open restioid cover to a low thicket mosaic with fynbos and dwarf shrubs. (See Plates 1 - 3).

The vegetation is rich in palatable browse shrub and dwarf shrubs species which include the following:

Chrysanthemoides incana

Chrysanthemoides monilifera

Cissampelos capensis

Euphorbia racemosa

Lessertia frutescens

Nylandtia spinosa

Olea exasperata

Pterocelastrus tricuspidatus

Rhus crenata

Rhus glauca

Rhus laevigata

Rhus lucida

Tetragonia fruticosa

Zygophyllum morgsana.

The unpalatable indigenous grass *Ehrharta villosa* occurs in abundance on the dune areas and is often the only grass in the vegetation. Other indigenous grasses like the palatable *Ehrhartha calycina* and *Cynodon dactylon* occur in occasional patches, particularly after fires. The most abundant grass is the unpalatable alien *Bromus diandrus* which is also an annual. *Pentaschistis pallida* is an indigenous grass that occurs in all of the sandy parts of the BCA.

Annual grasses, both alien and indigenous, occur in the dune troughs, often forming a dense cover. The bulk of the grass cover of the dune thicket area thus consists mostly of unpalatable and annual grasses with very little sustainable forage remaining during the drier summer months.

PLATE 1: Typical Dune Thicket vegetation (inland).

PLATE 2: Typical Dune Thicket vegetation (coastal).

PLATE 3: Post-fire Dune Thicket vegetation.

3.2 DUNE THICKET/SAND PLAIN FYNBOS TRANSITION (Garden Cities)

From the eastern foot of the Kleinberg this habitat extends eastwards to the BCA boundary. It is best described as a dense and extensive alien tree thicket. The Port Jackson willow (*Acacia saligna*) is the most important invader, often forming almost impenetrable thickets with little or no natural ground cover remaining. (See Plates 4 & 5).

PLATE 4: Typical dense infestation of Port Jackson can be seen in the upper half of the picture.

PLATE 5: In areas of Dune Thicket infested by Port Jackson most of the original natural plant cover has been lost.

In the northern part of the “Garden Cities” property, sand plain fynbos still occurs within the Port Jackson thickets and where clearing has been done, bounces back into a typically diverse fynbos with a very minor grass component.

Over most of the “Garden Cities” property, the Port Jackson dominates except for a number of cleared areas and dune patches. The Blaauwbergsvlei supports a dense *Cynodon dactylon* grassland which extends along the entire wetland area.

Other cleared areas (including a perennial spring) (see Plate 6) and dune ridges are the only areas (see Plate 7), other than the sand plain fynbos area, that supports any significant indigenous shrub and grass cover. In these open areas the grass cover is dominated by the alien annuals *Bromus diandrus* and *Avena fatua*. (See Plate 8). The indigenous (but unpalatable) *Ehrharta villosa* occurs on all dune ridge areas and where the sand surface is stable under *Ehrharta villosa, Cynodon dactylon* is prevalent. (See Plate 9) The palatable *Ehrharta calycina* occurs within shrubs and in the dune troughs in open areas. (See Plate 10).

Indigenous browse plants, also largely restricted to the open patches, consist of Asteraceous fynbos plants, *Lycium ferocissimum, Passerina vulgaris, Chrysanthemoides monilifera, Chrysanthemoides incana, Rhus lucida, Rhus glauca, Gymnorsporia buxifolia, Asparagus* spp and *Cissampelos capensis*.

PLATE 6: A cleared area, Port Jackson has been removed around a spring. Note the recovery of indigenous Dune Thicket shrubs.

PLATE 7: Dune ridges in the Port Jackson-invaded areas are relatively clear of infestation.

PLATE 8: The visually impressive grass cover of the open areas in the Port Jackson-invaded area consist almost exclusively of invasive alien annual grasses.

PLATE 9: Where *Ehrharta villosa* has stabilized sand slopes, the rhizomatous *Cynodon dactylon* is prevalent.

PLATE 10: In dune ridges and cleared areas, indigenous Dune Thicket shrubs are prevalent and increasing.

3.3 SAND PLAIN FYNBOS / WEST COAST RENOSTERVELD TRANSITION (Joyce's Dairy)

This area, consisting mostly of the private property Joyce's Dairy, covers most of the northern part of the BCA east of the N7 highway. Much of the area has been transformed by agricultural cultivation and invasion by alien trees.

The sand plain fynbos/renosterveld ecotonal vegetation occurs on less acidic, shale-derived and thus more nutrient-rich soils. (See Plate 11). These soils probably supported a much higher grass component in the past. The transformed cultivated pasture areas have the potential to support a relatively good quality grassy pasture albeit an artificial one.

The renosterveld area contains palatable shrubs like *Metalasia, Aspalathus, Eriocepahlus, Anthospermum, Podalyria, Hermannia* and *Drosanthemum* spp. Typical grasses are *Ehrharta calycina, Cynodon dactylon, Avena fatua, Bromus diandrus, Phalaris minor* and *Tribolium hispidum*.

PLATE 11: Sand Plain Fynbos/Renosterveld transitional habitat in a cleared area. The cover consists of annual alien grasses, *Ehrharta calycina* and Renosterveld shrubs.

3.4 WEST COAST RENOSTERVELD (Blaauwberg Hill and Kleinberg)

The western slopes of Blaauwberg Hill contain what is best described as Strandveld Thicket with elements of Succulent Karoo. (See Plate 12). Helme (2004) suggests that this habitat is not true Renosterveld and that all existing vegetation maps of the area are inaccurate. For the purpose of this assessment, it is accepted that Strandveld Thicket with a Succulent Karoo characteristic occurs within the Renosterveld area. The shrub component includes the following palatable shrubs:

Gymnosporia buxifolia

Lycium ferocissimum

Pterocelastrus tricuspidatus

Rhus glauca

Rhus laevigata

Rhus lucida

Zygophyllum morgsana.

On the eastern side of the Blaauwberg Hill, the vegetation is Renosterveld, dominated by *Dicerothamnus rhinocerotis, Eriocephalus africanus, Drosanthemum* spp, *Anthospermum spathulatum, Hermannia* spp and a high diversity of geophytes (Helme, 2004). (See Plate 13).

Grasses observed for the whole Blaauwberg Hill area include:

INDIGENOUS	**ALIEN**
Tribolum hispidum	*Phalaris minor*
Tribolium uniolae	*Avena fatua*
Eragrostis curvula	*Bromus diandrus*
Eragrostis spp	*Briza maxima*

Cynodon dactylon *Ehrharta calycina* *Cymbopogon marginatus* *Chaetobromus dregeanus*	

In areas that have been cleared of alien trees, the alien *Phalaris, Avena* and *Bromus* dominate the site with a dense sward. (See Plate 14). Higher up the hillside, the indigenous *Tribolium* spp, *Ehrharta* and *Cynodon* are more prominent.

In the Kleinberg area, indigenous and palatable *Cynodon dactylon* is well established on stony ground (see Plate 15) and *Phalaris* is important in disturbed and cleared areas.

PLATE 12: Blaauwberg west-facing slopes with typical Strandveld and Succulent Karoo vegetation.

PLATE 13: Typical shrubby Renosterveld vegetation of the southern and eastern Blaauwberg hill slopes.

PLATE 14: Areas in former Renosterveld that have been cleared of alien trees are covered with alien annual grasses, with recovering Renosterveld shrubs.

PLATE 15: Indigenous grass *Cynodon dactylon* is sometimes prevalent on gravel soils within the Renosterveld area.

3.5 HABITAT CONDITION SUMMARY

3.5.1 SUMMARY

A broad habitat condition summary is contained in Table 3. In this section each of the habitat types illustrated in Figure 2 has been generally described in terms of large ungulate forage requirements. The table summarises the estimated degree of grass cover, grass sustainability, palatable shrub availability, degree of alien plant invasion and estimated suitability for grazers, mixed feeders and browsers for each major habitat type.

The important key findings of this habitat condition assessment are:

- Much of the available grazing consists of alien annual grasses; the lack of grazing sustainability in the dry season is thus an important limitation.
- Indigenous perennial grasses are sparse and localised, and some are not really quality grazing species (eg: *Tribolium uniolae*).
- The widespread and often dominant indigenous grass, *Ehrharta villosa* is completely unpalatable.

- The Sand Plain Fynbos habitat does not contain a significant grass component (in terms of grazing).
- Conditions for high densities of small selective browsers are suitable throughout the study area (steenbok, grysbok, duiker).
- Cleared areas and clearings (in the Garden Cities area) are critical wildlife habitat nuclei which can be improved through connection, further alien clearing and seeding with palatable indigenous grasses.
- Areas recently cleared of aliens and currently covered in annual alien grasses can potentially all become relatively good grazing areas with some encouragement and experimentation.

VEGETATION / HABITAT UNIT	GRASS COVER	GRAZING SUSTAINABILITY	PALATABLE BROWSE AVAILABILITY	PALATABLE BROWSE SUSTAINABILITY	ALIEN TREE INFESTATION	SUITABILITY PER HERBIVORE GROUP (GRAZERS / BROWSERS)
Dune Thicket	Sparse to dense. Most prevalent grasses are unpalatable. Alien annual grasses dominate.	Grazing in the dry season very poor. Only unpalatable *E villosa* maintains vigour.	High incidence of palatable shrubs. High diversity.	Palatable browse is sustainable in the dry season.	Largely uninfested, pockets of Port Jackson remain.	The Dune Thicket area is poor habitat for grazers, but suitable habitat for selective browsers at high to moderate densities and mixed feeders at low densities.
Dune Thicket / Sand Plain Fynbos (Garden Cities)	Grasses only occur in clearings in the Port Jackson. Grasses consist mostly of unpalatable indigenous species and annual alien species.	Gazing in the dry season is very poor except on the limited vlei area where *Cynodon* maintains its vigour.	Browse shrubs mostly in clearings, recovering but low density.	Browse is sustainable in the dry season, but currently shrubs too few to provide sustainable browsing for large numbers of large browsers.	Severe infestation of Port Jackson with little natural ground cover, except in north-east Fynbos area.	This unit is poor habitat for gazers (limited in extent and sustainability) and is only marginally suitable for mixed feeders in low densities and small browsers in moderate densities.
Sand Plain Fynbos / Renosterveld (Joyce's Dairy)	Grasses dominated by alien annuals. Low density of palatable indigenous species.	Grazing in the dry season is poor, except on the cultivated pasture areas which appear to be sustainable. (Currently used for low density cattle	Browse limited to Renosterveld, dwarf shrubs and a low density of larger shrubs/trees.	Browse is sustainable in the dry season, but is not enough to provide sustainable browsing for large numbers of large browsers.	Pockets of alien tree infestation.	This area is potentially suitable for grazers at low to moderate densities. It is suitable for mixed feeders at low densities and small selective browsers at moderate densities.

		grazing).				
West Coast Renosterveld (Blaauwberg & Kleinberg)	Grasses dominated by alien annuals. Good patches of quality indigenous grasses are few. Large areas recovering.	Grazing in the dry season is poor. Rehabilitation areas have poor quality grass cover.	Moderate incidence of palatable shrubs over the whole hill area. Strandveld and Renosterveld species.	Browse is sustainable in the dry season for small browsers and low densities of mixed feeders.	Alien tree infestations restricted to lower south-eastern and south-western slopes.	This area is moderate but limited habitat for grazers, good habitat for small selective browsers and moderately suitable habitat for mixed feeders.

TABLE 3: Habitat condition summary expressed in terms of estimated grazing and browsing potential for grazing, mixed feeding and browsing ungulates.

3.5.2 HERBIVORY AND THE INTERACTION BETWEEN HERBIVORES AND THEIR HABITAT

It can be assumed that, in the times when black rhinoceros were observed between the Cape settlement and the Saldana area, habitat conditions may have been a great deal more suitable for large herbivores. "Civilization" has taken its toll through ploughing and aridification, the introduction of alien plants, draining, overgrazing, overbrowsing and fragmentation.

The habitats (see Figure 2) of the BCA were probably a bit moister and grassier and the large herbivores of the area constantly on the move in search of better forage and water.

The introduction (and management) of large ungulates into the BCA must be guided by the modern constraints of fenced landscape units and generally degraded habitat conditions.

The grazing and browsing (and other life functions) of large ungulates will have an impact of both structure and composition of the vegetation of the BCA. Moderate levels of plant utilization may result in an increase of vegetation productivity while excessive defoliation will reduce the productive leaf area below the level at which the vegetation can maintain efficient productivity (Puttman & Wratten, 1984).

Trampling and the effects of both urination and defecation can also influence plant community structure, particularly in favoured "hotspot" areas. The development of piospheres around water points in Sandveld is another potential animal impact.

There are thus many "cautions" and constraints with respect to large ungulate introduction into the BCA, but the objective of this report is to provide effective guidelines for the successful introduction of ungulates, populations of which will be maintained well within the ecological capacity of the vegetation, and the area of available habitat.

The introductions recommended are thus a cautious and conservative estimate of the potential of the BCA.

4. SUITABLE SPECIES FOR INTRODUCTION AND SPECIES REVIEW

4.1 SUITABLE SPECIES

An important consideration regarding suitable large mammal species for introduction to any area must be the management objectives for the introduction area.

When developing a wildlife reserve, whatever the reason, it is extremely important to decide what ***theme*** is to be created. Collinson (1995) described the options as follows:

A. The first option is to restrict the theme to only those species that are known to have occurred naturally in the area in the historical past.

B. The second option is to broaden the theme to include all species that are known to be indigenous to South Africa and that can adapt well enough to the available habitat.

C. A third option is to broaden the theme even more and to stock any game species, from anywhere in the world, provided that they will do well in the available habitat.

A further option that is often a good "fit" for introduction areas with transformed habitat is to primarily base introduction on animals that occurred historically in the area (Option A), but to include one or two benign extralimital species that are a good match for the transformed or artificial habitat.

While criteria of habitat suitability will, in most cases, determine the success of an introduction, we know from experience that many alien species thrive in South African habitats and many extralimital species are highly competitive. Value judgements or aesthetic criteria, in addition to ecological criteria, are thus considerations that are important aspects for establishing objectives for an area such as the BCA.

The primary theme that is suggested for the BCA is the first option (A) above. The general principle of stocking indigenous species should thus be the primary aim for the reserve. Such a reserve can then be seen as a true west coast restoration project and can be marketed as such.

According to Novellie and Knight (1994), who reviewed mammal re-establishment into South African National Parks, the introduction of species into an area in which they did not occur historically is less likely to be successful in the longer term than the introduction of species which did occur naturally in the area historically. Introducing wild herbivores is a costly exercise which is another good reason why all introductions should be carefully considered.

Other than aesthetic considerations, suitability for introduction cannot simply be determined in terms of historical occurrence, but must also be considered in terms of the available habitats, current habitat condition and other physical factors like size of the area, water provision and specific management requirements like the need for veld improvement. Other than these ecological factors, the reality of economics must also play a role in determining suitable species for introduction.

The translocation policy of the West Cape Nature Conservation Board is also an important guide. They will not issue permits for the translocation of any species that may have a negative impact on either the habitats into which they are introduced or the indigenous wildlife occurring in those habitats. This generally excludes most species that did not occur in the area in the historical past.

In view of these guidelines, the animals considered suitable for introduction into the BCA are shown in Table 4. The table also lists the species which are not suitable for introduction, either because the habitat or size of the area is no longer suitable (eg: elephant, black rhinoceros) or because the animals are extralimital or ali

SPECIES THAT STILL OCCUR ON THE BCA	SPECIES THAT STILL OCCUR NATURALLY IN THE GENE-RAL WEST COAST AREA	SPECIES THAT CAN BE CONSIDERED FOR INTRODUCTION	SPECIES NOT SUITABLE FOR INTRODUCTION ←	ALIEN SPECIES THAT SHOULD NOT EVEN BE CONSIDERED

Θ Common duiker Θ Steenbok Θ Grysbok	ΘCommon duiker ΘSteenbok ΘGrysbok ΘGrey rhebok	**ΘEland** **ΘRed hartebeest** **ΘGrey rhebok**	σBlue wildebeest σBlack wildebeest σRed lechwe σSable antelope σRoan antelope σSitatunga σRed duiker σOribi σBlue duiker σNyala σKudu μBushbuck σSouthern reedbuck σDik dik σWhite rhinoceros σBlesbok μBontebok μBuffalo ΘElephant ΘBlack rhinoceros μGemsbok	=Fallow deer =Black buck =Sambar =Mouflon =Himalayan tahr =Barbary sheep =Water buffalo =Nilgai =Red deer =Camel =Llama

1.2.1 <u>TABLE 5</u>: A SUMMARY OF LARGE HERBIVORE INTRODUCTION POTENTIAL

Θ Historically occurred in the area

μ Nearby historical occurrence

σ Not indigenous to the area

= Alien to Southern Africa

← These species are not considered suitable because of unsuitable habitat, too little habitat, incompatibility with stocking mix or insufficient dry season forage

4.2 REVIEW OF THE SUITABLE SPECIES

Because the introduction of large animals necessitates a range of ensuing management considerations, not least their potential impact on the small species already present, possible interspecific competition and the impact of utilization on veld improvement programmes, the species considered suitable for introduction are reviewed as follows:

4.2.1 ELAND (*Taurotragus oryx*):

Eland are at home in semi-desert shrubveld, woodland, Bushveld, fynbos, mountain grasslands and mountain shrubveld. They also do well on grassland and marshlands of coastal areas. They occur from sea level to altitudes of up to 4 000 m and are found in areas with precipitation ranging from 250 mm/year to 1 200 mm/year (Furstenburg, 2003).

Bushy thickets and kloofs provide important shelter for eland against cold and rain in winter, particularly in mountain country. Eland can tolerate low temperatures for short spells, after which they will move to lower (warmer) altitudes and more sheltered areas (Furstenburg, 2007).

Eland are thus very versatile in their requirements and have been introduced with success into numerous fynbos and Karoo areas. Some writers state that eland are predominantly browsers (Stuart & Stuart, 1996; Smithers, 1983; Hillman, 1988; Littlejohn, 1968), but that they also feed on grasses when available after summer rains. Furstenburg (2003) states that eland are mixed feeders that optimize protein intake by utilizing different resources during different seasons, ie: browse during the dry season and green grass during the wet growing season.

Research has revealed that eland diet always consists of more than 33% grass, irrespective of season, and grass can form up to 92% of their diet (Furstenburg, 2007). The period of highest nutrient stress occurs during the dry months (winter in the northern areas and summer in the western Cape) and this may impact on the survival of the young calves born during early summer. Eland favour burnt areas and are often the first animal to move into them to feed on new growth (Furstenburg, 2007).

Because eland are mixed feeders, it can be predicted that they will also prefer the thicket and more broken habitats, with a higher incidence of palatable shrubs and grasses, to the plains areas. They should utilize *Rhus* spp, *Olea* spp, *Euclea* spp, Karroid dwarf shrubs and grasses like *Ehrharta* and *Cynodon*, which are regular components of their diets elsewhere.

Because eland largely make use of browse, it can be predicted that they will make most use of the Blaauwberg and Kleinberg Shrubveld and Thicket Shrubveld in the dune areas. Monitoring of these habitats will be of vital importance in detecting changes and utilization patterns with a view to population management.

More grazing can be expected during the wet later winter season and conversely more browsing can be expected during the dry summer season.

Because the eland is able to "switch" diet in response to availability, it represents a good option for introduction into the BCA. During winter, eland can utilize alien grasses like *Phalaris* and *Avena* and when they die off in the dry summer, they can switch to a largely browse diet.

Eland are a highly gregarious species occurring in nomadic non-territorial herds. Group size varies according to habitat and season. Generally, they form small herds which sometimes come together to form huge groupings of up to 500 individuals. The herds are fluid and the only fixed associations are between mothers and calves. Herds may consist of cows, their calves and juveniles. Often herds consisting of largely juveniles and calves are observed.

Average recorded home ranges vary between 1 200 Ha for bulls and 2 600 Ha for family groups in the dry season. Furstenburg (2007) suggests that eland that are kept on smaller areas (to which they adapt well) require supplementary feeding to compensate for the reduction in nutrients normally derived over a larger range area. He further suggests that with supplementary feeding, a stocking rate of 15 - 25 eland per 500 Ha can be used.

Adult bulls are least sociable and are either solitary or form small groups or pairs. They tend to browse more than the cow herds and thus keep to more wooded habitat while the cow/calf herds tend to utilize more open areas. Adult bulls have the habit of breaking off branches when browsing, but this should not be cause for any concern, as the habit actually does a great deal of good in terms of ground cover improvement.

Eland drink water when available, but are capable of surviving without water by obtaining their moisture requirements from their food.

4.2.2 RED HARTEBEEST (*Alcelaphus buselaphus*):

Red hartebeest habitat includes dry desert sandveld, savanna plains, Karoo shrubveld and succulent veld, high mountain grassveld and in historical times, the fynbos and strandveld grassy areas. They adapt well to hot desert climates as well as cold climates in mountainous areas (Furstenburg, 2003).

Unlike black wildebeest, red hartebeest cannot be regarded as typical plains antelope. They are most often encountered in ecotones or transition areas between different vegetation types. (Kok, 1975).

The most important habitat requirement is a wide variety of grass species of middle height (12 - 35 cm above ground). This, together with relatively open habitat and woodland (but not thicket), constitutes their preferred habitat.

Red hartebeest are considered to be predominantly tall grass grazers (Kok, 1975; Van Rooyen, 1998 and Smithers, 1983), but they are known to browse when grass is not available. In the S A Lombard Nature Reserve in the Western Transvaal, their food consists of 56,5% grass and 44,4% browse and in the Orange Free State, browse constituted 40% of the diet (Smithers, 1983).

It can be expected that, in the BCA study area, red hartebeest will make use of *Cynodon dactylon, Ehrharta calycina* and the more palatable annual grasses. Although the study area has suitable habitat for red hartebeest, their numbers will have to be carefully controlled due to the competition for grazing that can be expected from eland. No other grazers should be introduced so the red hartebeest will have most of the grazing to themselves. The currently cultivated parts of Joyce's Dairy can be developed into a productive grassland/renosterveld pasture and the proposal to link and seed the currently open and grassy vlei areas of Garden Cities will also result in greatly improved grazing conditions for red hartebeest.

Red hartebeest are attached to specific areas due to their territorial behaviour, but according to Kok (1975), concentrate mainly on grass-covered slopes of ridges and koppies. Personal observation on various Karoo reserves confirms this and grassy shrubveld should be selected as optimal habitat by the hartebeest. The potential for

habitat degradation through patch selection by red hartebeest is more localised and is less severe than in the case of black wildebeest. Red hartebeest will compete to some extent with eland, as they may both feed on the same grasses and at roughly the same feeding height.

Red hartebeest are organised into harem (breeding) herds, bachelor herds and occasional lone bulls. A typical harem herd consists of an adult bull, a sub-adult bull and a number of cows with their calves. Bachelor herds consist of bulls of all ages, mostly bulls too young or too old to participate in the rutting activities. While the harem herds occupy the best grazing, the bachelor herds utilize more marginal periphery habitat. (Kok, 1975).

Kok (1975) suggests that for re-establishment purposes, the social structure of red hartebeest is very important. He suggests one adult bull (at least 3 years old), six cows of 2 years old as a primary introduction group and 1 sub-adult bull as a nucleus for a bachelor herd.

As a very broad guide, Furstenburg (2003) recommends no more than 25 red hartebeest per 500 Ha in regions with a rainfall between 300 and 350 mm per year.

4.2.3 GREY RHEBOK (*Pelea capreolus*):

Although the grey rhebok is best known to occur in hill country, ridges and mountains, it does occur in lower foothills at altitudes as low as 300 m (Furstenburg, 1999).

Scott (1991) recorded grey rhebok on the coastal plain in sand plain fynbos, old lands and limestone fynbos of the De Hoop Nature Reserve. In these areas, the habitat consisted of low, herbaceous vegetation cover with medium to high bush. Stuart and Stuart (1996) report that grey rhebok occur in the wheat lands of the Bredasdorp and Swellendam districts. Furstenburg (1999) suggests that habitat should generally consist of short grassveld, with a dispersed cover of shrubs and with numerous herbaceous plants and dwarf shrubs (below 30 cm). These are habitat conditions that are well represented on the BCA, particularly on the Blaauwberg Hill and the transformed pasture areas of Joyce's Dairy.

Studies in the O F S found that grey rhebok spend 90% of their time in short grassveld with scattered shrub cover and Furstenburg (2004) considers this to be critical habitat conditions.

Grey rhebok are sensitive to drought and are consequently often found at higher altitudes. Their preferred (wetter) habitat is often very exposed to inclement weather (ie: in the case of Blaauwberg, rain and wind from the north-west and strong wind from the south-east), to which the rhebok are suitably adapated.

Grey rhebok are chiefly browsers (Ferreira, 1983 and Beukes, 1988) utilizing 90% herbs and shrubs and only a maximum of 10% of grasses, restios and sedges. Like many other small browsers, grey rhebok, are independent of water. Being very sensitive to drought, grey rhebok die easily as a result of feeding stress during dry periods. They feed primarily on herbaceous plants with a high protein content and are unable to simply switch to a low protein, high fibre grass diet. This may be the reason why grey rhebok are not “common” in the dry west coast area.

Grey rhebok form family groups of 3 to 12 animals and stick to a general home range. Groups typically consist of females, young and 1 adult, territorial male. Home ranges of family groups range from 30 Ha during periods of low feeding stress to 160 Ha during dry periods and high feeding stress (Furstenburg, 2004). The core home range area remains stable and because grey rhebok do not migrate, the young rams are aggressively chased away by the territorial dominant ram.

Studies country-wide have shown that grey rhebok density varies between 15 to 80 Ha per animal with the average in the Bontebok Park at Swellendam being 15 Ha per animal (66 grey rhebok per 1 000 Ha). Because these estimates were based on total area and not specific favoured grey rhebok habitat, Furstenburg (2004) recommends 8 Ha per animal for optimal grey rhebok habitat.

4.3 DISCUSSION

QUAGGA: The quagga may have occurred in the BCA area historically. No longer available for introduction, the quagga is often replaced by the plains zebra as an ecological equivalent on game farms/ranches, but zebra have not been recommended for the BCA. The plains zebra is not a good ecological “fit” with the BCA habitat. Zebra are bulk grazers and require a sustainable bulk grass diet which, as already discussed, is not available on the BCA. The red hartebeest is a much better option for grazer introduction.

BONTEBOK: Bontebok are frequently introduced to western Cape game ranches and even nature reserves where they did not occur historically, because of their relative rarity. Bontebok did not extend up into the west coast area and it is doubtful whether habitat conditions on the BCA are suitable for them. This species has thus not been recommended in keeping with the policy of “Historically indigenous” fauna for the BCA.

OSTRICH: Although ostrich occurred in abundance in the west coast area, they are omitted from the "suitable" species for the BCA for a number of reasons. Firstly, they breed very fast in areas with few predators, resulting in "exploding" populations which management invariably find difficult to control. Secondly, they are dangerous (during breeding seasons) in an area where the public are encouraged to hike. Lastly, they have a destructive feeding habit of pulling whole plants out of the ground, roots and all, which is not needed where rehabilitation of natural veld is a primary management objective.

BLACK RHINOCEROS: Black rhinoceros were recorded for the west coast Sandveld area in the past, but under completely open landscape conditions. We do not know what kind of range size would have sustained an individual black rhinoceros, but we do know what kind of range is required, per individual, in similar rainfall regions. The average rainfall of 400 mm can be compared to that of Etosha in Namibia (±350 mm) where each rhinoceros requires approximately 3 000 - 4 000 Ha of suitable habitat (Joubert & Eloff, 1971).

It thus follows that even a small and unviable group of 4 black rhinoceros will require at least 12 000 Ha of optimal habitat, which in the case of the BCA, constitutes thicket. These constraints, together with the additional cost of rhino-proof fencing and black rhinoceros purchase, lead to the conclusion that this species is not a practical option for the BCA. Black rhinoceros are still relatively scarce and the national management strategy for the species aims to introduce the species into areas which have the potential to sustainably support viable populations of at least 20 animals (Brooks, 1988).

RECOMMENDED ACTION:

i. **Introduce only the following historically indigenous species:**
Eland

Red hartebeest

5. HABITAT AND GAME INTRODUCTION MANAGEMENT IMPLICATIONS

In this section each of the spatial landscape zones, or units, will be discussed in terms of wildlife regarding feasibility for introduction, practicalities of fencing and veld

improvement/rehabilitation requirements. The boundaries of the landscape units to be discussed are shown in Figures 3A - 3G.

5.1 COASTAL DUNE THICKET UNIT

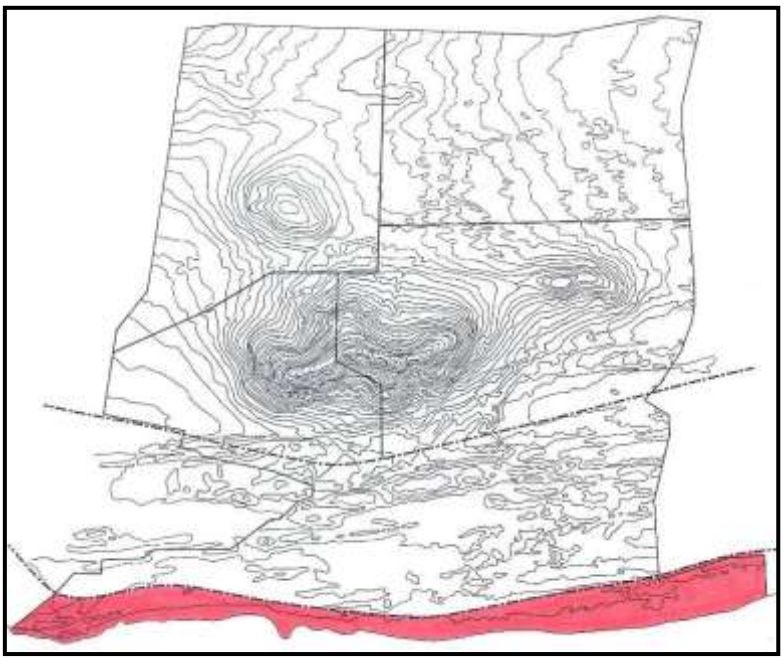


FIGURE 3A: Coastal Dune Thicket Unit.

This unit is bound by the Otto du Plessis road on the eastern side and the seashore on the western side. Vegetation cover varies from sparse dune cover to dense thicket. It will not be practical to introduce any large animals to this area because of its limited size, linear layout and limited sustainable forage for large herbivores. Wildlife habitat management can thus be restricted to the control of alien plants, dune vegetation protection and the rehabilitation of plant cover.

5.2 DUNE THICKET UNIT

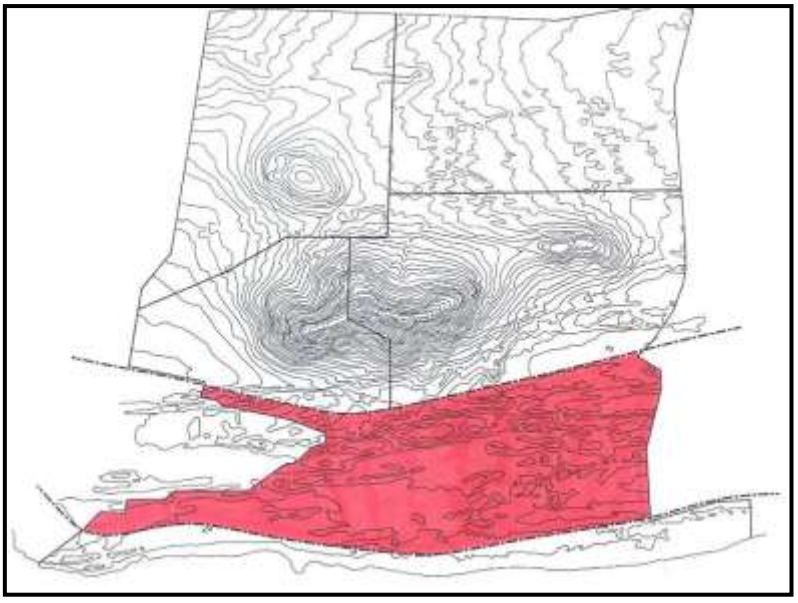
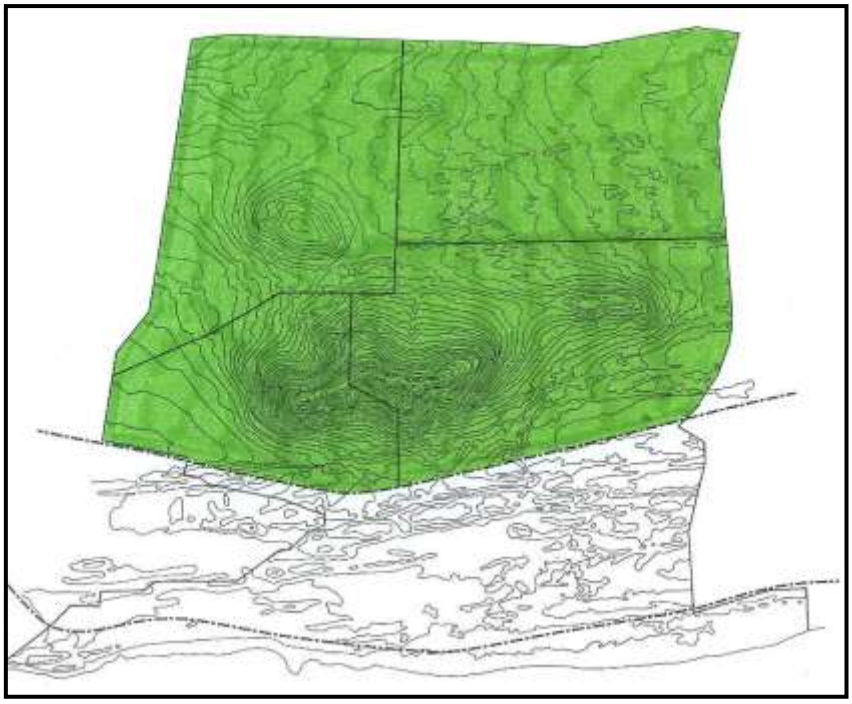


FIGURE 3B: Dune Thicket Unit

This unit consists of excellent coastal thicket with an abundance of palatable browse plants, but little grass. It will not be practical to introduce larger animals into this area because it would necessitate the construction of game fencing along both the coastal Otto du Plessis road as well as the West Coast Road. These fences would be unsightly in the area and unnecessary because the enclosed area would be too small, only 399 Ha, to sustainably support viable groups of either eland or red hartebeest. Connectivity with the Blaauwberg area by means of underpasses or overpasses is also not a practical option due to the topographical difficulties of the area, the number of under/over passes needed and the subsequent need for fencing along the roads. It will not be worth the cumulative cost for the sake of a few large animals.

The best option for this unit is to manage it for vegetation habitat conservation, together with the small indigenous wildlife species which currently occupy the unit.

5.3 ENTIRE AREA EAST OF THE WEST COAST ROAD



<u>FIGURE 3C</u>: Entire area east of West Coast Road: -

Combined game introduction area

This entire area, consisting of Blaauwberg/Kleinberg, Garden Cities and Joyce's Dairy is considered to be a suitable combined unit for the introduction of suitable large antelope. The combined area of 1 321 Ha is a practical option in terms of boundary fencing and will provide sustainable grazing and browsing as well as the space needed for the social requirements of the animals introduced.

The combined area can be easily fenced to contain red hartebeest and eland with the western boundary along the West Coast Road. The combined area will provide diverse habitat conditions for large antelope ranging from renosterveld to dune thicket and artificial pastures to areas cleared of alien tree infestations. As eland tend to roam widely, it will be necessary to fence the entire boundary as shown in Figure 3C.

Each sub-unit of this combined area will be discussed in terms of the specific habitat management implications.

5.3.1 BLAAUWBERG HILL / KLEINBERG UNIT

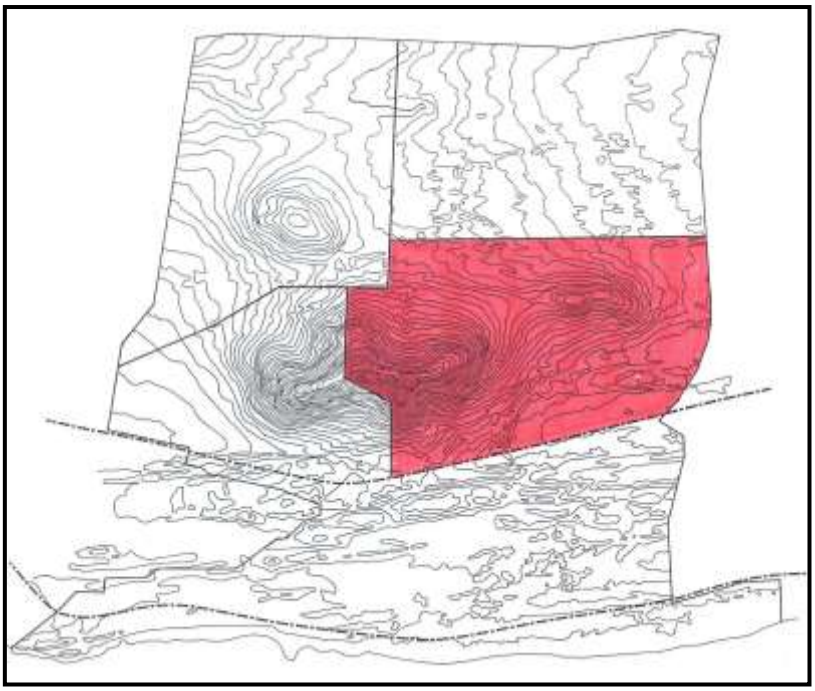


FIGURE 3D: Blaauwberg Hill / Kleinberg Unit

In this unit, alien vegetation control is the main management requirement, followed by the natural rehabilitation of the indigenous vegetation. On the eastern lower slopes of Blaauwberg Hill cleared areas are currently dominated by alien annual grasses. The gradual replacement of the alien grasses with locally indigenous *Ehrharta calycina, Tribolium hispidum* and *Cynodon dactylon* will help to improve the sustainability of the grass for grazing and should be tested on a trial basis.

This unit includes a portion of the dune thicket habitat with its wealth of palatable browse shrubs and which also features the dune trough areas which could potentially support indigenous (palatable) rather than the current (unpalatable) alien annual grasses.

5.3.2 GARDEN CITIES UNIT

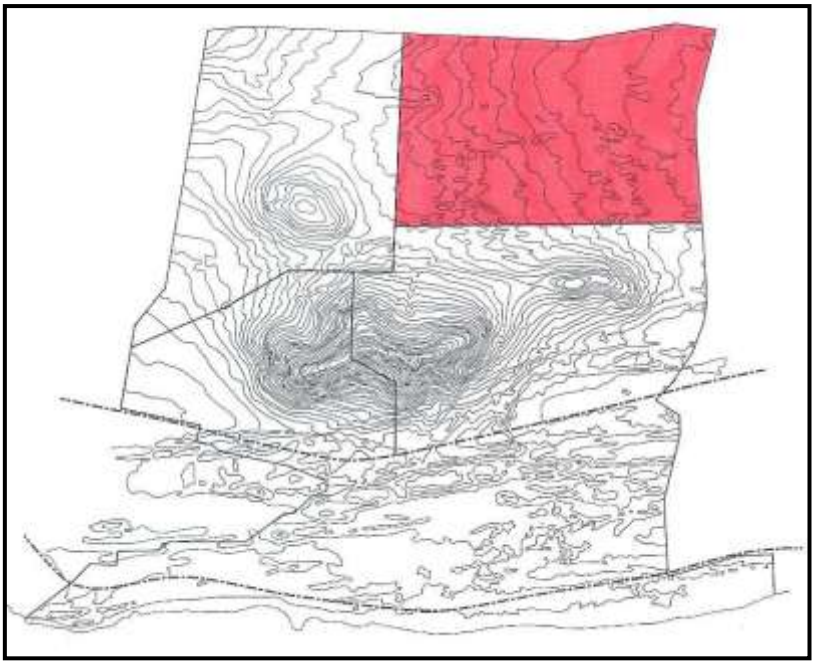


FIGURE 3E: Garden Cities Unit

Although this area is mostly invaded by Port Jackson, it will be possible to create a linked network of open grassy areas which will provide suitable habitat for introduced wildlife. Within the dense Port Jackson thickets, there is little left of the natural vegetation cover except for the north-eastern part where sand plain fynbos still persists in a relatively intact state, despite the infestation.

Over the rest of the unit, most of the natural vegetation occurs in numerous cleared areas (eg: Fountain) on open dune ridges and at the Blaauwberg vlei and associated wetland area. By keeping these areas clear of alien re-infestation and opening up cleared linkages between them, it will be possible to improve habitat for introduced wildlife. (See Plate 16).

PLATE 16: Open, sandy ridges and grassy patches in the dense Port Jackson thicket of Garden Cities could be enlarged and linked.

Once the patches and linkages are cleared, indigenous grass like *Chaetobromus dregeanus, Ehrharta calycina* and *Cynodon dactylon* can be established within the open patches in protected, brush-packed sites.

Introduced eland and red hartebeest can be attracted to the area by the provision of permanent water. (See Section 6.3).

Their presence in the area will help to develop the indigenous grass cover through concentrated grazing and the abundant seed of *Rhus* spp bushes will be spread throughout the area in eland dung. Research has shown that seeds that have passed through eland are more likely to germinate where deposited, which is exactly what is needed in the cleared rehabilitation areas of the BCA. (See Plate 17).

PLATE 17: Abundant berries (with seed) on an Rhus bush just waiting for

browsing eland to disperse in their dung.

5.3.3 JOYCE' S DAIRY UNIT 1

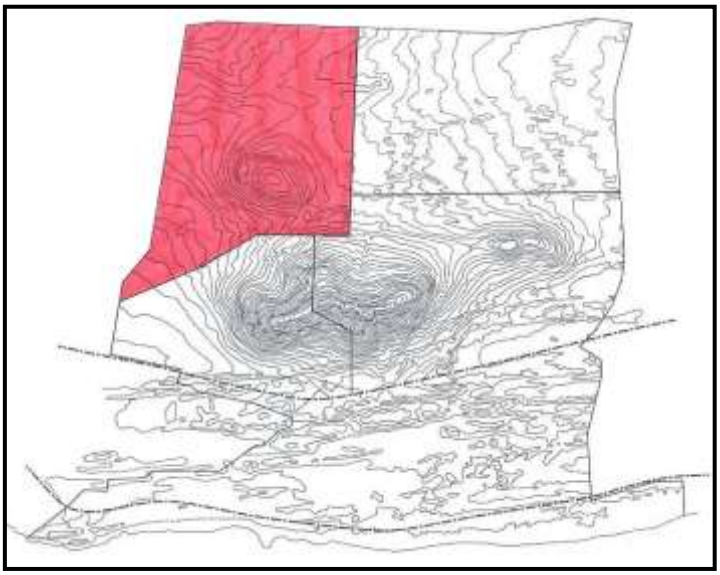


FIGURE 3F: Joyce's Dairy Unit 1

A significant part of this area on good shale soils has been transformed through cultivation and pasture establishment. These pastures can be partly retained and managed for the maintenance of large antelope grazing. (See Figure 3G). The pastures can be over-seeded with locally indigenous palatable grasses (*Ehrharta, Chaetobromus, Cynodon*). Parts of the transformed area could be naturally rehabilitated to renosterveld, creating a patch mosaic of natural veld and open productive pastures, rather than the current ploughed area "look". These pasture areas also represent the ideal locality for animal watering points as they are already disturbed, and they will also be good sites to view the animals when the need arises. The active establishment of fast-growing *Rhus* bushclumps within this patchy renosterveld/pasture mosaic will further improve opportunities for browsing, as well as and the visual appeal of the area.

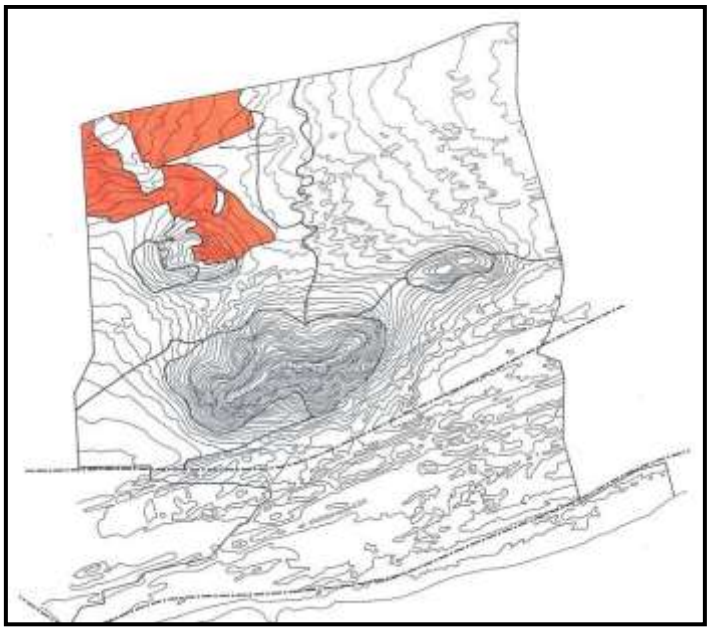


FIGURE 3G: The transformed pasture area that can be retained for grazing.

5.3.4 JOYCE' S DAIRY UNIT 2

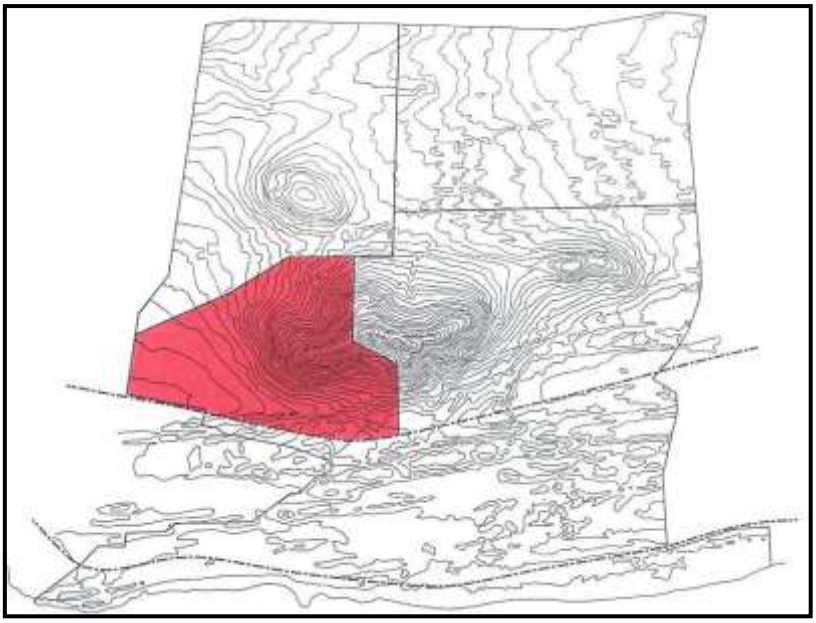


FIGURE 3H: Joyce's Dairy Unit 2

A large portion of this unit has also been transformed for crops or pastures, but the greatest value of this area lies in the northern half of the Blaauwberg with its valuable renosterveld vegetation.

As with other disturbed parts of the BCA, alien annual grasses proliferate. In this unit, the entire transformed area should be rehabilitated back "towards" renosterveld and no areas of pasture grazing need to be specifically managed for grazing as is the case with Joyce's Dairy Unit 1.

The establishment of locally indigenous grasses should be a part of the renosterveld rehabilitation process in this unit.

RECOMMENDED ACTIONS:

ii) Use only the combined area east of the West Coast Road for game introduction.

iii) Fence the entire combined area east of the West Coast Road to contain eland.

iv) Institute a programme of indigenous grass establishment to replace alien annual grasses.

v) Rehabilitate cleared, grassed and wetland areas in the Garden Cities area to create a system of linked open grassland. Sow indigenous grasses and establish indigenous bushclumps.

vi) Establish waterholes for wildlife.

6. WILDLIFE MANAGEMENT

6.1 GUIDELINES FOR ANIMAL NUMBERS

It is currently very difficult to estimate the potential for animal numbers for the BCA because it is not yet known exactly which areas will finally be included within the BCA and come under BCA management. In terms of large antelope introduction, two possible scenarios for the area east of the West Coast Road are examined and they are:

a) The entire area east of the West Coast Road including Garden Cities and both parts of Joyce's Dairy. (Total: 1 320,96 Ha).

b) Only the municipal and state-owned area. (Total: 399 Ha).

(See Figures 4A & 4B).

If the Garden Cities and Joyce's Dairy areas do not contractually become part of the BCA, the latter scenario (only municipal and state-owned land east of the West Coast Road) which is an area of only ±399 Ha, will be too small for the introduction of large antelope. The total combined area of 1 320,16 Ha represents the minimum practical introduction area because it contains the potential for improved grazing development on the old lands of Joyce's Dairy.

If the second scenario (399 Ha), for some reason is all that will be available, the area can support the introduction of grey rhebok, but not eland or red hartebeest. If the entire first scenario (1 321 Ha) area becomes available, all three species can be introduced, but it is important that the recommended veld improvement actions be implemented to help ensure a sustainable forage base during the dry summers.

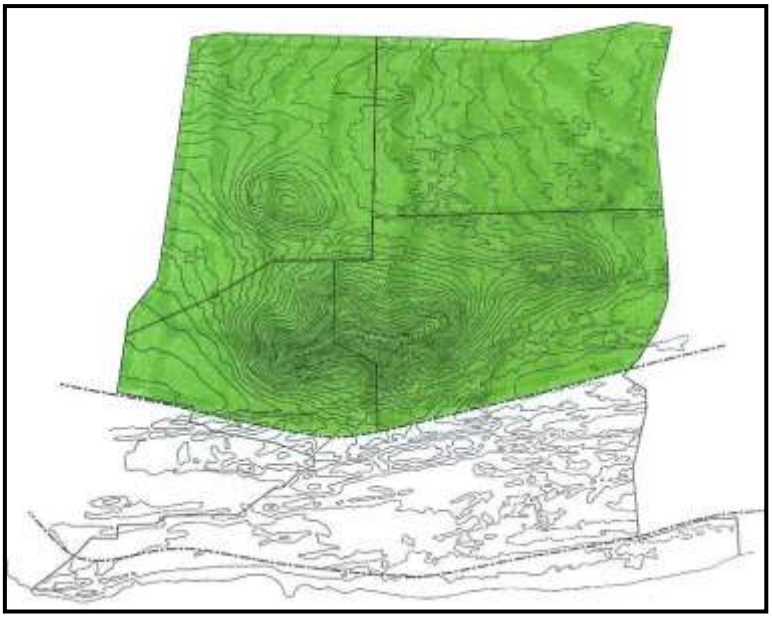


FIGURE 4A: Scenario 1 introduction area: Combined private land and state/municipal area - 1 321 Ha.

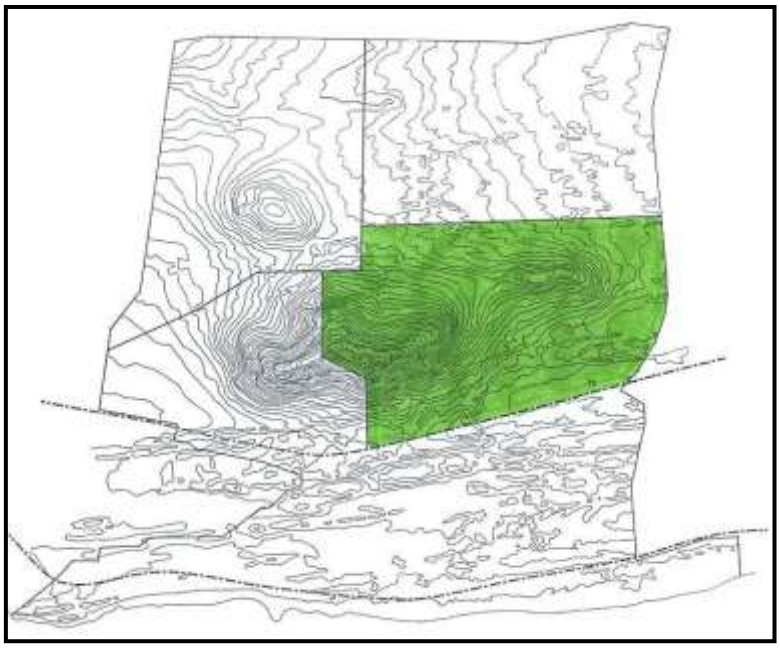


FIGURE 4B: Scenario 2 introduction area: Combined municipal and state-owned land - 300 Ha.

Table 5 shows the broadly estimated availability of grazing and browsing in the BCA game introduction area. The table shows that there is currently a shortfall of sustainable grazing. This is the reason for the recommendation that the pasture areas on Joyce's Dairy be retained and managed for grazing, and that the Garden Cities open areas be rehabilitated.

SPECIES	ESTIMATED % OF GRAZING IN THE DIET	ESTIMATED SUSTAINABLE AVAILABILITY OF GRAZING IN THE TOTAL BCA FORAGE	ESTIMATED % OF BROWSING IN THE DIET	ESTIMATED SUSTAINABILITY OF BROWSING IN THE TOTAL BCA FORAGE
Eland	40%	20%	60%	60%
Red hartebeest	90%		10%	

TABLE 5: Estimated current availability of sustainable grazing and browsing in the game introduction area.

The overall ecological capacity of the BCA for large herbivores is relatively low. Official estimates for the area are unreliable and are not really applicable to wild herbivores. Using the nature conservation objectives of the BCA as a general guide, it is preliminarily recommended that the stocking rate should not exceed 66 Ha/Large Animal Unit (LAU) and that a more moderate rate of 73 Ha/LAU be used as a guide initially. This estimate relates only to the eland and red hartebeest. (Guidelines for grey rhebok follow).

In Table 6, the LAU, conversion and recommended number of eland and red hartebeest is shown.

SPECIES	ESTIMATED LAU AVAILABLE (PRELIMINARY) ▪	ANIMALS PER LAU *	TOTAL NUMBER

Eland	14	0,98	13,72 (14)
Red hartebeest	4	2,69	10,76 (11)

- LAU availability is largely based on the successful implementation of the recommended grazing improvements.

* Bothma (2002)

TABLE 6: Large Animal Units (LAU), conversion rate into equivalent game units and estimated numbers for introduction.

The numbers of grey rhebok should be estimated in terms of their spatial habitat requirements rather than by means of a comparison to LAU.

A total of 476 Ha, centered on the hills and cultivated pasture areas of the game introduction area is estimated to represent suitable grey rhebok habitat. With an average requirement of 30 - 160 Ha home range (wet season to dry season) variability, it follows that the maximum of 160 Ha can be loosely used as the total requirement per grey rhebok family group of 3 - 8 animals (average of 5).

The 476 Ha area of suitable habitat, can thus contain approximately 3 family groups (476 ÷ 160 = 2,975) with an average of 5 animals per group.

This is a purposefully conservative estimate considering Furstenburg's (2004) recommendation of ±8 Ha per animal for optimal habitat.

The densities of the other small selective browsers (common duiker, steenbok and grysbok) have not been specifically considered. These antelope have self-regulating populations which match habitat availability and condition. It is considered unlikely that the introduction of grey rhebok will have any negative impact on these species due to niche separation and the relative abundance of thicket/fynbos/renosterveld browse. No competition is expected from introduced eland or hartebeest either.

It must be appreciated that the proposed carrying capacities are ***a very rough estimate*** of what the vegetation can carry. The use of agricultural large stock units, and the

conversion of these into equivalent game units, should only be seen as a very rough guide to work on and by no means as an accurate prescription. Converting a stock unit into equivalent wild herbivore units in terms of biomass does not, for example, take into account the differences in degree of selection between the two herbivore types (Mentis, 1977).

Current consensus regarding the use of agricultural LAU conversions for calculating game stocking rates is that a more conservative approach should be used than the agricultural norms. This is because domestic stock systems consist of easily managed animals that can be rotated through multi-camp systems where grazing pressure and intensity can be manipulated and controlled. This is not easily achieved on a nature reserve (Grossman et al, 1999). This is the reason why the stocking rate for wildlife must be calculated per feeding class and habitat unit available. There is a need to be conservative as well, because grazing capacity is almost always over-estimated.

In the case of browser stocking rates, an observable browse-line or animal die-off generally happens before any permanent damage to the vegetation occurs. Veld management and assessment for most browser species is thus not as complex as is the case with grazers (Grossman et al, 1999).

The proposals made should thus be seen as an initial guide which can later be adjusted with the help of monitoring and a first hand knowledge of the observable impacts that the adjusted wildlife stocking rate will have on the vegetation, both positive and negative.

6.2 GUIDELINES FOR INTRODUCTION

Antelope should not be introduced in numbers below the minimum social norms for the species.

Table 7 lists the minimum introduction groups and suggested sex and age ratios per species. Animals should be introduced during the winter months (lower temperatures help to reduce the stresses of capture and transport). It is critical that grey rhebok are captured and introduced in established family groups.

SPECIES	MINIMUM GROUP SIZE	RECOMMENDED GROUP SIZE	AGE AND SEX COMPOSITION PER GROUP

Eland	8	12	1 adult ♂, 2 subadult ♂, 9 adult/subadult ♀ or 5 cows with calves
Red hartebeest	8	11	1 adult ♂, 2 subadult ♂, 8 adult/subadult ♀ or 4 cows with calves
Grey rhebok	2 groups of 5	3 groups of 5	1 adult ♂, 4 adult/subadult ♀ per group

TABLE 7: Minimum group size for introduction and recommended composition per group.

General considerations for introduction:

- Offload animals in suitable habitat.
- Do not offload anywhere near fences.
- Offload animals near to water.
- It is not necessary to hold animals after offloading, unless treatment of some kind is necessary.
- Leave animals undisturbed to settle.

POPULATION CONTROL

It is critical that the population numbers of eland and red hartebeest are timeously controlled. Population number estimates need to be finalised before the onset of winter, at the end of the calving period, which will probably be from October to February. Excess animals can then be removed during the following winter.

In small populations, it is practical to remove large ungulates every alternate year rather than yearly. The population can build up for 2 years after which the excess can be removed.

The number to reduce each population by depends on the rate of population growth and also the veld conditions, which must be determined annually by means of the recommended monitoring programme.

As a preliminary guide, each population can be reduced to the level recommended in Table 6 (eland 14 and red hartebeest 11) every two years.

This can be reviewed when more information becomes available about the performance of the populations and their observed impact on the vegetation.

RECOMMENDED ACTIONS:

viii) If the combined game introduction area does not materialize, restrict introductions to grey rhebok.

ix) Use 73 Ha (LAU as a preliminary guide to the large ungulate stocking rate. This relates to populations of 14 eland and 11 red hartebeest.

x) Use spatial requirements for grey rhebok. This relates to 3 family groups of 5 animals each (15).

6.3 GUIDELINES FOR WATER PROVISION

6.3.1 SPREAD OF WATER

The small wildlife (common duiker, steenbok, grysbok) of the BCA are mostly water-independent, deriving their water requirements from their browse and dew. Grey rhebok are also water-independent.

Eland are capable of surviving without water, but will use water when it is available and red hartebeest are water-dependent.

It will thus be necessary to provide water for wildlife and this necessity can be used to attract and keep larger animals in areas of higher grazing availability. It is thus recommended that water be provided in the lower lying grazing/rehabilitation areas rather than in the hill areas. Figure 5 illustrates a suggested water provision distribution.

The water provision programme on the BCA (game area) should be developed according to the following principles:

- Water should be provided in areas of low habitat/vegetation sensitivity.
- Most water requirements can be derived from harvested rainwater with adequate long-term storage capacity.
- The habitat around water provision points should be monitored to detect for possible negative animal impact (ie: development of piospheres).
- It should be possible to temporarily close down each water supply point in order to rotate the use of and impact on watering sites.
- Vlei and natural fountain areas should be further rehabilitated through to additional removal of thirsty alien trees in the vicinity and minimal clearing of reeds/rushes in the depression (to make water accessible).

An important consideration with the provision of drinking water for wildlife is the grazing and browsing pressure that the animals exert on the vegetation closest to the water point. Collinson (1985) reported that providing a widespread and even coverage of artificial water supply throughout an area resulted in a more widespread and heavy over-utilization of the vegetation close to water by water-dependent herbivore species. Similarly, Landsberg et al (1997) found that vegetation and animal diversity decreased the closer one got to artificial water points, also as a result of over-utilization of the vegetation closest to water by water-dependent stock and wildlife.

It is proposed that the vegetation cover at important water points be monitored at varying distances from the water on an annual basis. A simple monitoring technique can be devised and can be implemented by *Conservation Management Services* or reserve management staff. A combination of photographs and a simple, specially designed questionnaire should suffice. This monitoring will help to determine whether any form of water point rotation is required. Timely implementation of this monitoring could help to detect undesirable veld degradation and loss of valuable grazing.

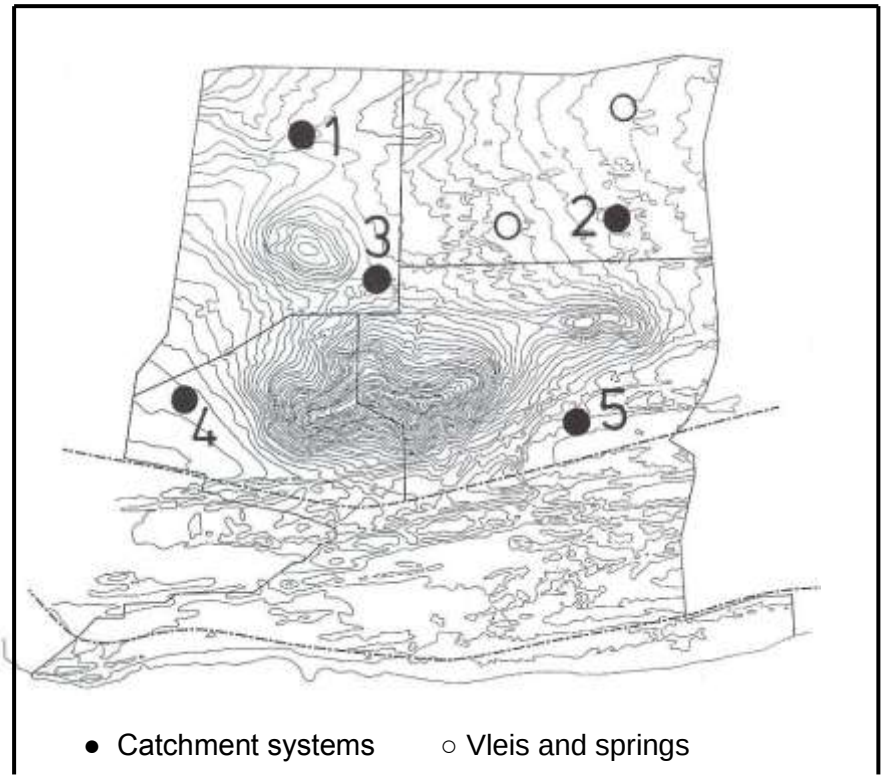


FIGURE 5: Water provision distribution

6.3.2 RAINWATER HARVESTING AND STORAGE

Rainwater "catchments" can be put up at each suggested water provision sites (Figure 5). These installations are completely reliable if the water storage capacity is adequate. They are a cost-effective alternative to drilling for and pumping water or the laying of water pipes to remote sites.

The construction consists of a specially made “roof” fixed to an inexpensive pole and wooden beam support frame. (See Figure 6). The height above ground is not important, but longer poles do cost more. This method is particularly adaptable, as the harvesting surface can consist of corrugated iron or aluminum roofing sheets, plastic or fibre-glass roofing sheets or even metal sheets made from the flattened out plate of 200 ℓ oil drums. The condition of the surface material is not critical, as long as most of the water finds its way into the storage tanks. Costs can be cut by making use of scrap or second-hand materials. A relatively cheap alternative to new materials, is to make the sloping roof with old board, planking or even closely spaced poles, and then covering the surface with plastic sheeting. The central catchment gutter can consist of ordinary house gutters made of galvanized plate, fibre cement or plastic. It must be borne in mind, however, that the structure must be robust enough to withstand the mischievous attentions of passing vandals, and in some areas, playful but destructive baboons.

Table 8 shows what the rain water collection rate can be per 100 m².

SINGLE RAINFALL EVENT	RATE OF WATER COLLECTION	TOTAL LITERS WATER STORED
10 mm	10 ℓ/m²	1 000 ℓ
30 mm	30 ℓ/m²	3 000 ℓ
50 mm	50 ℓ/m²	5 000 ℓ
70 mm	70 ℓ/m²	7 000 ℓ
100 mm	100 ℓ/m²	10 000 ℓ

TABLE 8: Rainwater collection rate on a 10 m x 10 m surface (100 m²) per rainfall event.

It is recommended that at least 4 x 10 000 liter plastic storage tanks be installed at each of the catchment sites. (The potential water collected with 400 mm of rain per year is 40 000 liters on 100 m² surface).

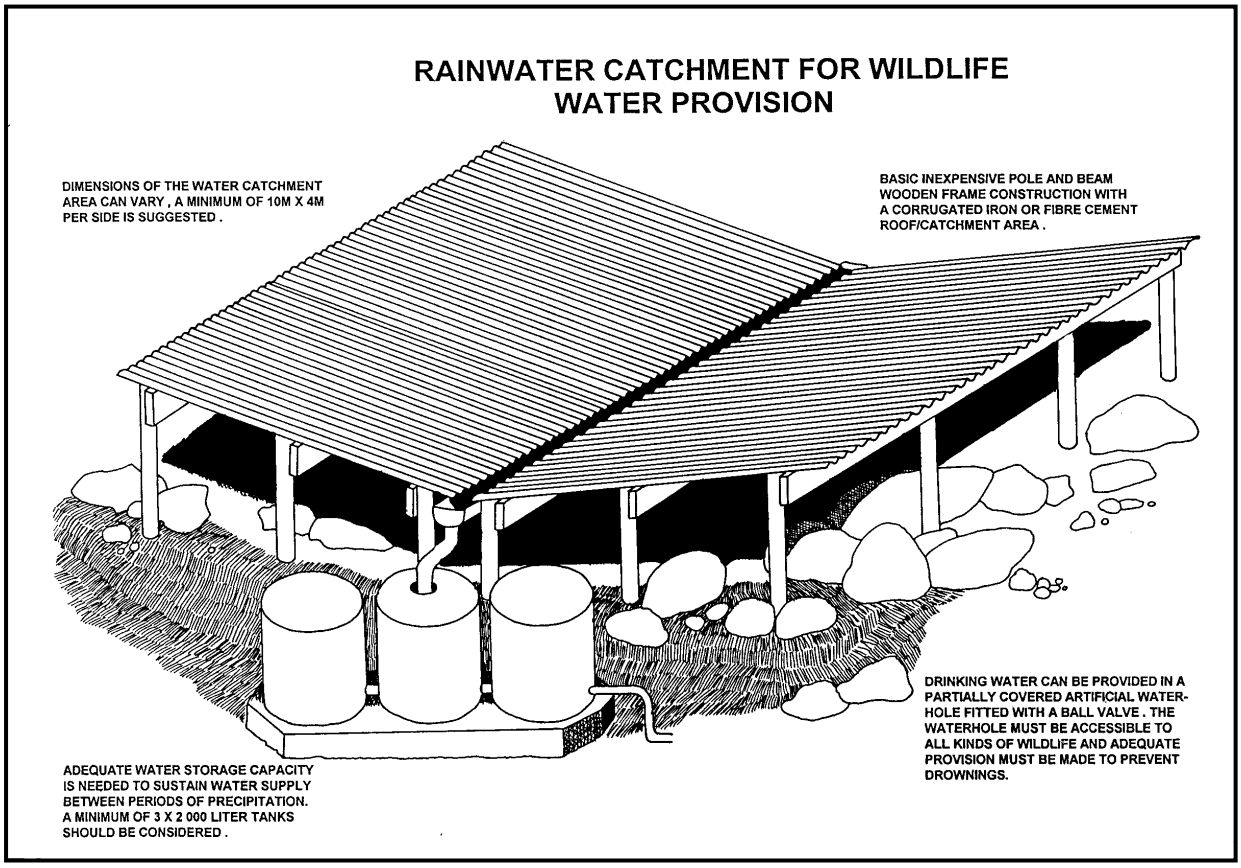


FIGURE 6

6.3.3 WATER PROVISION

Water can be provided in a constructed waterhole as illustrated in Figure 7. Eland and red hartebeest herds will be small in the BCA, so a waterhole of ±3 m - 4 m diameter will be sufficient. The small wildlife consideration in the illustrated design is important (ie: shallow area, sloping sides, etc). The control of water flow into the waterhole is provided by a ball valve, which must also be suitably protected to avoid malfunction die to animal damage.

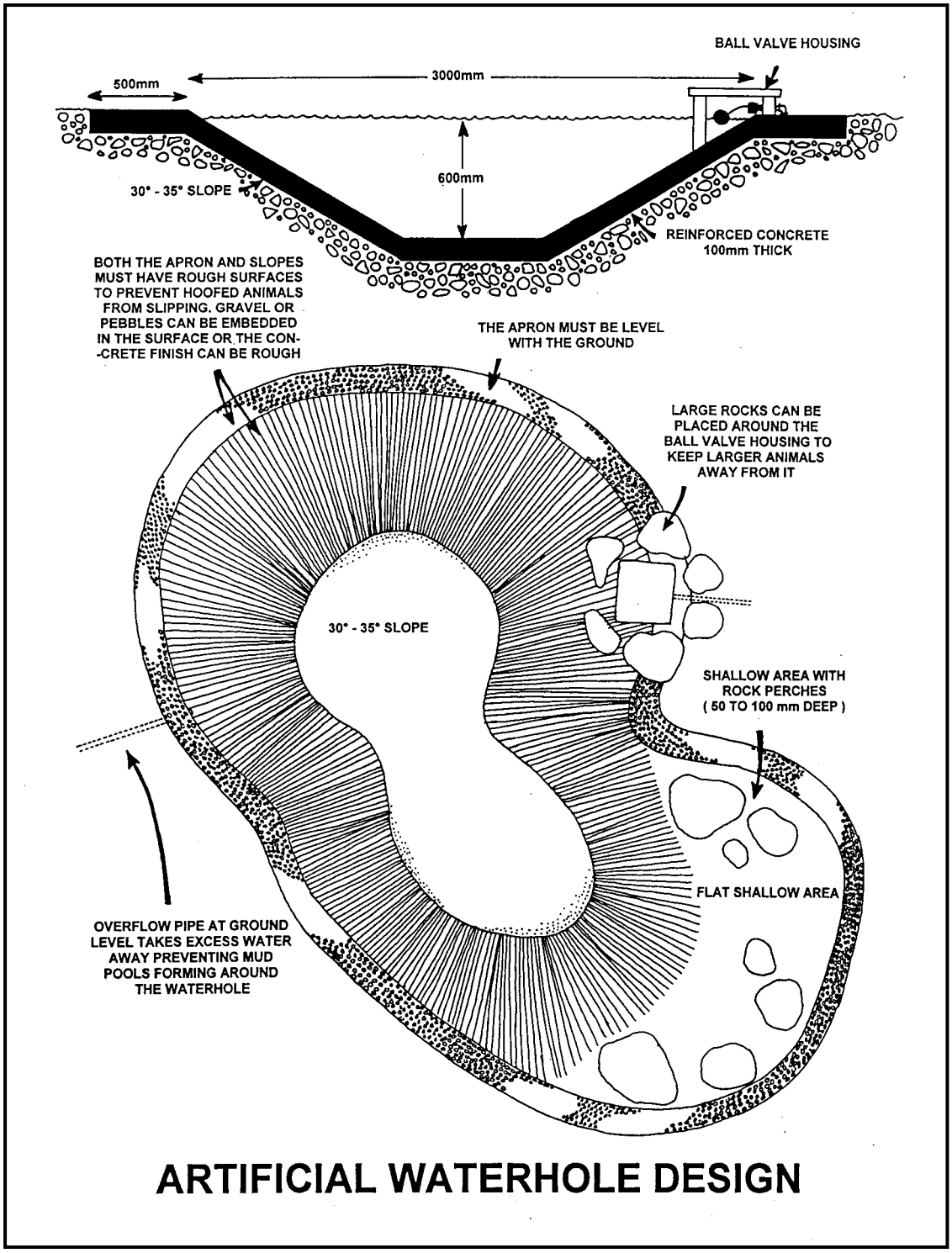


FIGURE 7

RECOMMENDED ACTIONS:

xiii) Provide water at the indicated localities.

xiv) Install rainwater harvesting systems, each with a 40 000 liter storage capacity.

6.4 MONITORING

6.4.1 WILDLIFE RECORDS AND CENSUS

A. RECORDING WILDLIFE OBSERVATIONS

Staff can play an important role in the collection of biological information on the reserve. This will help to encourage participation and learning about the natural character of the area.

The simple recording system proposed can be used for all wildlife, not only game species. It can be used to record sign and observations of animals like the African wildcat, caracal, porcupines, hares, baboons and all other wildlife species on the reserve.

As with all forms of collected information, observations will only be of value if accurately recorded according to a standard format. This is particularly important when a number of different observers contribute. Similarly, there must be consensus regarding place or locality names or locality identification.

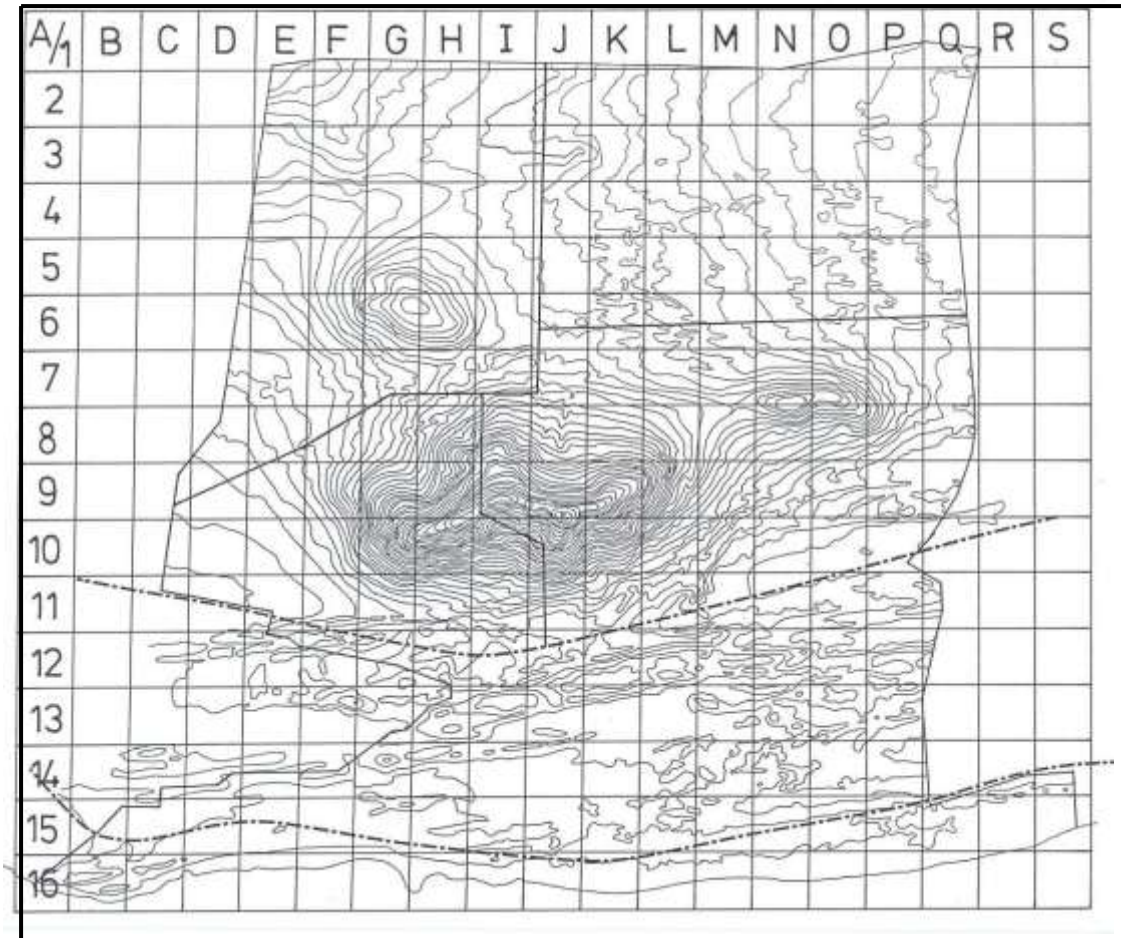
Casual observation record forms must be simple to use and analyse. Recording an observation should simply consist of one line on a form. The important aspects of each observation are the date, species, number and locality. Any other information such as ages, sex ratio and calves or lambs would be useful if not essential. Each observer simply has his own set of forms which he or she fills in on a regular basis. The best would be to fill the form in while still in the veld. The forms can be kept on a clipboard in each vehicle and filed in the office when completed in preparation for later analysis of the information.

GRID CELL METHOD FOR RECORDING OBSERVATION LOCALITIES: If a GPS is not available, this system offers versatility and is also very easy to use. It involves a grid of blocks drawn on a map of the reserve. The blocks are identified with an alpha-numeric system consisting of rows of blocks numbered along the side row and lettered along the top row. (See Figure 8A).

One simply locates the position where animals were observed on the map and then identifies the block by reading the corresponding letter vertically and corresponding number horizontally. The Blaauwberg vlei locality is thus expressed as 02.

Figure 8A illustrates a grid cell system that is suitable for field observation recording on the reserve. The real beauty of this simple system is that blocks can be coloured in to illustrate the general distribution of a certain species for a specific time period. One can also correlate this with vegetation types to see which species spend most of their time in which vegetation types.

Each group of observers thus needs only a base grid map (Figure 8A), preferably laminated in plastic, and a pile of observation record forms on a lever arch file in the office, and forms on a clipboard in each vehicle.



Grid block size: 320 m x 320 m
= 102 400 m²
÷ 10 000 m²
= 10,24 Ha/block

FIGURE 8A: Alpha-numeric grid for observation locality recording.

The advantages of using this grid cell system are many and they include:

- Increased accuracy for locality of observations. (10 ha per grid block).
- It is simple to use a map to locate observations. Data can be correlated to vegetation types, burnt areas, alien vegetation, etc.
- The grid cell blocks can be coloured in to illustrate the general habitat preference of each of the wildlife species.
- The grid cell can be used to identify localities for a host of other aspects like rare plants, animal kills, erosion, weeds, nests and many more.
- It is an easy system that can be used by all field staff.

It is important to note that this system for recording observations can be given to any of the staff or visitors to the area if they show interest in making observations and keeping records – however trivial they may seem. If well administered, this data base could build up into something and of great interest that is also really useful.

It is, however, very important that the collected data be analysed and used, it will be of little use if information is collected, but never referred to or used. It is suggested that the collected information be analysed annually and that a brief summary / report then be filed for future reference. This analysis can be done by any interested person, possibly in conjunction with Conservation Management Services.

The following example illustrates a standard casual wildlife observation recording form that can easily be implemented on the reserve.

BLAAUWBERG CONSERVATION AREA:
CASUAL OBSERVATION RECORD SHEET

SPECIES	DATE	LOCALITY	NUMBER	SEXES	YOUNG	NOTES

B. WILDLIFE REGISTER

Without accurate records of the history and growth of the large game population numbers, it will be difficult to manage populations effectively, which may result in ill-advised plans for removals or uncontrolled population expansion. It is thus proposed that a game register be kept in which the known births, deaths, removals and introductions per species are recorded. This is particularly important immediately after the introduction of animals, in order to keep a record of their progress and thereafter to keep track of population growth.

A simple recording form can be used. An example is illustrated below. Each time a birth, death, removal or introduction is made, an entry is made on the form and the population total adjusted accordingly. A separate form is used for each species.

BLAAUWBERG CONSERVATION AREA

WILDLIFE REGISTER

SPECIES: **YEAR:**

Date	Births	Deaths	Number Removed	Number Introduced	Total 1.2.1.1.1.1	NOTES
TOTALS						

A simple register that can be used to keep basic records of game populations.

C. GAME CENSUS

A complete population estimate, or census, should be done annually and preferably at the same time every year.

The choice of which method to use will depend on a number of factors:

Available resources – counters on foot, helicopters, horses, etc.

Size of the area to be censussed.

Nature of the terrain – determines accessibility.

Vegetation structure – determines visibility.

Type of game to be censussed.

Generally, a suitable census technique has to be designed for each different situation. The most widely used techniques are total ground counts on foot, sample ground counts on foot, sample aerial counts by helicopter and total aerial counts by helicopter.

For the purpose of generally keeping track of eland and red hartebeest numbers, it is suggested that the most practical method to use will be the *known group method*.

This technique can be applied by the manager and his field staff who should have an intimate knowledge of the reserve and the groups of animals on it. It works well on highly visible species living in open, or very predictable, habitat and localities and that congregate in large groups. Groups are located and counted over a short period – usually a morning or afternoon, and preferably not more than a day. A systematic coverage of the whole reserve is not attempted; the manager merely goes to all the localities that he knows the herds frequent (usually in a vehicle), and notes the locality and size of each group seen. Trained game guards can also be used to count areas not easily accessible by vehicle. The total count is calculated by adding all the known groups. Because of the possibility that one or more groups may have moved into an area they do not usually visit, and therefore been missed, it is worth repeating the count at least once. The count can also be compared to the general game observation records, and groups will be recognised by their size, composition and certain characteristics of one or more members, eg, broken horns, scars, etc.

Game census work can be done during February, when most species have completed calving and lambing, but before they start rutting and breeding.

The populations of shy or widespread species like grey rhebok, duiker, steenbok and grysbok can be roughly estimated, based on field observations made throughout the year. More accurate population estimates of these species will have to be based on more intensive census techniques like transect counts.

RECOMMENDED ACTIONS:

xvii) Establish a wildlife recording system.

6.4.2 MONITORING VEGETATION TO ASSESS HERBIVORE IMPACT

Monitoring can be described as the regular, repeatable measurement of the condition of the veld and climate and the evaluation of these measurements in terms of management objectives. The results of the monitoring programme will thus be useful, if not essential, in making decisions about veld conditions and the wildlife that is dependent on the veld (eg: off-take numbers can be based on veld condition assessments). The real advantage in the use of a fixed, objective monitoring system is that it eliminates subjective, unsubstantiated opinions about veld condition, because it is based on proven practical methods.

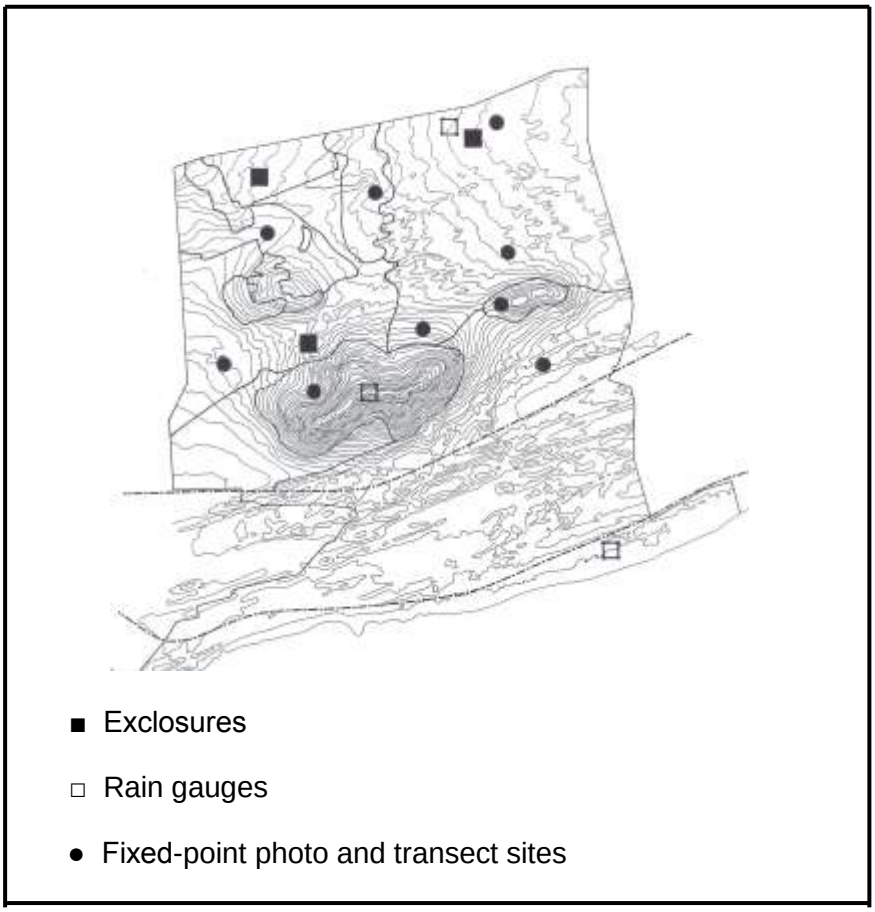
Habitat quality should be evaluated at least on an annual basis, because an estimate of wildlife carrying capacity is dependent on a knowledge of the condition of the habitats of the wildlife species. We also need to know whether the management efforts employed for veld improvement (eg: rehabilitation, alien plant clearing) are effective in the long term. ***Monitoring is especially critical on properties like the BCA and where regular coverage of all parts of the reserve is not practical.***

The monitoring programme suggested here is the basic minimum required for effective veld evaluation on a reserve and can be implemented by persons with little or no scientific training, with some professional guidance. It is, however, very important that the monitoring programme be applied with accuracy and precision

(accuracy = true value and precision = comparable information). The suggested methods are accordingly designed and described.

Monitoring methods for detecting animal impact on vegetation preferably need to be established before introductions of larger game are made. It is, however, difficult to predict where animals will spend most of their time foraging. A minimum spread of monitoring sites is initially suggested and further sites can be selected when introduced animals indicate which areas are favoured for foraging.

The following monitoring methods are suggested as the minimum for the assessment and evaluation of veld condition and change on the BCA and the suggested localities for preliminary monitoring sites are marked in Figure 8B.



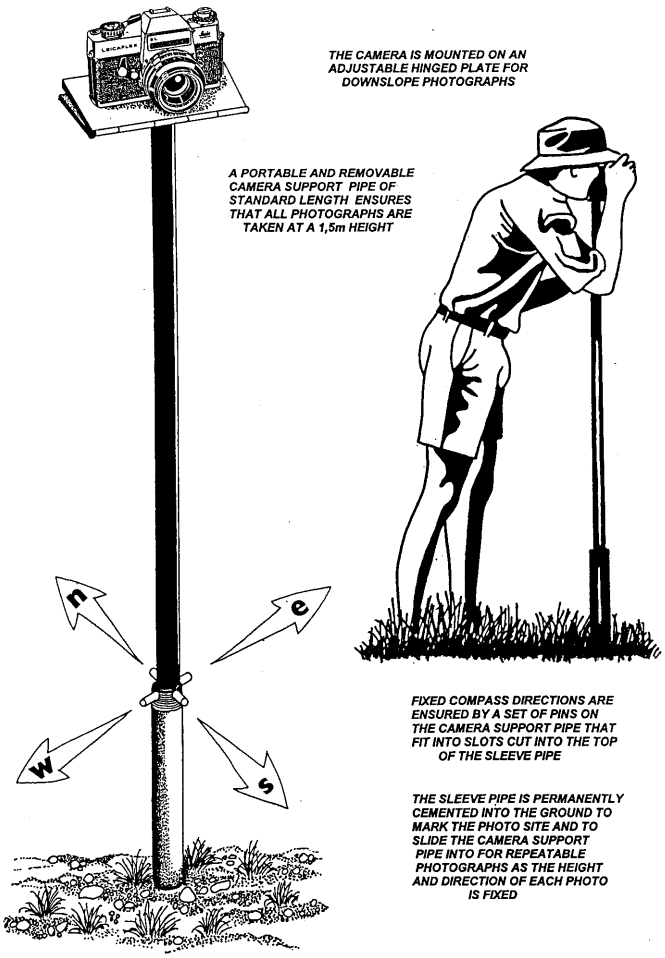
<u>FIGURE 8B</u>: Habitat monitoring sites.

a) FIXED POINT PHOTOGRAPHIC MONITORING:

It is proposed that a system of vegetation monitoring points be established at which a photographic record of the vegetation around that point can be made and at which plant species and their density are regularly recorded.

The network of photographic monitoring points will provide the reserve manager with a comparative record, which can be consulted annually for an objective indication of veld condition and trends over time. The monitoring technique is simple to implement and is inexpensive to establish. See Figure 8C for a description of the fixed point photographic monitoring system. The system of 10 short, capped pipes and 1 camera stand costs approximately R1 000 if professionally made. Alternatively, the system can be made up by any competent field handyman.

A record sheet containing information about the type of vegetation cover, species checklist and utilization by herbivores must be completed per photo site, as well as a soil erosion condition record sheet. (Examples of the record sheets follow the figure). This vital information is then used later, together with the photographs to compare condition of the site from one period of monitoring to the next.



FIXED POINT INSTALLATION FOR PHOTOGRAPHIC MONITORING

FIGURE 8C

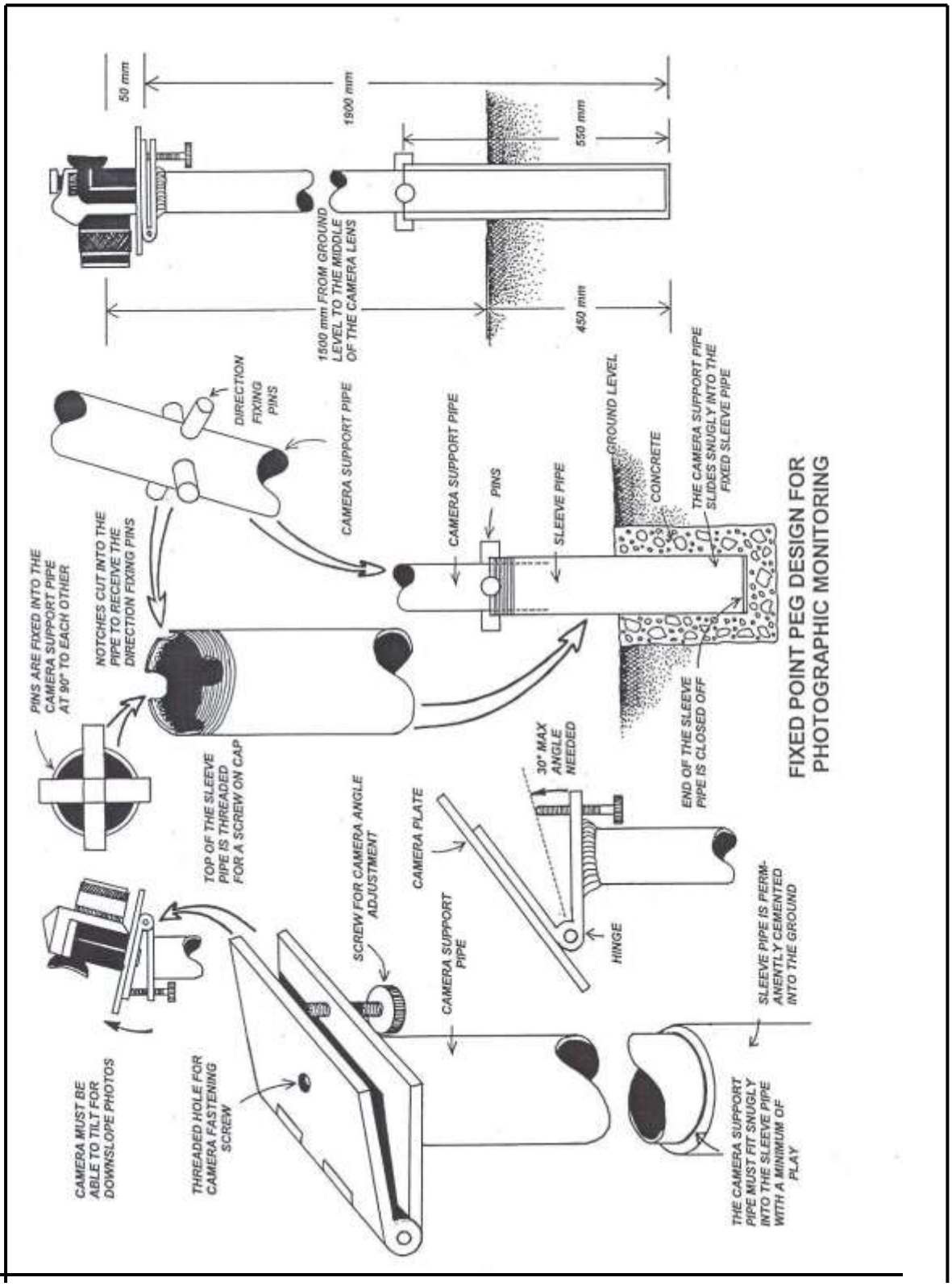

FIXED POINT PEG DESIGN FOR PHOTOGRAPHIC MONITORING
50 mm
1900 mm
550 mm
450 mm
1500 mm FROM GROUND LEVEL TO THE MIDDLE OF THE CAMERA LENS
DIRECTION FIXING PINS
CAMERA SUPPORT PIPE
PINS
SLEEVE PIPE
GROUND LEVEL
CONCRETE
THE CAMERA SUPPORT PIPE SLIDES SNUGLY INTO THE FIXED SLEEVE PIPE
PINS ARE FIXED INTO THE CAMERA SUPPORT PIPE AT 90° TO EACH OTHER
NOTCHES CUT INTO THE PIPE TO RECEIVE THE DIRECTION FIXING PINS
TOP OF THE SLEEVE PIPE IS THREADED FOR A SCREW ON CAP
END OF THE SLEEVE PIPE IS CLOSED OFF
30° MAX ANGLE NEEDED
CAMERA PLATE
SCREW FOR CAMERA ANGLE ADJUSTMENT
CAMERA SUPPORT PIPE
HINGE
SLEEVE PIPE IS PERMANENTLY CEMENTED INTO THE GROUND
CAMERA MUST BE ABLE TO TILT FOR DOWNSLOPE PHOTOS
THREADED HOLE FOR CAMERA FASTENING SCREW
THE CAMERA SUPPORT PIPE MUST FIT SNUGLY INTO THE SLEEVE PIPE WITH A MINIMUM OF PLAY

FIGURE 8C

b) EXCLOSURES:

It is suggested that at least one exclusion plot be established in each of the major habitat types. These plots will need to be fenced at 1,4 m height to keep all herbivores out and must be mesh enclosed and rock-packed or buried along the ground. The plots need be no larger than 15m x 15m. (See Figure 8D). It is preliminarily suggested that the plots be established in the vicinity of water points. Excluding grazing animals will show what the short term utilization impact on the vegetation actually is, as it is something that is not always easy to observe if the entire area is heavily utilized. Exclosures also help to assess veld recovery progress in the absence of utilization. An unfenced control plot, the same size, should be marked out alongside the exclosure for comparison purposes.

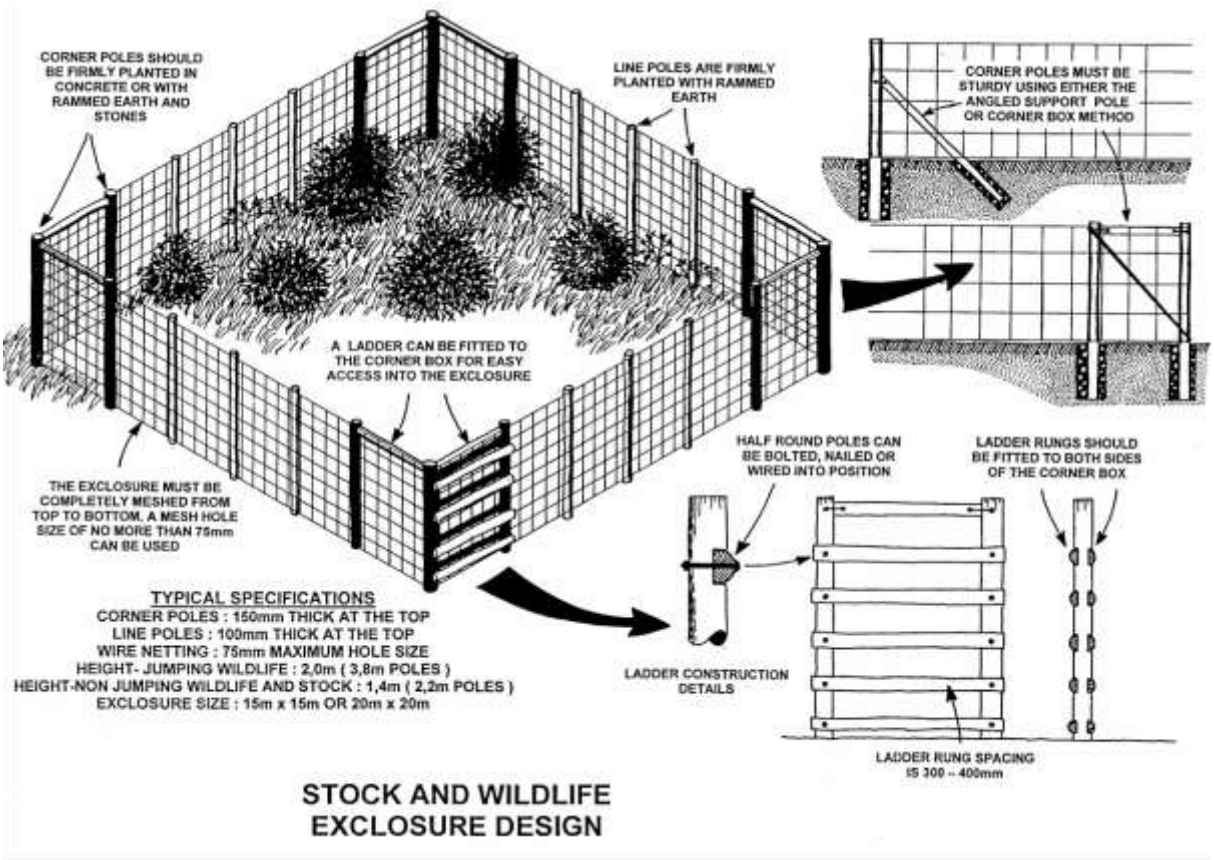


FIGURE 8D

FIXED POINT PHOTOGRAPH RECORD SHEET

PLOT NO:	**DATE:**	**SURVEYOR:**
GPS CO-ORDINATE:		
GRID REF NO:		

POINT DESCRIPTION: (How to find the marker)

HABITAT DESCRIPTION: (use back of form, if necessary)

VEGETATION TYPE:

TREE & SHRUB SPECIES:

DWARF SCRUB SPECIES:

HERBACEOUS PLANT SPECIES:

COVER DESCRIPTION:

COVER TYPE	HEIGHT	% OF PLOT	DOMINANT SPECIES
CANOPY COVER			
GROUND COVER			

UTILIZATION:

BROWSING DENSITY:		**PLANTS BROWSED**	**BROWSING HERBIVORES**
HEAVY			
MODERATE			
LIGHT			
GRAZING INTENSITY:		**PLANTS GRAZED**	**GRAZING HERBIVORES**
HEAVY			
MODERATE			
LIGHT			
OTHER NOTES:			

c) VELD CONDITION ASSESSMENT (FIXED TRANSECTS):

Permanent vegetation transects for recording plant species composition, forage cover abundance and plant utilization should be established. A number of fixed transects, each of 100 points will be needed to record improvement or deterioration (change) in the vegetation cover and species condition in relation to grazing pressure. This is a critical monitoring method and is the only way in which to

objectively monitor vegetation condition in relation to grazing pressure. (See Figure 8E). This type of monitoring will provide invaluable information about veld condition, in relation to utilization, and is thus highly recommended as a basis for informed decision making about pasture condition and carrying capacity.

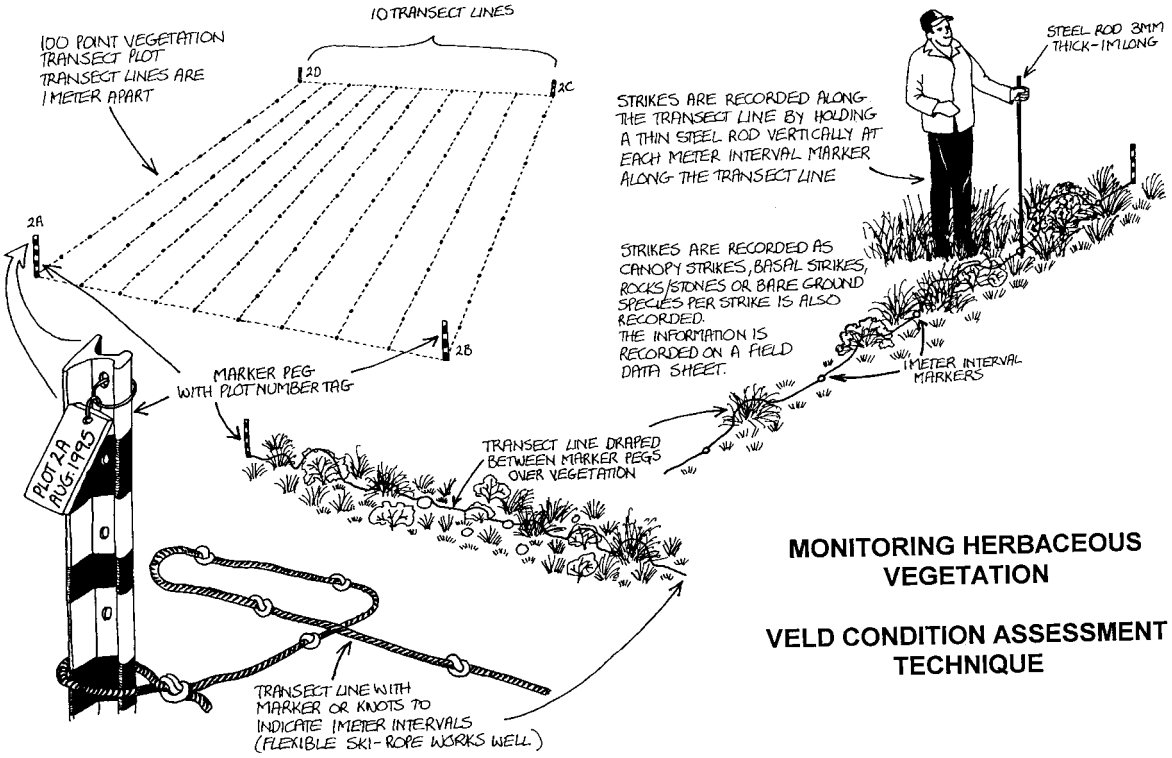


FIGURE 8E

SERVICES-KEN COETZEE
4 Chestnut Street
Heather Park GEORGE 6529
Tel/Fax: 044 8708472

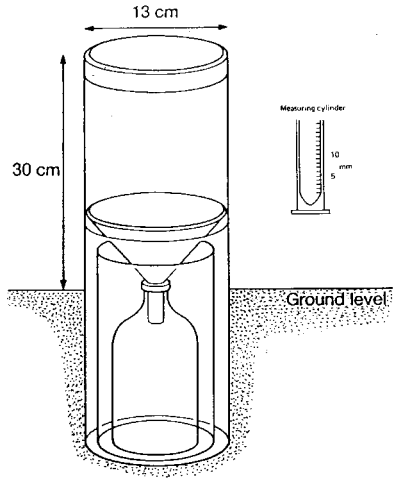
VEGETATION TRANSECT DATA SHEET

DATE:	SURVEYER:	PHOTOGRAPH DATE:
LOCALITY:	GPS CO-ORDINATE:	HABITAT DESCIPTION:
MONITORING SITE:	MAP CO-ORDINATE:	

POINT NO	SPECIES	DISTANCE cm	PLANT TYPE						CONDITION				UTILIZATION				AGE			COVER				CANOPY STRIKE			CAPPING			EROSION					ANIMALS			NOTES
			GEOPHYTE	FORB	GRASS	DWARF SHRUB	SHRUB	TREE	VIGOROUS	MORIBUND	DYING	RESPROUTING	UNGRAZED	LIGHT	MEDIUM	HEAVY	SEEDLING	YOUNG	MATURE	BARE	ROCK	LITTER	BASAL	GRASS/FORB	SHRUB	TREE	UNCAPPED	BROKEN	CAPPED	SOIL MVMT	LITTER LOSS	PEDESTALLING	WATER FLOW	RILL/GULLEY	INVERTEBRATES	SMALL ANIMALS	LARGE ANIMALS	

d) RAINFALL MEASUREMENT:

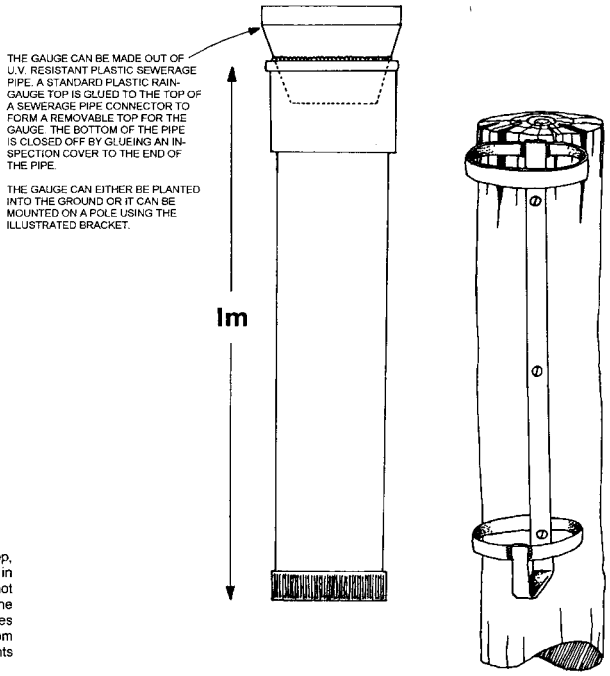
Rainfall should be accurately recorded at a number of fixed points on the property. Site selection will depend on the sustained ability of management to service and record at each gauge. At this stage, it is suggested that gauges be positioned as indicated in Figure 8B. This spread of rainfall measurement will jointly provide a more accurate picture of what the rainfall is over the full extent of the property. A "long term" rain gauge can be considered for sites that are not frequently visited. (Figure 8F). Rainfall records are needed to help interpret changes in vegetation and wildlife movements, and to help make informed decisions about wildlife population management. A rainfall record sheet follows Figure 8F.



STANDARD DAILY RAINFALL MEASUREMENT

Rain water is collected in a *rain gauge*, a metal cylinder with a funnel at the top, made of copper, which has a collecting jar inside. The cylinder is set firmly in the ground with the rim 30 cm from the surface; at this height water does not splash in from the surrounding surface, when the rain is particularly heavy. The standard gauge has a rim of 130 mm or 5 inches in diameter. The rain passes down through the funnel into the collecting jar. Because the jar is in the bottom of the rain gauge, it is beneath the ground level where it is cool. This prevents the evaporation of the water if the sun shines brightly after it has rained.

The amount of rain collected is measured once every 24 hours. It is important that the reading should be taken at the same time each day so that the period over which the rain is collected remains constant. The water from the jar is poured into a graduated measuring cylinder from which the reading can be made directly. It is important to place the rain gauge in an open space where it is not shaded by trees or buildings, and to protect it with a fence to stop animals and people tampering with it. The gauge should be cleaned regularly, particularly at the end of the dry season when dust and leaves may have collected inside.



MODIFIED RAIN GAUGE FOR MONTHLY MEASUREMENT

It may not always be possible to measure rainfall on a daily basis, particularly if roads are very muddy, or in less accessible areas. For this reason, a special storage gauge which conforms to the standard rain gauge collecting diameter can be used to measure rainfall over a longer period. The components of the rain gauge are clearly illustrated. Collected rainwater is decanted out of the storage gauge by removing the top and measured with a standard calibrated measuring cylinder. Storage rain gauges should have a teaspoon of light engine oil added to the collection chamber, which will float on any collected water and prevent evaporation.

FIGURE 8F

RAINFALL RECORD FORM

Station…….. Year ending……

Month												
1st												
2nd												
3rd												
4th												
5th												
6th												
7th												
8th												
9th												
10th												
11th												
12th												
13th												
14th												
15th												
16th												
17th												
18th												
19th												
20th												
21st												
22nd												

23rd													
24th													
25th													
26th													
27th													
28th													
29th													
30th													Year's
31st													Totals
Month's Total													
AVERAGE PREVIOUS YEAR													

Instructions: Rainfall should be recorded at 08h00 each morning and may be prefixed "L, M or H" as follows:

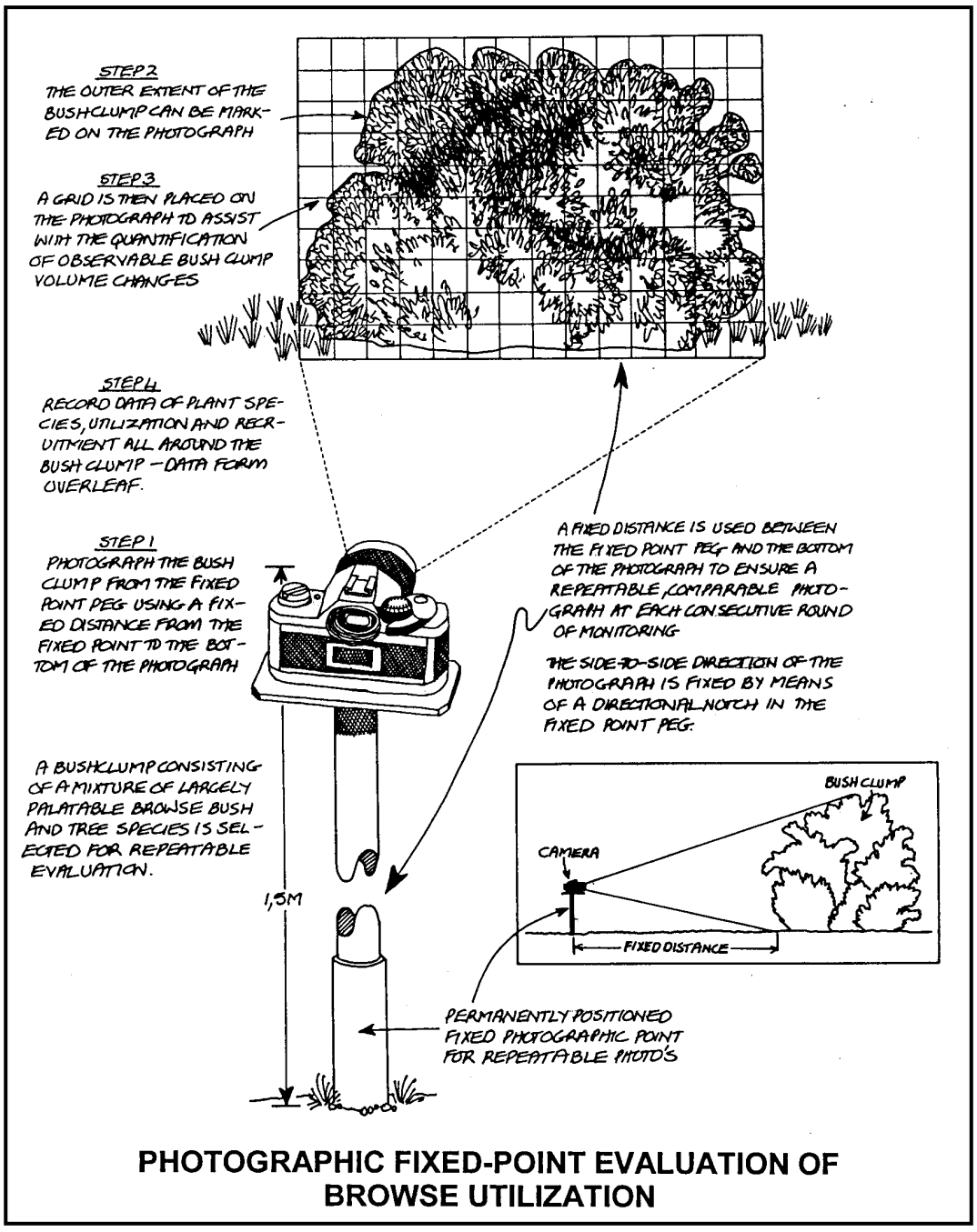
L: Light rain; very good penetration.

M: Medium; anything that is neither noticeably light or heavy.

H: Heavy rain or thunderstorm; high runoff with little penetration.

e) BROWSE MONITORING PLOTS:

Because of the relative importance of browsers (eland, common duiker) on the area, a rapid and practical method for browse utilization assessment must be established. A combination of a fixed-point photograph of selected bush clumps **(photographs can be used to actually measure degree of the utilization of bushes in the bush clump)**, together with an evaluation of species, degree of utilization and recruitment of bushes is suggested. (See Figure 8G). A number of these browse monitoring sites should be established in areas of known browser concentration. (Preliminarily suggested sites are indicated in Figure 8B).



PHOTOGRAPHIC FIXED-POINT EVALUATION OF BROWSE UTILIZATION

FIGURE 8G

BROWSE UTILIZATION DATA SHEET

DATE:	SURVEYOR:	HABITAT DESCRIPTION:
LOCALITY:	GPS CO-ORDINATE:	

MONITORING SITE:	MAP CO-ORDINATE:	

FIXED-POINT PHOTOGRAPH DETAILS

PHOTO NUMBER:	FILM TYPE:
DISTANCE FROM FIXED POINT TO BOTTOM OF PHOTOGRAPH:	FOCUS DETAIL:

BROWSE UTILIZATION / RECRUITMENT DATA SHEET

SPECIES	HEIGHT < 1 m							HEIGHT > 1 m							*1.2.1.1.1.* *1.2.1.1.1.* *1.2.1.1.1.* *1.2.1.1.1.* NOTES
	UTILIZATION				RECRUITMENT			UTILIZATION				RECRUITMENT			
	UNUTILIZED	LIGHT	MODERATE	HEAVY	NUMBER OF SEEDLINGS <0.5M	NEW BRANCH TIP	NEW LEAVES,	UNUTILIZED	LIGHT	MODERATE	HEAVY	NUMBER OF	NEW BRANCH TIP	NEW LEAVES,	
TOTALS															

FIGURE 8G

f) THE FILING AND STORAGE OF RESERVE MONITORING DATA:

Any monitoring system is only as good as its filing system. Data that is not easily accessible is unlikely to be used, and therefore the major aim of the monitoring programme, that of integrating objective scientific information into decision-making is not fulfilled. One cannot overstress the necessity for an efficient and practical filing system for monitoring data.

Most monitoring data can be captured into simple PC data storage programmes. Data sheets can be stored together with digital photos. The following are guidelines for the non-digital storage of monitoring data, the principles, however, remain the same. The most important thing about monitoring data is (a) that it must be easily accessible and (b) that it be regularly analysed in terms of the reason for the monitoring (ie: objective). The following are general guidelines for non-digital data storage:

1. A lever-arch or box filing system is most practical for bulky monitoring data.
2. A separate file should be used for each monitoring type (eg erosion, fire, wildlife census).
3. Files should be clearly marked with monitoring system type and the relevant file numbers.
4. Related data should be stored together to facilitate easier analysis.
5. Slides collected for the monitoring record should be filed in plastic sheets of slide pockets and kept in the same file as their accompanying information.
6. Photographs should be kept in plastic file pockets and should be attached to the accompanying forms or reports.
7. Every individual slide and photograph must be carefully marked with date, locality, monitoring system, etc. It is not sufficient to give them a number, because confusion can easily arise when they are used to illustrate a talk, and there must be no chance of mistakes when they are put back in the file.
8. The filing system must be uncomplicated and clearly marked so that any interested person can retrieve the required data easily.

RECOMMENDED ACTIONS:

xx) Establish habitat monitoring system consisting of fixed-point photo sites, vegetation condition transects, exclosures, browse monitoring sites and rainfall recording.

6.5 SUPPLEMENTARY FEEDING

Free-ranging wild ungulates are generally able to take up all of the nutrients and minerals that they need in their normal grazing, browsing or mixed feeding diets. Concentrate feeders and browsers are more resistant to nutritional deficiencies than bulk grazers, because browse has a consistently higher nutritive value than grass. This is an important aspect of the BCA in which the available browse diversity and volume is relatively high. By contrast, the sustained nutrient availability in the largely alien annual grass component is very low.

However, under conditions of confinement within fenced game camps (ie: less than 5 000 Ha), animals are restricted and may be unable to range widely enough to fulfill all of their dietary requirements.

The nutritional value of natural veld and pasture differs vastly from area to area as well as from season to season. It is, therefore, sometimes necessary to supplement the nutritional deficiencies typical of a particular area, in order to maintain both the general condition as well as the productivity of the ungulates confined to the area. Nutritional deficiencies in wild herbivores often result in poor hair pigmentation, poor growth, poor appetite, low fertility, itching skin, anaemia, still-born young, fractures and general emaciation of the animals.

Karoo dwarf shrubs generally have a high nutritive value and maintain this value throughout the year, with very little variation. Analysis has shown that deficiencies of proteins and minerals are less likely to occur in natural pastures rich in palatable karroid shrubs than in pure grassland habitats. During drought, the little forage that is available is still of a relatively high quality, albeit very dry forage, from which herbivores are often not able to derive sufficient energy. When absolutely necessary, emergency drought feed should consist largely of energy-rich supplementary food such as enriched maize (Schmidt & Snyman, 2002).

Most shrubs on typically nutrient-poor fynbos soils have sclerophyllous leaves which, according to Stock and Allsopp (1992) is a functional response to low nutrient environments. Fynbos environments typically undergo a dry season period of severe nutrient stress. The renosterveld and thicket shrubveld areas occur on nutrient-rich soils and nutrient stress during summer drought is somewhat less pronounced.

It follows that a summer drought food supplementation may be necessary in the BCA game introduction area in view of the fact that much of the habitat has been transformed in some way.

Supplementary feed can be put out at water points. An effective supplement feed recipe consists of pure bonemeal mixed with chopped lucern, mielies, urea and molasses. This is clearly highly favoured by most species, and it is quickly used up after it is provided. This supplementation of calcium, protein, carbohydrate and sugars is probably more than adequate.

It has also been shown that protein is the most important limiting nutrient during the dry winter months in most areas, but during the summer months on the BCA. This affects the pure grazers and not the browsers who derive sufficient protein from the browse. Urea is the most widely used source of protein supplement fed to animals on protein-deficient veld. Non-ruminants (like zebras and rhinoceros), however, derive no benefit from urea supplementation and must be given an alternative protein-rich supplement like lucern hay. (Schmidt & Snyman, 2002).

If any deficiencies do occur, they most probably can be related to shortages of copper, cobalt, selenium, manganese, magnesium, phosphorous and zinc (Van Niekerk, 1996), which are typical in the area. Copper deficiencies, in particular, have been reported from some of the Cape Peninsula coastal areas.

Salt licks are widely used for mineral and trace element supplementation and they provide for the animals' need for sodium. There is, however, a range of problems associated with supplementary feeding. For example, many micro minerals (including salt) and trace elements can become toxic if certain limits are exceeded (Meissner, 1999). Care must thus be taken to carefully research the requirements before any supplementary feeding programme is implemented.

It is recommended, as a first step, that the local office of the Department of Agriculture be approached for assistance with the sampling of soil and the determination of mineral and trace element deficiencies. Alternatively, the CSIR can be contacted for assistance with soil nutrient evaluation. Once we know what the shortages are, then the animal feed companies can be contacted for assistance.

If dietary deficiencies are detected, it is suggested that specially formulated licks or blocks be expertly prepared so that the important deficiencies can be effectively corrected in the supplementary licks or blocks provided for the introduced wildlife on

the BCA. The *Voermol* game block is a protein, energy, mineral and trace element supplement that also contains urea. Get specific information on this product from the *Voermol* Information Centre toll-free at: 0800310078 or telephone: 032 – 4395599.

Wes Game Feed makes a supplement from the material cut down during control of bush encroachment and can add any element to the feed as required. It is available in 50 kg bags. Tel: 014 – 7771330.

It goes without saying, however, that supplementary feeding, whether for energy supplementation or mineral deficiencies, should only be provided when it is absolutely necessary.

RECOMMENDED ACTIONS:

6.6 EXTERNAL PARASITE AND DISEASE CONTROL

Browsers and mixed feeding ungulates are generally more exposed and infested with ticks than grazers. This is because bushy habitats are more suitable habitat for ticks (than grassland) and the taller plants provide good "questing" height for ticks. These habitats also support larger populations of small mammals and ground birds which are important intermediate hosts for immature stages of most ticks. (Gallivan & Horak, 1997).

Larger ungulates, like eland, generally carry more ticks, because small antelopes (like steenbok, common duiker and grey rhebok) groom themselves more frequently and efficiently than larger ungulates. (Gallivan & Horak, 1997).

Because of the shrubby and thicket type vegetation on many parts of the reserve, heavier tick loads can be expected than on areas with only grass or duneveld.

Ungulates are also more susceptible to tick infestation when in poor condition or under nutritional stress, such as immediately after capture and translocation or as a

result of trace element or mineral deficiencies in their diet during the summer drought period.

Bontebok and zebra are particularly susceptible to tick infestation, as they utilize bush and tall grass habitat which is also good tick habitat. In the Bontebok National Park, bontebok were found to be hosts for 8 different ticks, while grey rhebok were hosts to 6 tick species. (Horak et al, 1997).

Animals that are to be introduced into the BCA should be treated to remove parasites before introduction in order to avoid the accidental introduction of parasites and the diseases that they may transmit. Larger animals should be treated to kill ticks, at the point of capture, before they are transported for release into the BCA. The animals can either be sprayed with acaricide in a hand pump or a pour-on dip can be used. It is, however, critical that the directions for acaricide use are very carefully followed. A wildlife veterinarian should be specially appointed to assist with the treatment.

It is recommended that animals for introduction be sourced from as close as possible to the reserve. Local animals have a natural immunity to the local ticks and the diseases that they transmit. They get this immunity through natural selection over a period of time (years), because the weak and more susceptible animals in the population die out. Animals introduced from other regions do not have this local immunity and are more susceptible to infection (Van Niekerk, 1998). This is one of the reasons why so many new introductions of game animals into fynbos and coastal areas suffer severe losses and take a long time to settle and breed.

The idea of tick control or eradication is not at all possible, because ticks do not only use larger game animals as hosts, but also make use of small animals like hares, shrews, rodents and birds as intermediate hosts. Tick control can thus aim at a reduction in tick numbers on game hosts, while retaining enough ticks to expose young animals and allow them to build up immunity to tick-transferred diseases.

If it is found that the control of ticks on larger game animals is absolutely necessary, there are two different types of acaricide applicators that are specifically designed for use in areas of intensive wild animal concentration. The details of the hydraulic applicator and the vertical pipe applicator are illustrated in Figures 9A & 9B.

It is suggested that the hydraulic applicator system be positioned within a “branch and bush” enclosure around a well used waterhole. (See Figure 9B). The enclosure can be made around a waterhole with two openings so that the animals can get used

to going into the system. When the animals are well used to the enclosed waterhole, one of the openings can be closed. When the animals are used to the single opening, the hydraulic dispenser can be installed and put into operation whenever required. When not required, the “dispenser opening” can be closed and the other opening can again be used. The dispenser delivers a safe, measured account of acaricide onto the animal when it activates a buried pressure plate. Injury or damage from overdosing is not possible, even if the same animal is repeatedly dosed.
60.

If attracting animals to a particular water point is problematic because of a wide natural water distribution then the same method can either be applied by placing a supplementary feeding station or lick in the enclosure. Alternatively, a well used game path through bush or gap in a line of bush leading from one pasture area to another can also be used. If the parasite problem requires sustained control, it will make good sense to install a number of hydraulic dispensers at a variety of “restricted” opening or “access” sites for use when required.

The vertical *Duncan* pipe applicator can be installed wherever game animals congregate to feed or rest. The applicator doses an animal when it is attracted to a lick or food placed within it. The ears and neck of the animal comes into contact with a vertical pipe down which acaricide (pour on type) slowly runs. The excess dip flows into a container at the bottom of the pipe and is then transferred manually into a container at the top of the pipe again for further dosing. (See Figure 9A).

It is extremely important that an environmentally friendly acaricide be used in these applicators. *Pirotroides* is recommended by Van Niekerk (1998). It is also recommended that acaricide applicators only be used in spring, summer and autumn if animals are to be hunted during winter for meat. The acaricide has a “waiting” period after application before the meat is fit for human consumption. It is thus best to not use acaricide applications during the peak hunting season (June - August).

In some areas, herds of domestic cattle have been used for tick control during periods of intense tick infestation on game farms. Cattle graze the area during late summer for a few weeks after which they are removed and dipped to kill the ticks picked up every 5 to 14 days (Bester, 2002).

It must, however, be appreciated that the treatment of game animals against parasites, may have the result that the parasites develop resistance to the chemicals used. If at all possible, the animals introduced should be left to develop a natural resistance to the parasites (tick diseases) of the area and treatments should only be used if conditions become critical. The animals introduced should be obtained from

sources already suitably adapted or resistant to the particular parasites of the introduction area.

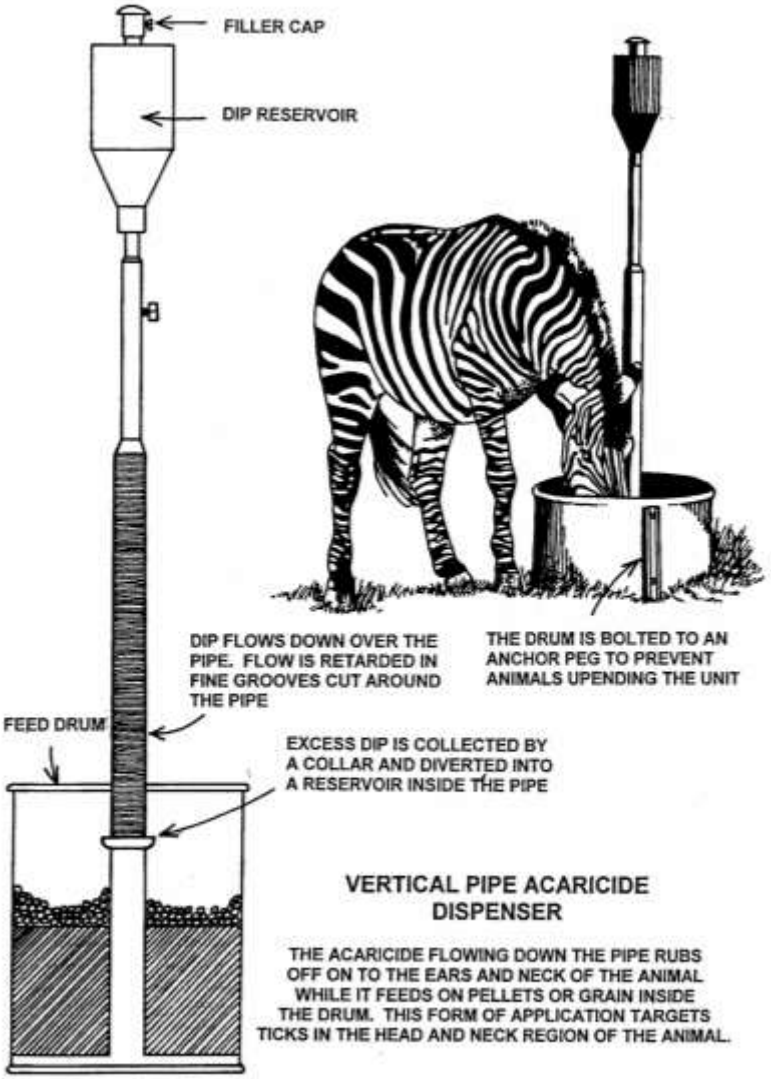
It is also recommended that animals that are obviously sick or diseased should be culled and disposed of to eliminate a possible source of disease or parasite contamination for other animals.

RECOMMENDED ACTIONS:

xxiii) Install acaricide dispensers at waterholes (pressure plate type) for tick control.

xxiv) Source animals for introduction as close as possible to the BCA.

xxv) Ensure that animals obtained for introduction are treated to remove parasites at source



VERTICAL PIPE ACARICIDE DISPENSER

THE ACARICIDE FLOWING DOWN THE PIPE RUBS OFF ON TO THE EARS AND NECK OF THE ANIMAL WHILE IT FEEDS ON PELLETS OR GRAIN INSIDE THE DRUM. THIS FORM OF APPLICATION TARGETS TICKS IN THE HEAD AND NECK REGION OF THE ANIMAL.

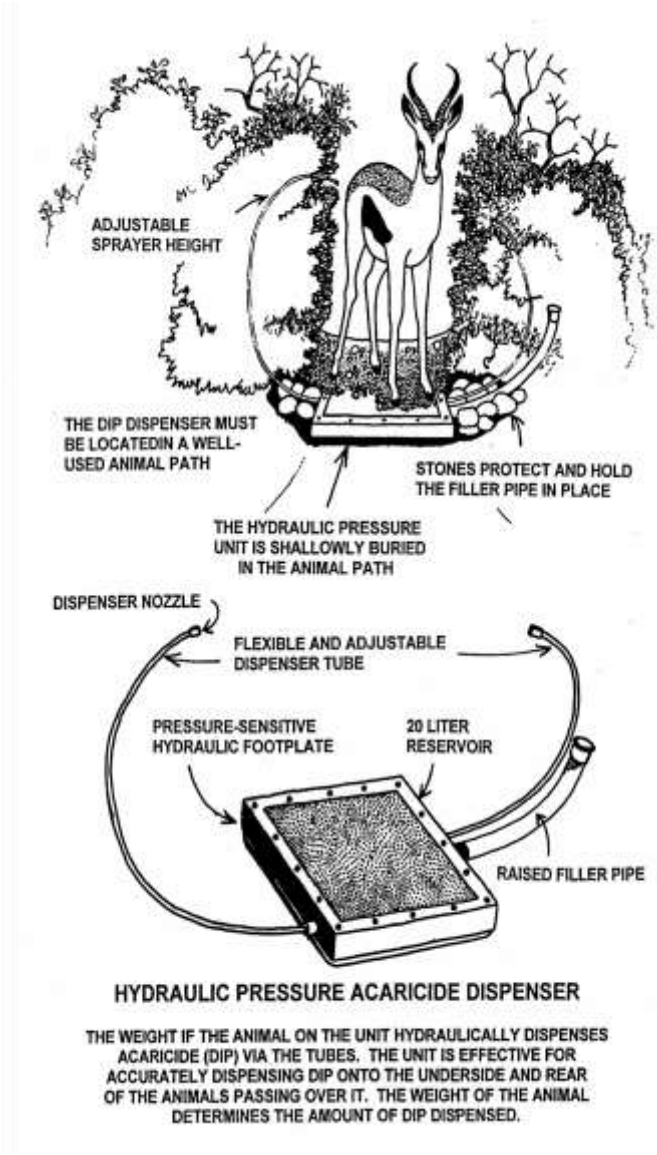


FIGURE 9A

FIGURE 9B

7. VELD IMPROVEMENT FOR LARGE HERBIVORES

No attempt should be made to modify or transform any natural vegetation to favour introduced grazers and browsers. The improvement of forage for animals should rather become a part of the general rehabilitation efforts and should thus be restricted to the areas where extremely dense alien tree infestations have been controlled or where the veld has been disturbed/transformed to establish crops or pastures.

Some of the existing pasture areas of Joyce's Dairy (see Figure 3G) can be improved for grazing by the establishment of a variety of locally indigenous grasses while in the fallow lands areas, locally indigenous (and palatable) grasses can be established as part of the restoration of the renosterveld.

In the Garden Cities area, indigenous grasses can be generally established in an effort to replace the widespread alien annual grasses, the bulk of which are unpalatable. Similarly, indigenous grasses can be sown to stabilize sand where dense stands of Port Jackson are removed and thee is little or no natural vegetation cover.

The agricultural approach to grass establishment is not proposed, but rather a "low key" patch establishment approach. Each established patch of grass will then serve as a source of seed for natural spread and establishment. It is proposed that a range of locally indigenous grasses be tested at a number of different sites and that the best method for establishment be determined through experimenting with methods.

The grasses which can be tested for grazing improvement and rehabilitation are as follows:

a) *Cynodon dactylon* (couch grass): Because it is a palatable creeping pioneer, couch grass is an ideal species to promote. It grows in all kinds of soils and is particularly good for disturbed areas. Establishment trials should include both the transfer of live sods and the sowing of seed, which is commercially available.

b) *Ehrharta calycina* (common ehrharta): This is an important perennial grass, because it is one of the few good grazing grasses of the winter rainfall area. Tolerates a wide range of habitats, but is good for disturbed sandy soil. It occurs in all areas of the BCA and should become an important pasture improvement and rehabilitation species. Seed is commercially available.

c) *Chaetobromus dregeanus* (hartbeesgras): An important palatable grass of the west coast area, and one of the few useful winter rainfall area grasses. Establishes well in sandy soil. This species is recorded in the plant checklist for the BCA (Helme, 2004). The seed is sometimes available commercially.

d) *Chaetobromus schraderi* (wortelgras): Although not listed in the BCA plant checklist, this is a grass of the sandy west coast from Cape Town to Oranjemund (Van Breda & Barnard, 1991). It is a palatable creeping grass that

stabilizes loose sand and will be very valuable for BCA rehabilitation work. Availability of seed is doubtful. The best option is to find it and transplant runners.

e) *Tribolium hispidum*: A perennial winter rainfall grass that occurs on sandy and gravel soils in Fynbos and Renosterveld. It is prevalent on Blaauwberg Hill in shale-derived gravelly soil. Will be valuable for Renosterveld rehabilitation (old lands and pastures). Seed unavailable, will have to be field-harvested which will not be difficult, as it has large inflorescences.

f) *Stenotaphrum secundatum* (buffalo grass): Favours sandy soil in disturbed places and wetter areas like vleis. It is very palatable and is sometimes used as pasture. It can only be established by planting runners or sods, but establishes easily. This grass already occurs in wetter areas of the BCA and promoting it will result in good quality pasture grazing.

Indigenous grasses that do not occur in the BCA area like *Eragrostis* spp, *Digitaria* spp, *Sporobolus* spp, *Hyparrhenia* spp, *Panicum* spp, *Cenchrus* spp should not be used for rehabilitation or pasture improvement on the BCA. Alien pasture grasses that are frequently used for pastures like *Lolium* spp and *Chloris gayana* should also be avoided even if their seed is more freely available.

ESTABLISHMENT

It will be best to sow a mixture of grass seed, rather than a single species at a time. A mixture of grasses will compliment each other in terms of germination rates, soil stabilization, etc.

Seed can be hand-sowed at a rate of ±6 kg per Ha. The soil surface must be prepared with light, shallow raking and very shallow raking after sowing. The seeds must not be buried more than a few millimeters in the ground. It is advisable to use a brush-packing (or other mulch) on the seeded area to create a shaded, protected site for seed germination.

The following can be used as a rough guide to grass seed establishment:

SPECIES	SITE PREPARATION	MOISTURE	SOWING TIME	GERMINATION
Chaetobromus dregeanus *Chaetobromus schraderi* *Ehrharta calycina* *Tribolium hispidum*	Lightly rake soil surface and brush-pack	Sow in damp soil after rains	April - May	±7 days
Cynodon dactylon	Lightly rake soil surface and brush-pack	Sow in damp soil	Sept - Oct	?

SHRUB AND BUSH CLUMP ESTABLISHMENT

From an aesthetics point of view, pasture areas and old lands areas may be seen to be a little too unnatural. The “pasture” appearance can be simply and inexpensively changed by establishing bushclump patches spread throughout the area, thus breaking up the open appearance and hard, straight edges of the lands.

Numerous small, fenced exclosures of about 6 x 6m can be built in which to establish a dense mixture of locally indigenous trees and shrubs which need to be protected from browsing game like eland and duiker.

Once the shrubs are well established, the fences can be removed and used again to start another bushclump. This method is intended to improve the appearance of transformed land and not to increase the shrub component of natural veld.

The method can also be used in areas of former dense Port Jackson infestation (such as the Garden Cities area) where indigenous shrub cover was largely lost. Most of the shrub and tree species natural to the area are also known to be palatable to browsing ungulates.

Shrub and tree species which can be used for bushclump establishment are:

Chrysanthemoides incana

Chrysanthemoides monilifera

Gymnosporia buxifolia

Lycium ferocissimum

Olea europaea subsp *africana*

Pterocelastrus tricuspidatus

Putterlickia pyracantha

Rhus glauca

Rhus laevigata

Rhus lucida

Sideroxylon inerme

Zygophyllum morgsana.

Once established and flourishing, these protected bushclumps will provide shaded, protected habitat for a variety of grasses. Grasses should also be seeded into these bushclump areas at the same time when patches of indigenous grass are sown on the old lands.

8. SUMMARY OF ACTION LIST:

	ACTION	PRIORITY	IMPLEMENT-ATION DATE	PRELIMINARY COST ESTIMATE
i	Introduce only the following historically indigenous species: Eland Red hartebeest Grey rhebok.			
ii iii iv v vi vii	Use only the combined area east of the West Coast Road for game introduction. Fence the entire combined area east of the West Coast Road to contain eland. Institute a programme of indigenous grass establishment to replace alien annual grasses. Rehabilitate cleared, grassed and wetland areas in the Garden Cities area to create a system of linked open grassland. Sow indigenous grasses and establish indigenous bushclumps. Establish waterholes for wildlife. Retain some of the cultivated pastures for wildlife grazing.			
viii ix x xi	If the combined game introduction area does not materialize, restrict introductions to grey rhebok. Use 73 Ha/LAU as a preliminary guide to the large ungulate stocking rate. This relates to populations of 14 eland and 11 red hartebeest. Use spatial requirements for grey rhebok numbers. This relates to 3 family groups of			

xii	5 animals each (15). The minimum introduction numbers are 8 eland, 8 red hartebeest and 10 grey rhebok. Reduce eland & red hartebeest populations to 14 eland & 11 red hartebeest every 2 yrs.			
xiii xiv xv xvi	Provide water at the indicated localities. Install rainwater harvesting systems, each with a 40 000 liter storage capacity. Install wildlife-"friendly" waterholes. Set up a monitoring programme for habitat impact near to waterholes.			
xvii xviii xix	Establish a wildlife recording system. Establish a wildlife register. Do annual game census.			
xx xxi	Establish habitat monitoring system consisting of fixed-point photo sites, vegetation condition transects, exclosures, browse monitoring sites and rainfall recording. Do habitat monitoring annually.			
xxii	Have samples of soil tested to determine nutrient deficiencies.			
xxiii xxiv xxv xxvi	Install acaricide dispensers at waterholes (pressure plate type) for tick control. Source animals for introduction as close as possible to the BCA. Ensure that animals obtained for introduction are treated to remove parasites at source. Cull and dispose of sick and diseased animals.			

9. FOLLOW-UP RESERVE MANAGEMENT AUDIT

It is proposed that these management guidelines be followed up with a simple reserve management audit. This would entail the assessment and evaluation of the progress made with the proposed goals of this report. Such an audit will help the BCA management staff to plan and set goals for the following phases of the projects. It may also help to modify (or even discard) goals that become dated or are considered unattainable or impractical and identify new goals. Audit input can also be instructive (hands-on) and therefore of value to staff.

The audits can be based on the summary list of actions included in Section 8, and a specific audit report can be drawn up for each audit. It is important to appreciate that these audits are not intended as a "check-up" of progress, but rather aimed at helping the management staff attain their goals by bringing in new ideas, methods and support.

Regular audit chould also be combined with other field management assistance. *Conservation Management Services* could, for example, assist with annual habitat assessment in terms of large ungulate impact on vegetation. It would be good ecological practice to do the monitoring first and follow with the audit. There are no fixed rules concerning the envisaged audit. It can be done annually or every two years. The requirement will depend on the rate of progress with management projects, financial and logistical support given to reserve staff and also the need for instructive input.

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APPENDIX 6 – BIRD SPECIES LIST

Species Name	Common Name	Red Book Status
Accipiter melanoleucus	Black Sparrowhawk	
Accipiter rufiventris	Rufous-chested Sparrowhawk	
Accipiter tachiro	African Goshawk	
Acrocephalus baeticatus	African Reed-Warbler	
Acrocephalus gracilirostris	Lesser Swamp-Warbler	
Afrotis afra	Southern Black Korhaan	
Alcedo cristata	Malachite Kingfisher	
Alopochen aegyptiacus	Egyptian Goose, Kolgans	
Anas undulata	Yellow-billed Duck	
Anhinga rufa	African Darter	
Anthoscopus minutus	Cape Penduline-Tit	
Anthropoides paradiseus	Blue Crane	Vulnerable (VU)
Anthus cinnamomeus	African Pipit	
Anthus similis	Long-billed Pipit	
Apalis thoracica	Bar-throated Apalis	
Apus affinis	Little Swift	
Apus barbatus	African Black Swift	
Apus caffer	White-rumped Swift	
Aquila pennatus	Booted Eagle	
Aquila verreauxii	Verreauxs' Eagle	
Ardea cinerea	Grey Heron	
Ardea melanocephala	Black-headed Heron	
Arenaria interpres	Ruddy Turnstone	

Batis capensis	Cape Batis	
Bostrychia hagedash	Hadeda Ibis	
Bubo africanus	Spotted Eagle-Owl	
Bubulcus ibis	Cattle Egret	
Buphagus erythrorhynchus	Red-billed Oxpecker	
Burhinus capensis	Spotted Thick-knee, Spotted Dikkop	
Buteo rufinus	Long-legged Buzzard	
Buteo rufofuscus	Jackal Buzzard	
Buteo vulpinus	Steppe Buzzard	
Calidris alba	Sanderling	
Calidris ferruginea	Curlew Sandpiper	
Caprimulgus pectoralis	Fiery-necked Nightjar	
Caprimulgus tristigma	Freckled Nightjar	
Cercotrichas coryphoeus	Karoo Scrub-Robin	
Ceryle rudis	Pied Kingfisher	
Charadrius hiaticula	Common Ringed Plover	
Charadrius marginatus	White-fronted Plover	
Charadrius pecuarius	Kittlitz's Plover	
Chrysococcyx caprius	Diderick Cuckoo	
Chrysococcyx klaas	Klaas's Cuckoo	
Ciconia ciconia	White Stork	
Cinnyris chalybeus	Southern Double-collared Sunbird	
Circus maurus	Black Harrier	Near Threatened (NT)
Circus ranivorus	African Marsh-Harrier	Vulnerable (VU)
Cisticola juncidis	Zitting Cisticola	
Cisticola subruficapilla	Grey-backed Cisticola	

Cisticola textrix	Cloud Cisticola	
Cisticola tinniens	Levaillant's Cisticola	
Colius colius	White-backed Mousebird	
Colius striatus	Speckled Mousebird	
Columba guinea	Speckled Pigeon	
Corvus albicollis	White-necked Raven	
Corvus albus	Pied Crow	
Cossypha caffra	Cape Robin-Chat	
Cossypha humeralis	White-throated Robin-Chat	
Coturnix coturnix	Common Quail	
Crithagra albogularis	White-throated Canary	
Crithagra flaviventris	Yellow Canary	
Crithagra gularis	Streaky-headed Seedeater	
Dendropicos fuscescens	Cardinal Woodpecker	
Egretta garzetta	Little Egret	
Egretta intermedia	Yellow-billed Egret	
Elanus caeruleus	Black-shouldered Kite	
Emberiza capensis	Cape Bunting	
Estrilda astrild	Common Waxbill	
Euplectes capensis	Yellow Bishop	
Euplectes orix	Southern Red Bishop	
Falco biarmicus	Lanner Falcon	Near Threatened (NT)
Falco peregrinus	Peregrine Falcon	Near Threatened (NT)
Falco rupicolus	Rock Kestrel	
Fulica cristata	Red-knobbed Coot	
Gallinula chloropus	Common Moorhen	

Haematopus moquini	African Black Oystercatcher	Near Threatened (NT)
Haliaeetus vocifer	African Fish-Eagle	
Himantopus himantopus	Black-winged Stilt	
Hirundo albigularis	White-throated Swallow	
Hirundo cucullata	Greater Striped Swallow	
Hirundo dimidiata	Pearl-breasted Swallow	
Hirundo fuligula	Rock Martin	
Hirundo rustica	Barn Swallow	
Indicator indicator	Greater Honeyguide	
Indicator minor	Lesser Honeyguide	
Laniarius ferrugineus	Southern Boubou	
Lanius collaris	Common Fiscal, Fiscal Shrike	
Lanius collurio	Red-backed Shrike	
Larus cirrocephalus	Grey-headed Gull	
Larus dominicanus	Kelp Gull	
Larus hartlaubii	Hartlaub's Gull	
Larus ridibundus	Common Black-headed Gull	
Leptoptilos crumeniferus	Marabou Stork	
Merops apiaster	European Bee-eater	
Milvus migrans	Black Kite, Yellow-billed Kite	
Morus capensis	Cape Gannet	Vulnerable (VU)
Motacilla capensis	Cape Wagtail	
Nectarinia famosa	Malachite Sunbird	
Numida meleagris	Helmeted Guineafowl	
Oena capensis	Namaqua Dove	
Oenanthe pileata	Capped Wheatear	
Parisoma layardi	Layard's Tit-Babbler	

Parisoma subcaeruleum	Chestnut-vented Tit-Babbler	
Passer diffusus	Southern Grey-headed Sparrow	
Passer domesticus	House Sparrow	
Passer melanurus	Cape Sparrow	
Pelecanus onocrotalus	Great White Pelican, Wit Pelikan	Near Threatened (NT)
Phalacrocorax capensis	Cape Cormorant	Near Threatened (NT)
Phalacrocorax coronatus	Crowned Cormorant	Near Threatened (NT)
Phalacrocorax lucidus	White-breasted Cormorant	
Phoenicopterus minor	Lesser Flamingo	Near Threatened (NT)
Phoenicopterus ruber	Greater Flamingo	Near Threatened (NT)
Platalea alba	African Spoonbill	
Plectropterus gambensis	Spur-winged Goose	
Ploceus capensis	Cape Weaver	
Ploceus velatus	Southern Masked-Weaver	
Polemaetus bellicosus	Martial Eagle	Vulnerable (VU)
Prinia maculosa	Karoo Prinia	
Procellaria aequinoctialis	White-chinned Petrel	Near Threatened (NT)
Promerops cafer	Cape Sugarbird	
Pternistis capensis	Cape Spurfowl	
Puffinus griseus	Sooty Shearwater	
Pycnonotus capensis	Cape Bulbul	
Riparia cincta	Banded Martin	
Riparia paludicola	Brown-throated Martin	
Sagittarius serpentarius	Secretarybird	Near Threatened

		(NT)
Scleroptila africanus	Grey-winged Francolin	
Scopus umbretta	Hamerkop	
Serinus canicollis	Cape Canary	
Sigelus silens	Fiscal Flycatcher	
Spheniscus demersus	African Penguin	Vulnerable (VU)
Sphenoeacus afer	Cape Grassbird	
Spreo bicolor	Pied Starling	
Stercorarius parasiticus	Parasitic Jaeger	
Sterna bergii	Swift Tern	
Sterna caspia	Caspian Tern	Near Threatened (NT)
Sterna hirundo	Common Tern	
Sterna sandvicensis	Sandwich Tern	
Streptopelia capicola	Cape Turtle-Dove	
Streptopelia semitorquata	Red-eyed Dove	
Streptopelia senegalensis	Lag Duifie, Laughing Dove	
Struthio camelus	Common Ostrich	
Sturnus vulgaris	Common Starling, European Starling	
Sylvietta rufescens	Long-billed Crombec	
Tachymarptis melba	Alpine Swift	
Telophorus zeylonus	Bokmakierie	
Terpsiphone viridis	African Paradise-Flycatcher	
Threskiornis aethiopicus	African Sacred Ibis	
Tricholaema leucomelas	Acacia Pied Barbet	
Tringa nebularia	Common Greenshank	
Turdus smithi	Karoo Thrush	
Turnix hottentottus	Hottentot Buttonquail	

Tyto alba	Barn Owl	
Upupa africana	African Hoopoe	
Urocolius indicus	Red-faced Mousebird	
Vanellus armatus	Blacksmith Lapwing, Blacksmith Plover	
Vanellus coronatus	Crowned Lapwing	
Vidua macroura	Pin-tailed Whydah	
Zosterops virens	Cape White-eye	

Species Name	Common Name	Red Book Status
Acontias meleagris	Cape Legless Skink	
Acontias meleagris orientalis	Cape Legless Skink	
Afrogecko porphyreus	Marbled Leaf-toed Gecko, Marbled Leaftoed Gecko	
Bradypodion occidentale	Namaqua Dwarf Chameleon	
Bradypodion pumilum	Cape Dwarf Chameleon	
Chamaesaura anguina	Cape Grass Lizard	
Chelonia mydas	Green Turtle	
Chersina angulata	Angulate Tortoise	
Cordylus cordylus	Cape Girdled Lizard	
Cordylus polyzonus	Karoo Girdled Lizard	
Crotaphopeltis hotamboeia	Herald Snake	
Dasypeltis scabra	Common Eggeater	
Dispholidus typus	Boomslang	
Duberria lutrix	Common Slug Eater	
Homopus areolatus	Parrot-beaked Tortoise, Parrotbeaked Tortoise	
Homoroselaps lacteus	Spotted Harlequin Snake	
Lamprophis inornatus	Olive House Snake	
Leptotyphlops longicaudus	Long-tailed Thread Snake, Longtailed Thread Snake	
Leptotyphlops nigricans	Black Thread Snake	
Meroles knoxii	Knox's Desert Lizard	
Naja nivea	Cape Cobra	
Pachydactylus geitje	Ocellated Thick-toed Gecko, Ocellated	

	Thicktoed Gecko	
Psammophis crucifer	Cross-marked Grass Snake, Crossmarked Grass Snake	
Psammophis notostictus	Karoo Sand Snake	
Psammophylax rhombeatus	Rhombic Skaapsteker	
Pseudaspis cana	Mole Snake	
Rhinotyphlops lalandei	Delalande's Beaked Blind Snake, Delalande's Blind Snake	
Scelotes bipes	Silvery Dwarf Burrowing Skink	
Scelotes montispectus	Blaauwberg Dwarf Burrowing Skink	
Trachylepis capensis	Cape Skink	
Trachylepis variegata	Variegated Skink	
Typhlosaurus caecus	Cuvier's Blind Legless Skink	

APPENDIX 8 – AMPHIBIAN SPECIES LIST

Species Name	Common Name	Red Book Status
Breviceps namaquensis	Namaqua Rain Frog	
Breviceps rosei	Sand Rain Frog	
Strongylopus grayii	Clicking Stream Frog	
Vandijkophrynus angusticeps	Sand Toad	

C. Other documents, as required

APPENDIX 9 – COMPREHENSIVE SECURITY AUDIT OF THE BIODIVERSITY MANAGEMENT BRANCH OF THE CITY OF CAPE TOWN

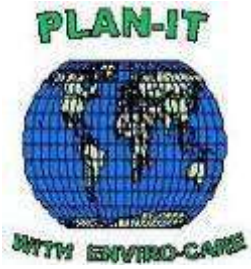
CITY OF CAPE TOWN

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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2 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.

3 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

4 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**
Witzand ACA	Medium	Illegal Access / Trespassing	Lack of fencing
Blaauberg 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
Fals 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.

5 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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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.

6 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 2. Operational Procedures &Protocols	1. Develop management Policies Goals & Objectives 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			
Witzand	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. 2. 1x Labourer	1. Visible patrols 2. Liaison with Everite Hostel.	1. Ablutions at gate 2. Day-night camera for main access area. 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	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	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

	7. 2x Visitor Controller Officers 8. Officers appointed as Peace Officers 9. Station District Law Enforcement Component	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.	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 5. Introduce ad hoc evening patrols 6. Formalise co-operation with Marine and Coastal Management regarding control at the estuary.	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 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	1. Regular patrols supported	1. Establish two or three Bushranger

	3. Officers appointed as Peace Officers 4. Station District Law Enforcement Component	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 Zeekowvlei picnic area during peak periods.	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	1. Northern and southern fences must be replaced with Razor Diamond Mesh be considered or electric fence using spring steel wire

		3. Office gate should remain locked	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 3. 2 x Community Liaison Officers 5. Officers appointed as Peace Officers 6. Station District Law Enforcement Component	1. Weltevereden office security system should include a response system 2. City employed private security with mobile support to patrol coastal road esp. parking areas 3. Investigate sand mining permits	1. Demarcate reserve using cement poles 2. Erect signage 3. Move Macassar Gate 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

7 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:

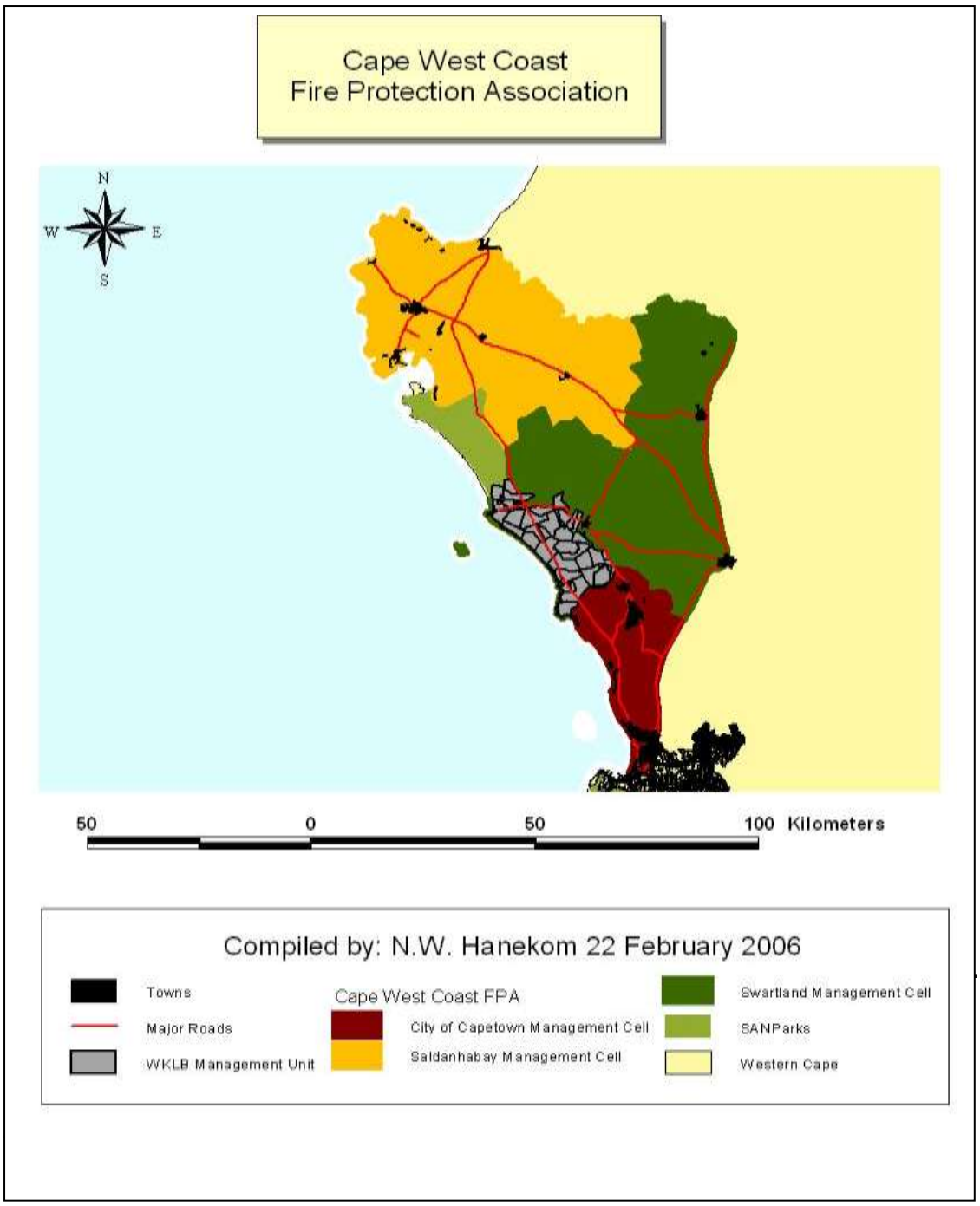
To supply and install one gate camera – Peak inversion camera, auto-iris lens, 40m co-axial cable, power supply, 4-channel embedded digital recorder (250 G) hard drive and one 17 inch monitor. Price includes camera housing and installation R 11 900,00 excl.

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.

CAPE WEST COAST FIRE PROTECTION ASSOCIATION

MAMRE - TABLEVIEW VELDFIRE MANAGEMENT UNIT: FIRE MANAGEMENT PLAN

[DRAFT 4 – JULY 2009]



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This management plan must be reviewed annually prior to the start of the fire season by the Veldfire Management Unit for approval by the association's Fire Protection Officer

1. BACKGROUND DESCRIPTION OF THE VELDFIRE MANAGEMENT UNIT

1.1. BOUNDARIES (Refer to attached CoCT GIS map)

The northern boundary of the Mamre – Tableview Veldfire Management Unit follows the City of Cape Town – West Coast District Municipal boundary which extends from Silwerstroomstrand on the Atlantic coast to Klein Dassenberg adjacent the N7 national road East of Atlantis. The eastern boundary follows the N7 southwards to Potsdam Road [Du Noon]. The southern boundary extends from Du Noon along the urban edge Potsdam rd to Koeberg rd. to Race course rd. to Marine drive and includes the Rietvlei Wetlands.

Land use outside the urban edge generally consist of small holdings and agriculture. Significant portions of land is also used for nature conservation [Blaauwberg Conservation Area and Koeberg], water catchment management and treatment [Witsand] , electricity generation and distribution [Koeberg Nuclear- and Atlantis Gas electricity generation plants], solid waste management [Vissershok] and coastal resorts [Big Bay, Eerste Steen and Silwerstroomstrand]. A significant portion of this area is untransformed which results in a homogenous vegetation dominated by shrubs associated with Renosterveld, Sandplain Fynbos and Dune Thicket vegetation types.

Alien invasive vegetation dominated by *Acacia saligna* [Port Jackson] and *A. cyclops* [Rooikrans] are commonly occurring in these as well as frequently disturbed undeveloped areas.

The fire risk in this area is high as a result of the relatively high amount of biomass combined with increasing human activity in the rural areas beyond the urban edge.

Three Municipal Fire Stations (Atlantis, Milnerton and Melkbos) are situated within the abutting urban edge as well as the Designated Eskom Koeberg Fire and Emergency Service.

1.2. WATER SUPPLY POINTS

Rainfall in this area is generally low, therefore permanent waterbodies of decent proportions are relatively absent on the surface. Waterbodies which are suitable for replenishing water for aerial fire fighting with helicopters are as follows;

Coordinates in degrees minutes and seconds

- Birkenhead Golf Estate S 33˚ 44'04" E 18˚ 27'26"
- Bon Esperansa farm S 33˚30'44" E 018˚37'95"
- Burgerspost Telkom Tower S 33˚ 31'07" E 18˚31'42"
- Dassenberg Witsand S 33˚ 37'52" E 18˚ 26'47"
- Diepriver and Rietvlei S 33˚50'37" E 018˚ 29' 41"– [Refer to attached map for sections of Rietvlei and Diepriver that must be avoided when replenishing water during aerial fire fighting]
- East of Atlantic Beach Golf Estate, S 33˚44' 04"E 018˚ 27'24"
- Mamre Quarry S 33˚ 30'51" E 18˚ 27'12"
- Melkbos waste water treatments S 33˚ 42'30" E 018˚ 27'30"
- The Atlantis Waste Water treatment plant S 33˚ 36'62" E 18˚ 28'79"
- Eskom Koeberg Nature reserve S 33˚40'46" E018˚37'13"

All suitable water bodies and hydrants outside the urban edge that can be used for the replenishing of water trucks and skid units are indicated on the map which will be used in conjunction with this management plan. The water treatment plants, reservoirs and pump stations in the area are provided with fire hydrants

1.3. FIRE BREAKS

In terms of the National Veld and Forest Fire Act, every landowner must prepare and maintain firebreaks along the boundary of his/her property unless exempted by the Minister.

Frequently maintained firebreaks are provided at:

- Witzand Water Works
- SANDF shooting range
- Eskom Koeberg Nature Reserve,
- Underneath Eskom transmission lines,
- Saldanha – Milnerton oil/gas supply line.
- Underneath CoCT distribution network.

The construction and maintenance of firebreaks should be performed in an environmentally responsible way and meet all specifications stipulated by the Fire Protection Officer. Lastmentioned is responsible for the annual auditing of all firebreaks in the CWCFPA.

1.4. AIRCRAFT LANDING STRIPS

The Delta 200 airfield is centrally situated in this Veldfire Management Unit area owned by Peter Dale tel.no. 082 807 4919 and it has a tarred runway approximately 800 metres long, coordinates in degrees minutes and seconds- S 33˚39'042" E 018˚27'060"

The nearest alternative tarred landing strips are:

Coordinates in---degrees, minutes and seconds

- Morningstar [Koeberg Flight Park]. S33˚45'63" E 018˚33'18"
- Ysterplaat Air Force Base coordinates S33˚54'35" E018˚29'25" Telephone — 021 508 6911

1.5. AREAS OF HIGH FIRE RISK [INDUSTRIES, INFORMAL DEVELOPMENTS, DUMP SITES AND PICNIC AREAS

The following places were identified as areas of note:

- Brickworks – Brakkefontein Road.
- Doornbach – southeastern border of FPA
- Edge of development off West Beach (Nature Conservation grounds)
- Klein Dassenberg road,
- M19 Morningstar – Mamre Road and
- N7 National Road,
- Ogieskraal – Informal settlement near Sewerage Works near Melkbos 4x4
- Ou Skip Caravan Park [Melkbosstrand]
- Pella informal settlement
- Picnic areas at Pella Holiday Farm,
- R27 West Coast Road,
- Rietvlei Bos — Informal settlement behind Melkbos Police Station
- Silwerstroomstrand Holiday Resort

- Silwerstroom Road
- Small farms Eest of Mamre [Silwerstroom Road]
- Small farms East and South of Atlantis
- Spoorkamp and Lawaaibos — Informal settlement at Vissershok waste site
- Tipsite — Informal settlement West of Atlantis
- Witzand off road vehicle trail.
- Witsand — Informal settlement East of Atlantis

1.6. VEGETATION AGE

Fires were experienced during the past 7 years between Atlantic Beach Golf Estate and Ou Skip Caravan Park, the Melkbos 4x4 trail and Eskom Koeberg Nature Reserve. Prescribed burns were performed during this time in the Royal Ascot reserve. A scientifically based prescribed burning programme should be prepared for this management unit. This will ensure amongst others that ecological factors are enhanced and fire risks appropriately reduced.

1.7. PROPERTIES OF MEMBERS

A relatively large proportion of properties within the management unit area are government or quasi – government owned. In terms of the Veld and Forest Fire Act all government owned properties are automatically members of the FPA

These properties are:

- Atlantis [Wesfleur] Waste Water treatment works [City of Cape Town]
- Blaauwberg Conservation Area [City of Cape Town Nature Conservation]
- Groot Springfontein
- Eskom Koeberg Nature Reserve
- Melkbos Waste Water treatment works [City of Cape Town]
- Rietvlei
- Shooting range North west of the R27 [SANDF]
- Silwerstroomstrand [City of Cape Town Amenities]
- Small farmers – Atlantis Kleinboere [Department Public Works]
- Vissershok Solid Waste dump site [City of Cape Town Solid Waste]
- Witzand aquifer Conservation Area [City of Cape Town Bulk Water]

Abovementioned properties represent ±30% of all properties bigger than 10 [ten] hectare in this Management Unit area. Non members [mostly private landowners] will continue to be encouraged by existing members to join the Cape West Coast Fire Protection Association as it serves the best interest of the majority of landowners in the area.

1.8. BASE WHERE EQUIPMENT IS STORED

Should firefighting equipment be donated to the management unit by the FPA, it will be stored at Atlantis Fire Station due to its central position, accessibility and good security.

In terms of the National Veld and Forest Fire Act, every landowner on whose land a veldfire may start or burn or from whose land it may spread must have fire fighting equipment, protective clothing and trained personnel available on his/her property.

1.9. CONTACT DETAILS OF MEMBERS AND INVENTORY OF VELDFIRE FIGHTING EQUIPMENT

Please complete the template below for properties under your control

PROPERTY	CONTACT	NUMBER	TRAINED STAFF	VEHICLES	2-WAY RADIOS	FIRE FIGHTING EQUIPMENT
Atlantis Witzand Bulk Water	**John Charles**	**0845545784** **0215775002** **0848802018**	**18**	**1x 4x4 with 500l Bakkie sak** **1x 2X4 with 500l Bakkie**	**6**	**Generator & lights** **5x Drip torches** **5x Spades**

	AF Carlse	**0832696548**		**sak** **1x Mercedes 4x4 with 3000l high pressure pump and double reel hoses** **1x Leyland Horse with 2 x 10 000l water tanks** **1x Quad Bike** **1xScrambler** **1x Trailer**		**5x Plakke** **2x Rakes** **1x Breathing apparatus** **4x Hand held brushcutters** **Chain saw** **Bolt cutter**
Witzand aquifer Conservation	**Charline Mc Kie**	**0799604107**	**1**	**4x4**	**3**	
SANDF Dassenberg	Riaan Muller	0828146018	1	1 X Samel		

Eskom Nuclear Division **Eskom Transmission** **Eskom Koeberg Nature Reserve**	Rhine Barnes M Verwey Gert Greeff	0215504444 0727396718 0827844374 0215532447	5 4 permanent 4 contract	1 X Samel 1 X Mini Pumper 3 LDV Skidunits. 1 4x4 truck 6000l tanker with pump unit. 1 4x4 tractor – trailer 5000l water and pump unit.	5	See attached list Brushcutter 2 Drip torches 6 Spades , 6 rakes,10 short bushbeaters, 20 long bush beaters,5 chainsaws, 3 brushcutters 3 mobile water tanks, 1 bolt cutter
Rietvlei (BCA)	Koos Retief	0215501086 0215575509 0827886987	7	Nissan skid unit 2x Transporters	3	10 Spades 11 Fire Beaters 5 Rakes 1 Chainsaw 2 Bush cutters
City of Cape Town **Fire and Rescue Service**	Ian Schnetler FB van der Byl	0215901741 0842481132	Sufficient for jurisdictional area	Sufficient for jurisdictional area	Sufficient for jurisdictional area	Sufficient for jurisdictional area

Road and Storm water	Roland Carelse	0843001125	0			0
Blaauwberg Conservation Area	Jaques Kuyler	082 967 2551	10	1x Skid 2 (4x4)	5	
Electricity	Isaac Prins Tony Charles	0215737001 0842481125		3x4x4	3	0

1.10. ACCESS – PRIVATE ROADS

A thorough network of roads is present to reach veldfires throughout the area. Sand and gravel tracks of FPA members are indicated on the latest 1:50 000 topographical maps.

1.11. BUILDING STRUCTURES

Buildings of FPA members are indicated on the latest 1:50 000 topographical maps.

2. COMMUNICATION

The 1:50 000 topographical maps [3318 CB and 3318 CC] are essential communication tools for use by members and the authorities. All relevant roleplayers e.g. Municipal fire departments should be supplied with these maps and management plans.

Communication during veldfire events between members will generally be via cell phone. Certain landowners are equiped with two way radios for communication with their staff members [fire fighting teams].

With the anticipated improvement in the financial position of the FPA in the longer term, two way radios should be purchased for use by the various management units.

3. PLANNED PRESCRIBED OPEN BURNS

Due to the potential of a prescribed open burn turning into a runaway fire, these type of burns must be approached with great care. In the Mamre - Tableview Veldfire Management Unit, the burning of stacked alien vegetation, firebreaks, rubbish dumps and harvested wheatfields will be regarded as prescribed burns.

Procedures and guidelines for prescribed open burns:

- Prescribed burns are restricted to the annual period of 1 May to 30 September and must be extinguished by 16:00 p.m No burning permitted over weekends and Publick holidays.

Note: All prescribed burns necessary for the ecology of the fynbos ecosystem that falls outside the timeframe 1 May — 30September are subject to special request and monitoring.

All prescribed open burns are subject to the following procedures and guidelines:

- The Fire Danger Index may not exceed ''yellow'' conditions, in other words the FDI must be blue, green or yellow on the particular day.
- All directly neighbouring landowners must be timely informed of the intended burn.

- Written application for a burning permit must be lodged timely with the Fire Protection Officer as well as the City Of Cape Town pollution Control Officer, for onward submission to the relevant Sub council for final approval. No prescribed open burn may be performed without a landowner being in possession of such a permit.
- *[Advice – the application to burn should not be limited to one day only. Create the option to burn on a suitable day by applying to burn on any one day during a 1-2 week period. Should conditions prove to be suitable, the landowner's decision to commence with the burn should be confirmed with the Fire Chief and direct neighbours in the 24 hours prior to the burn. This approach alleviates any pressure on the landowner to go ahead with the burn despite unfavorable environmental conditions].*
- If a prescribed open burn in an area adjacent to or surrounded by natural vegetation is performed, the following must be in place:
    - A freshly cut/ploughed firebreak of at least 10 meter wide must surround the area to be burned. It is advised to wet the firebreak thoroughly before the burn commence.
    - At least one properly equipped and trained firefighter must be provided for every 50 meter distance along the firebreak perimeter. In other words if the distance of the firebreak amounts to 1 kilometre, a minimum of 20 trained and equiped firefighting staff should be present at the scene of the fire.
    - At least one person at the scene of the controlled burn must be provided with a radio or cell phone plus member's cell numbers/callsigns to contact the neighbouring properties and municpal fire fighting services should it be required.
    - Each firefighter must have completed accredited veldfire fighting training and be provided with the minimum protective clothing and firefighting equipment.
    - At least 1 litre water to be applied with an operational pump and firehoses need to be available for every meter of firebreak. In other words if the firebreak is a distance of 1 kilometres at least 1000 litre of water must be readily available for use.
    - When a prescribed open burn is ignited the planned area to be burned must be positioned upwind and or down slope.
    - Should a prescribed open burn get out of control, the direct neighbours and municipal fire fighting services must be notified immediately.
    - The area burnt must be staffed for at least 48 hours after the fire has been extinguished.

7.1.1.1.1.1

7.1.1.1.1.2 **4.** VELDFIRE FIGHTING PREPARATION

4.1. PRE SEASON

An annual veldfire state of preparation audit of all the individual member's will be performed prior to / early in the fire season by the Fire Protection Officer or delegated members of the FPA's executive commitee. The audit includes:

- On site inspections of firebreaks and fire fighting equipment.
- Evaluate fire fighting management plans.
- Evaluate training programmes and firefighting drills.
- Evaluate operational efficiency of the Veldfire Management Unit through a combined annual simulated veldfire drill which involves both private land owners and the authorities.

4.2. IN SEASON – Fire Danger Index

The Fire Danger Index is available from the Cape Town Met office. All members will be informed by the Veldfire Management Unit chairman of Orange/Red conditions.

7.1.1.1.2 FIRE DANGER INDEX

7.1.1.1.3 BLUE

- No preventive action required

GREEN

- Perform prescribed burns in accordance with guidelines

YELLOW

- FPA fire fighting staff on standby according to set times.
- Reconsider intentions if prescribed burns are scheduled during less than favourable weather conditions

ORANGE

- FPA fire fighting staff on standby according to set times.
- Subject to rating limitations no prescribed burns are allowed.

Red

- FPA fire fighting staff on 24 hour standby.
- No prescribed or open fires are allowed
- Reaction team is available near firefighting equipment
- Test the working of firefighting equipment on a daily basis and maintain a state of full operational alert.

Protocol on Red days

Members are encouraged to post fire scouts on a rotational base between members to lookout points in order to provide early warning of veldfires in the area. The fire scouts must be equipped with a radio/ cellphone to contact the members.

7.1.1.1.3.1.1 4.3. REPORTING OF VELDFIRES AND STATISTICS

All veldfires must be reported to the FPO. The Fire Protection Officer [FPO] will record and map all veldfire incidents within the Cape West Coast FPA as per the guidelines of the Department Water Affairs and Forestry. It is the responsibility of every management unit coordinator to ensure that this information is forwarded to the FPO.

7.1.1.1.3.2 5. STAFF AND TRAINING

5.1. TRAINING

In accordance with the National Veld and Forest Fire Act, each property owner is responsible to have trained firefighting staff available on his/her property. Veldfire training is provided by the following institutions:

- Red Watch

- WOF

- MTO-Forestry

- Eskom Koeberg

- Cape Nature Conservation Cooperation

- SAN Parks

5.2 ROLES AND RESPONSIBILITIES

The immediate and agressive fighting of an veldfire on your own or your neighbour's property is each member's responsibility. When smoke or fire is detected on a property the affected landowner/s and neighbours must be immediately notified.

If no response is received or assistance requested by the property owner, the member should immediately deploy his/her firefighting team to the scene of the fire.

Neighbouring properties and the local fire department should be informed and requested to be on standby until the situation has been assessed [unless it is clear that a significant amount of resources are going to be required].

As a general policy, assistance by landowners and fire services further away from the scene of the fire will only be called upon once all available resources in the area have been committed to provide assistance. The decision to call for additional assistance should however not be delayed unnecesary.

Evaluate the position, size, speed of fire, atmospheric conditions and immediate/potential threat to life and property before standby crews and the Fire Protection Officer are called out.

In the absence of professional fire services, the property owner [or an assisting FPA member] should take up the role of Crew boss/leader and exercise control of his staff members [FPA firefighting Crew/s]. Should additional resources from the owner/ neighbouring properties arrive to assist with the firefighting effort, they must first report to the Crew boss/leader to inform him/her what resources are available, provide a cell number/ radio frequency and call sign and and be informed of the firefighting strategy [it is not only potentially dangerous but also a waste of valuable resources to waste your and your crew's efforts in an area of low priority / high risk without others knowing of your whereabouts, or leaving the scene without informing anyone].

Should several Crew bosses/leaders with their crews arrive at the scene of the veldfire, it becomes necessary that a suitable Crew leader who is able to coordinate the efforts of the fire fighting crews, be identified. This person shall take up the role of the Fireboss

Establish an interim command and control centre [which contains a map of the area, fire management plan, list of available resources]. Should the property owner be available during the veldfire event, it is advised that he/she remains in close contact with the command and control centre as his/ her knowledge of the property may be of value to decision making.

Firebosses can be replaced/ relieved during the veldfire event as required by circumstances. A proper handover must be performed i.e.

- What is the firefighting strategy
- What resources are available and where are the deployed
- Radio call signs/ cell numbers of crew leaders and fire scouts.

In the event of a large veldfire the responsibilities of the Incident Commander (IC) may include the following:

- Establishing a command and control centre which enables him/her to communicate with all crew leaders, fire scouts, municipal services and suppliers. Communication will generally take place via cell phone and where available two way radios.
- Arrange for evacuation where lives and properties are in danger.
- Call for the addition/ reduction of resources should it be required.
- Make logistical arrangements e.g. fuel, water, food, shelter and medical facilities for crews.
- Handle media interviews and enquiries from the public.

A Crew boss/leader must ensure that his team members are at all times within visual communication distance. No crew member/s may leave their assigned area without informing the Crew boss who in turn will keep the Fireboss informed of relevant events at his assigned section of the fire. It includes keeping the Fireboss informed of significant changes in fire behaviour as observed from the Crew boss's assigned position.

7.1.1.1.3.2.1

7.1.1.1.3.2.2 6. LOGISTICAL ARRANGEMENTS

6.1. FOOD RATIONS

Policy :

- FPA firefighters called out after hours or during weekends to a veldfire are required to provide their own food for the first 4-6 hours after having arrived at the firescene. Food parcels are to be made available after this period by the FPA.
- Food parcels are thereafter to be issued every 4-6 hours.
- The purchase of food parcels are to be refunded from FPA funds.
- The purchase of food parcels must be approved by the Fire Protection Officer.
- The Fire Protection Officer is responsible to identify food suppliers.
- All food purchase invoices are to be handed over to the Fire Protection Officer.
- All food parcels issued must be accounted for by the Fire Protection Officer.

Recommended content of food parcel

Amount	***7.1.2 Content***	*Weight*
1	*Tinned Bully beef / viennas)*	*190g*
1	*Tinned vegetables [corn/beans)*	*225g*
1	*Tinned fruit (peaches/fruit cocktail)*	*225*g
1	*Energy bar*	*50g*
1	*Cheese*	*30g*
1	*Energy drink [powder)*	*20g*

1	*Cookies/ Biscuits*	*200g*

NB : The Shelf life of items to be closely monitored and to be appropriately disposed of when expired.

The content of the food parcel may vary but not the total weight thereof.

7.1.2.1 The maximum number of food parcels that will be purchased/stored at any time = 50

The Shelf life of items to be closely monitored and to be appropriately disposed of when expired.

6.2. WATER

7.1.2.1.1.1 Crew bosses are responsible for the provision of drinking water for the first 4-6 hours after arrival at the fire scene. A simple method of replenishing water supply of each crew is to transport a number of 10- 25 liter water containers on their own vehicles.

7.1.2.1.1.2 Should the duration of a veldfire event exceed 4-6 hours it is the responsibility of the Fireboss to arrange through the Fire Protection Officer for the provision of food and drinking water supplies to be provided to firefighting crews, support services [e.g. traffic dept., police and ambulance service] and persons staffing the command & control centre.

7.1.2.1.1.3 7. OCCUPATIONAL HEALTH & SAFETY

7.1. FIRST AID

Every FPA member is responsible to maintain a well stocked first aid kit to be kept in the vehicle of the Crew Leader at the fire scene.

The following basic first aid equipment is recommended:

- Crepe bandage
- Plaster
- Splints
- Parafin gauze
- Eye drops

- Latex gloves
- Scissor
- Space blankets
- Disinfecting agent e.g [Savlon/Detttol]
- Gauze schwabs
- Anti histamin cream
- Burn Shield

Should a veldfire endure for an extended period the Fireboss / IC should consider setting up of a first aid base manned by paramedical staff.

7.2. PROTECTIVE CLOTHING

Policy:

- Every property owner is responsible to provide its fire fighting staff with relevant protective clothing.
- Fire fighting protective clothing should be stored near fire fighting equipment for easy access.
- Fire fighting protective clothing should only be worn during actual veldfires or veldfire drills. It is vital that said clothing is worn during fire drills in order to identify potential problems timely [e.g. boot blisters].

The following protective clothing is advised [E – essential; O – optional]

Leather boots [E]

Leather gloves [E]

Overall [E]

Safety glasses [O]

Water bottle [O]

Backpack/ belt [O]

Headlamp [O]

Hardhat [yellow- crew member: red – crew boss] [O]

Bandanna [yellow – crew member; red – crew boss] [O]

7.3. EMERGENCY TELEPHONE NUMBERS

Local Authority fire fighting services	*Malmesbury* *West Coast District Municipality* *Cape Town Fire & Rescue*	*022 4879400* *022 4338825* **107 (Cell) 021 4807700**
Hospitals & clinics	*Atlantis* *Langebaan* *Malmesbury*	*021 571 8040* *022 707 5033* *022 487 9400/ 482 1161*
Ambulance Services	*Moorreesburg* *Peninsula* *ER24*	*022 433 2769* *10177* *084 124*
SAPS	*Atlantis* *Darling* *Malmesbury* *Moorreesburg* *Metro Police*	*021 571 8500* *022 4091300* *022 482 7500* *022 4338660/1* *021 596 1999*
Provincial Traffic	*Cape Town*	*021 4832213 / 4835114*
Fire Protection Officer	*Bertus Senekal*	*O22 4338826* *0832364588*

Electricity	*COCT*	*107*
Working on fire	*Pierre Combrinck*	*082 923 7000*
FPA Executive Committee Chairperson	*Steyn Marais*	*083 635 9929*

8. MEDIA LIAISON

During a veldfire event in the absence of the City's Fire and Rescue Service Incident Commander the following persons are allowed to address the media:

- Fire Protection Officer
- Fire Boss
- Cape Nature
- The affected property owner/ manager

Note: In the jurisdictional area of the City Of Cape Town the City's protocol in respect of media liaison will be followed. (media liaison officer will be appointed)

7.1.2.1.1.3.1 9. AWARENESS RAISING

9.1. MEMBERSHIP DRIVE- FPA membership application forms are available from the Cape West Coast Biosphere Reserve office and the CWCFPA Executive Comittee members.

Certain costs will initially be absorbed by the Cape West Coast Biosphere Reserve and FPA members.

- All persons / organisations who previously expressed interest, will initially be kept informed of the various committee's progress through the distribution of minutes via e mails and delivery of hard copies.
- Regular reports in local newspapers through Working on Fire's media liaison official. The FPO will liase on an ongoing base with last mentioned.
- The possibility of using local agricultural or similar shows to promote awareness of the FPA should be considered]

9.2. VISITORS TO THE AREA

The provision of awareness raising signboards at strategic entrances along the boundary of the FPA should be considered once the FPA is in a sound financial position / sponsor is identified. Provision should be made to have the Fire danger index indicated on these signboards. Members whose properties are frequented by visitors should be encouraged to indicate dangerous Fire danger index ratings at a conspicuous position on their properties.

9.3. FARM WORKERS AND FAMILIES

Accredited veldfire fighting training must be provided to the minimum numbers of staff members as identified in the rules of the FPA. Veldfire training will be evaluated annually by the FPO.

10. REPORTING OF VELDFIRES

10.1. MEMBER

From an administrative viewpoint, any veldfire on a member or neighbour's property must be immediately reported to the FPO or the Veldfire Management Unit chairperson. Post fire details such as the property [non FPA members included] where the fire occurred, the date and time, cause of the fire, losses occurred and resources involved in the firefighting effort should be reported within 48 hours after the fire to the abovementioned persons.

10.2. FIRE PROTECTION OFFICER [FPO]

- Inform relevant roleplayers [e.g. Municipal Fire Services, Cape Nature, West Coast National Parks, SAPS, Traffic, Provincial roads, Escom, Telkom]
- Evaluate fire
- Activate Working on Fire team [if necessary]
- Arrange aerial fire fighting support [if required]
- Place other resources on standby
- Inform neighbouring management units and place them on standby [if necessary]
- Establish an operational centre [command and control, first aid, ration storage area, crew resting facilities]

The FPO is responsible to provide annual veldfire statistics for his/her area to the Minister of Water Affairs and Forestry.

11. AERIAL FIRE FIGHTING SUPPORT

*8 **POLICY***

- Property owners may request fire fighting aerial support for their own account if a prior written agreement for the provision of this service is in place.
- No aerial firefighting service will be provided to private landowners or the CWC Fire Protection Association in the absence of a prior written agreement.
- The decision to call in aerial firefighting support for the account of the CWC FPA rests with the Fire Protection Officer.

Note: The Western Cape Aerial fire fighting SOP to be followed within the City/s jurisdictional area.

8.1.1.1.1.1 12. VELDFIRE FIGHTING EQUIPMENT

Policy

- All equipment donated by the CWCFPA remains the property of the association and may only be used for veldfire related activities of the CWCFPA.
- All fire fighting equipment made available by members, remain theirs. The CWCFPA may not lay claim to any such equipment.
- Members are to ensure that they have sufficient insurance cover in the immediate term. The CWCFPA will pursue the possibilities of a reduced group insurance for its members during the longer term.
- The FPO is responsible to ensure that all fire fighting equipment which belongs to the CWCFPA and its members are maintained in a fully operational state and available for deployment at all times during the fire season [Oct – Mar].

8.1.1.1.1.2 13. TRANSPORT AND FUEL

Policy :

- No member may claim transport / fuel expenses incurred from the CWCFPA as a result of participating in a veldfire fighting event.
- In the event of special trips e.g. to collect rations, the expense incurred may be claimed back from the CWCFPA. It must however be done in prior consultation with the FPO.
- WoF teams may be transported by any member who is willing to collect them from their base station.

- The CWCFPA will only provide fuel for its own equipment e.g. water pumps and drip torches.
- The storage of fuels must comply with legislated safety and security standards.

14. ACKNOWLEDGEMENT

Appreciation is expressed to the members of the Mamre - Tableview Veldfire Management Unit for their valuable input provided thus far into the compilation of this document.

15. BILLING

In accordance with section ten (10) of the Fire Brigade Services Act, Act 99 of 1987, the City of Cape Town shall bill all landowners for services rendered by the Fire and Rescue Service as per the City/s approved tariff structure.

Francis Van Der Byl

July 2009

APPENDIX 11 – INVASIVE SPECIES MANAGEMENT UNIT CLEARING PLAN

WORKLOAD ASSESSMENT (P1)	
RESERVE or SITE NAME:	**Blaauwberg Conservation Area**
TOTAL AREA IN HECTARES	**1445**
FINANCIAL YEAR	**2010/11**
MANAGER RESPONSIBLE FOR RESERVE or SITE AND CONTACT DETAILS:	**Ettienne Jacques Kuyler Tel: 021 554 0957 / 2745 Email: ettienne.kuyler@capetown.gov.za**
NAME OF PERSON CONDUCTING SURVEY:	**Ettienne Jacques Kuyler**
CONTACT NUMBER:	**021 554 0957**
LANDOWNERSHIP:	**City of Cape Town / Provincial Government Western Cape and managed by CCT (Part proclaimed as Provincial Nature Reserve)**
LANDUSE:	**Proclaimed Nature Reserve**
ADJACENT LANDUSE - POTENTIAL FIRE RISK OR RE-INVASION:	**Agriculture / Residential**
MONTH AND YEAR:	**10.2010**
ADDITIONAL COMMENTS	**N/A**

APPENDIX 12 – SENSITIVITY VALUE ANALYSIS AND ZONATION

SENSITIVITY- VALUE ANALYSIS AND ZONATION PROCESS:

BLAAUWBERG NATURE RESERVE

Prepared for the Biodiversity Branch and Environmental Management Systems Branch

AUGUST 2010

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Natural Resource Specialist

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CITY OF CAPE TOWN | ISIXEKO SASEKAPA | STAD KAAPSTAD

THIS CITY WORKS FOR YOU

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1. INTRODUCTION AND SCOPE OF REPORT

The Blaauwberg Conservation Area (BCA) was proclaimed a local and provincial nature reserve in 2007. The BCA conserves three threatened vegetation types: Cape Flats Dune Strandveld (endangered), Swartland Shale Renosterveld (critically endangered), and Cape Flats Sand Fynbos (critically endangered) as listed under the National Environmental Management: Biodiversity Act (Act 10 of 2004), DEAT (in press) and they are poorly conserved in formal protected areas.

In early 2010, three Garden Cities portions of land were included into the reserve bringing the total reserve area to 1445 Ha (see Figure 1).

1.1 HISTORY

The reserve conserves the heritage site of the 1806 Battle of Blaauwberg, when the British took possession of the Cape from the Dutch for the second time. On Blaauwberg Hill, several buildings were constructed during World War II. These include South Africa's first radar station, a lookout and a mess room. There are several shell middens occurring along the coastline and these date back to the Late Stone Age.

1.2 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.

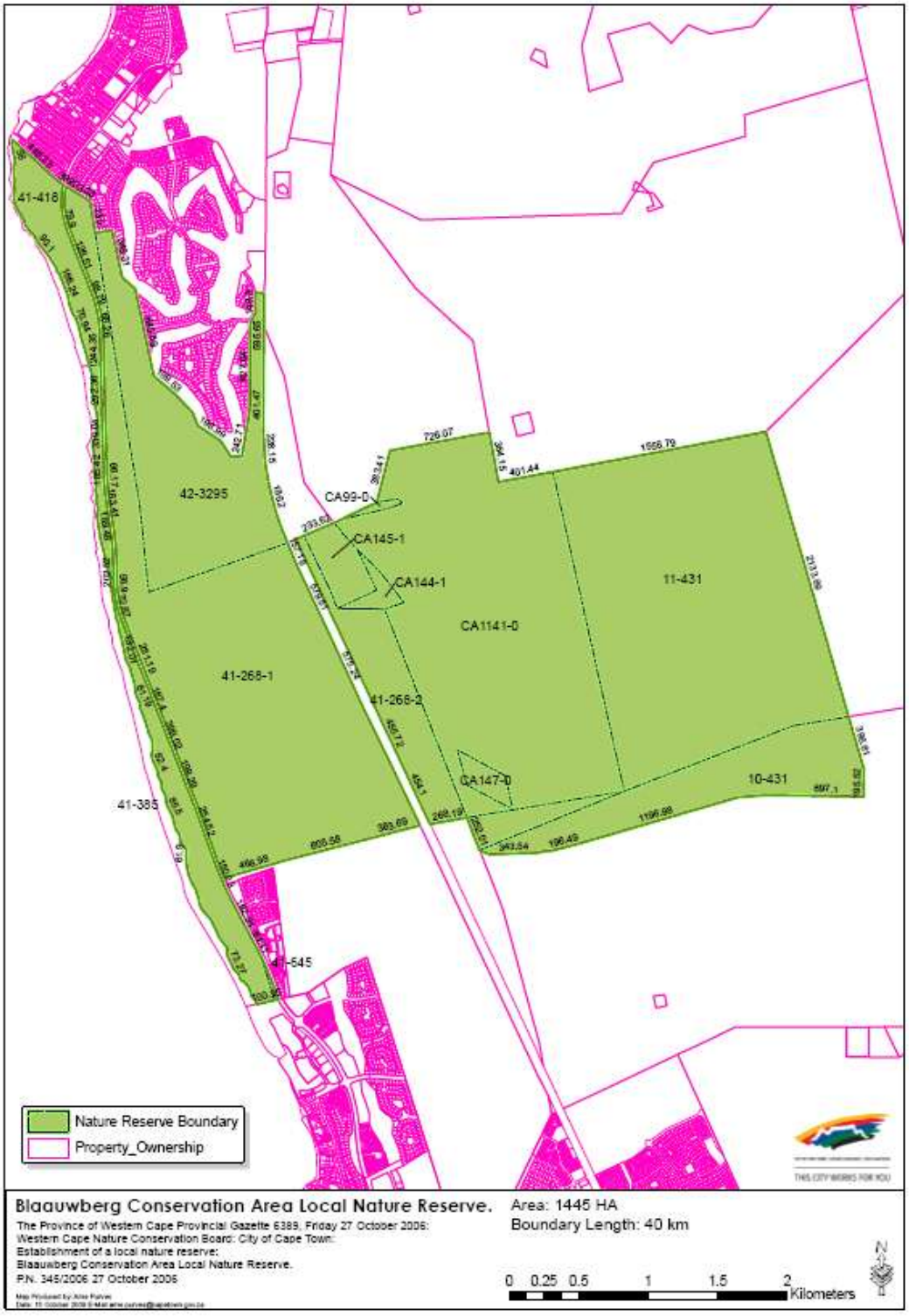


Figure 1: BCA Land Parcels

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 Blaauwberg Nature Reserve, including the road reserves and a marine portion that are not part of the proclaimed nature reserve boundary. The Garden City portions that are to be included in the nature reserve are also included in the study and form part of the reserve boundary. 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 2 shows the vegetation remnants as well as the coastal Special Habitat units.

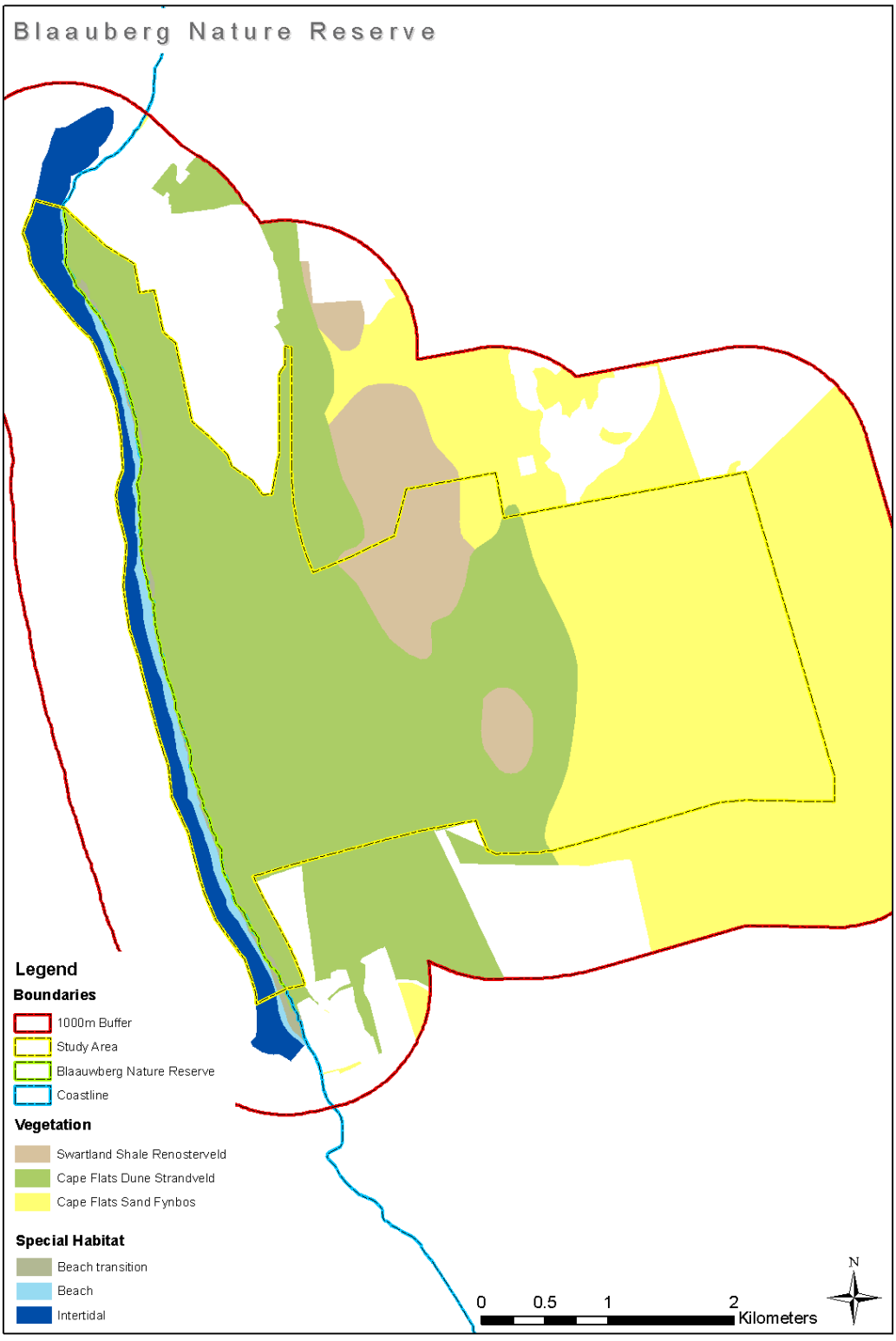


Figure 2: Blaauwberg Nature Reserve National Vegetation Types and Special Habitats

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 3 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

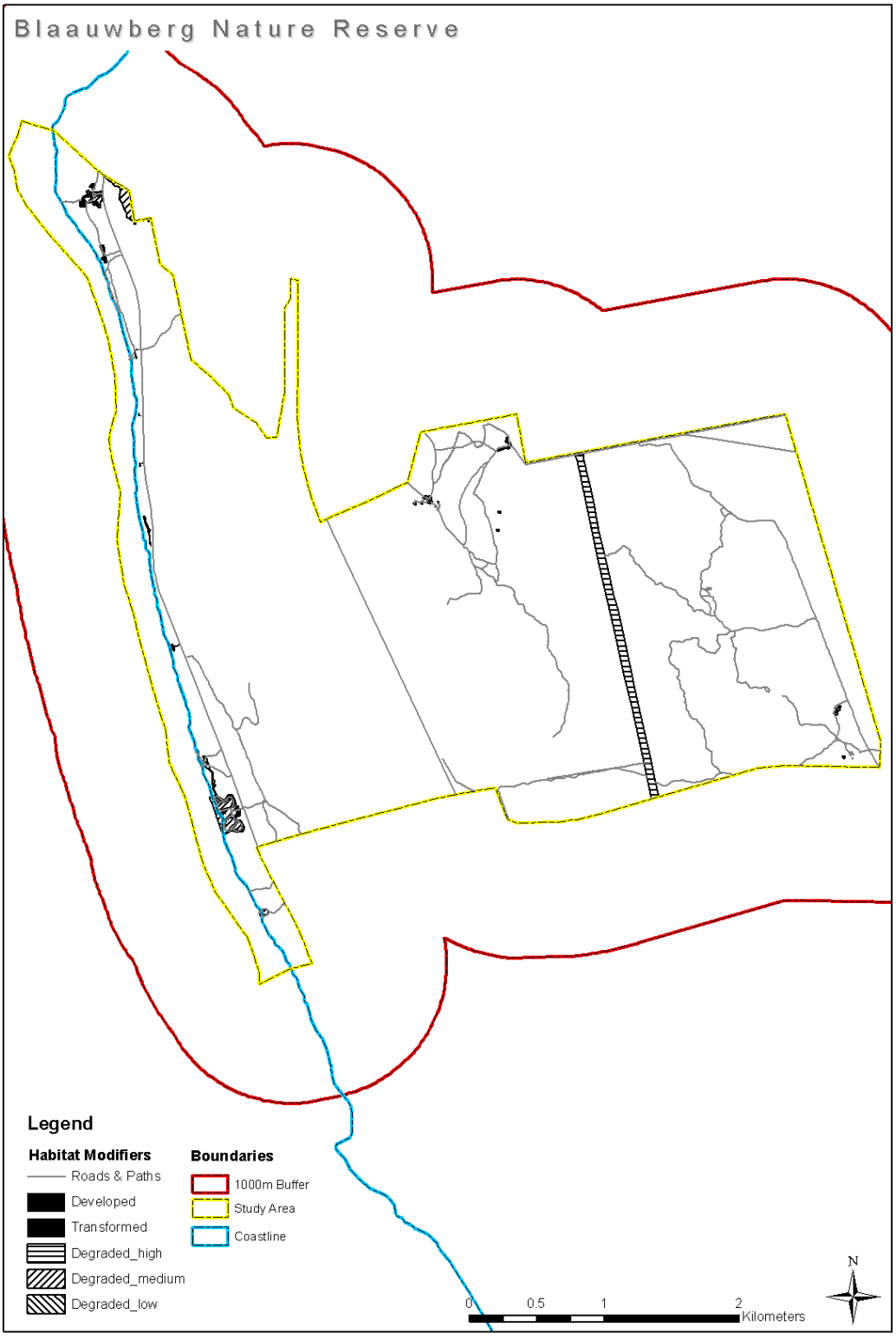


Figure 3: Habitat Modifiers

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 and special habitat types 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*

Special Habitats (Not vegetation based)		
Beach Transition	21	21
Sandy Beach	18	18
Inter tidal zone	15	15

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 BLAU_HabitatValue.shp
8. Create map for report and export

Outputs

See Figure 4

Figure 4: Habitat Value (Modified)

Interpretation in a local context

Cape Flats Dune Strandveld (E), Swartland Shale Renosterveld (CE), and Cape Flats Sand Fynbos (CE) are the predominant vegetation types occurring in the reserve. The transition

vegetation between the CFDS and the beach (referred to as Cape Seashore vegetation in the SA Vegetation map) has been mapped as beach Transition vegetation. There is a significant inter tidal zone consisting of rocky ledges and sandy white beaches. The beach transition area is usually where the historical shell middens are located.

Showstoppers#fatal flaws and special management area informants

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

Alien plant infestation has not been used as an input in the habitat modifier values. The scale and nature of the critically endangered vegetation types, does not warrant reducing habitat values based on the level of infestation. As has been shown in a small area of cleared Cape Flats Sand Fynbos in the reserve, this vegetation type restores readily to a near pristine condition.

3.1.1c 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] This value has been mapped and incorporated into Figure 2.

- 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 marine and coastal portions of the study area are mapped as Special Habitats. They have been incorporated into **Map 2** as the areas do not overlap with the vegetation units (therefore no risk of double counting). It is important that the coastal values are reflected and zoned appropriately.

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: BLAU_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 5

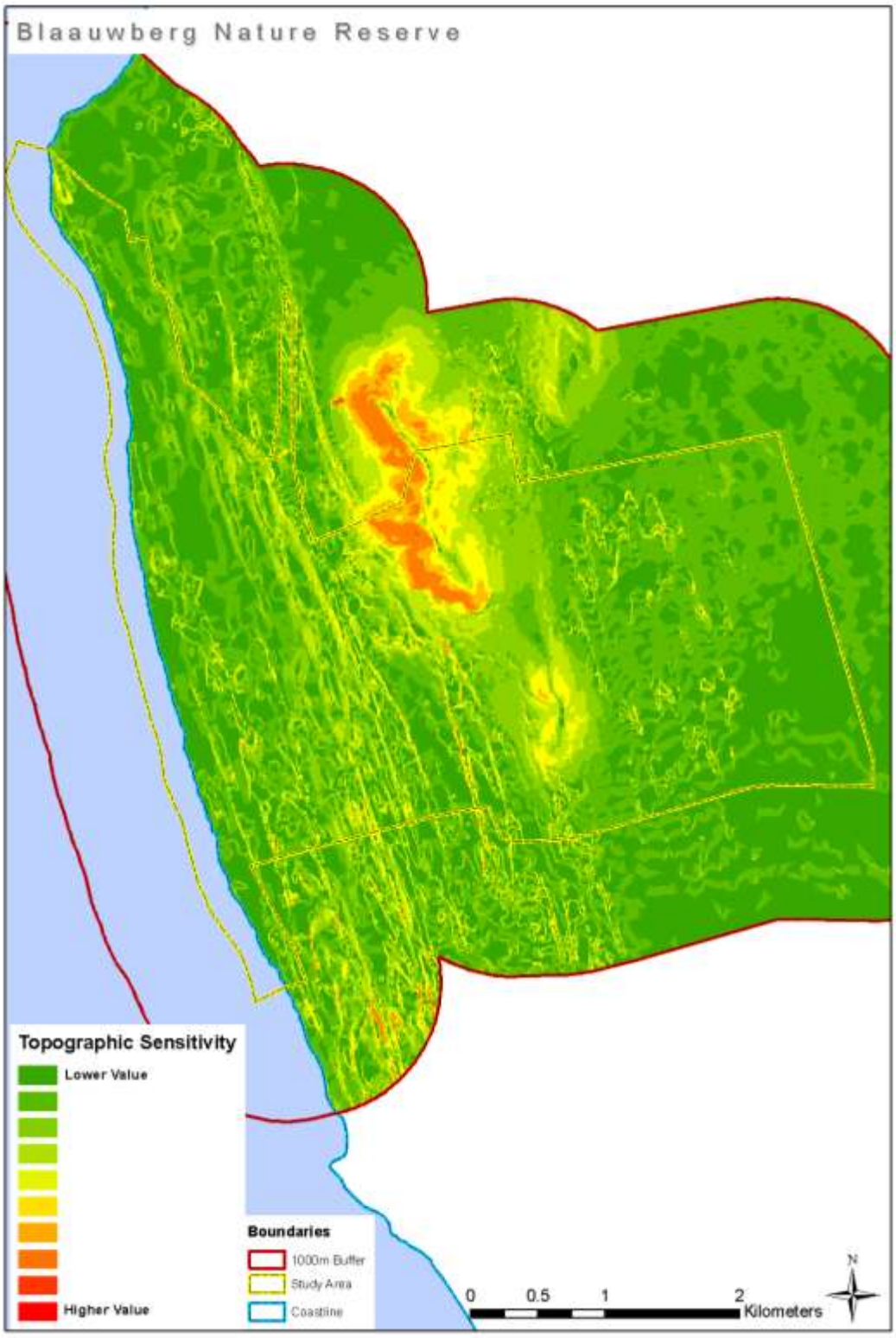


Figure 5: Topographic sensitivity map

Interpretation in local context

Blaauwberg Nature Reserve is characterised by vegetated longitudinal dunes and the steep slopes of Blaauwberg Hill and Kleinberg

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 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 values in Table 5.
- Delete all unnecessary fields.
- Repeat these steps for the artificial/modified wetlands and rivers, using the values and buffer distances specified in Table 5.
- 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: BLAU_hydro_sensitivity.shp

Table 5: Hydrological sensitivity

Source	Category	Value	Note
City Wetlands layer	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 6

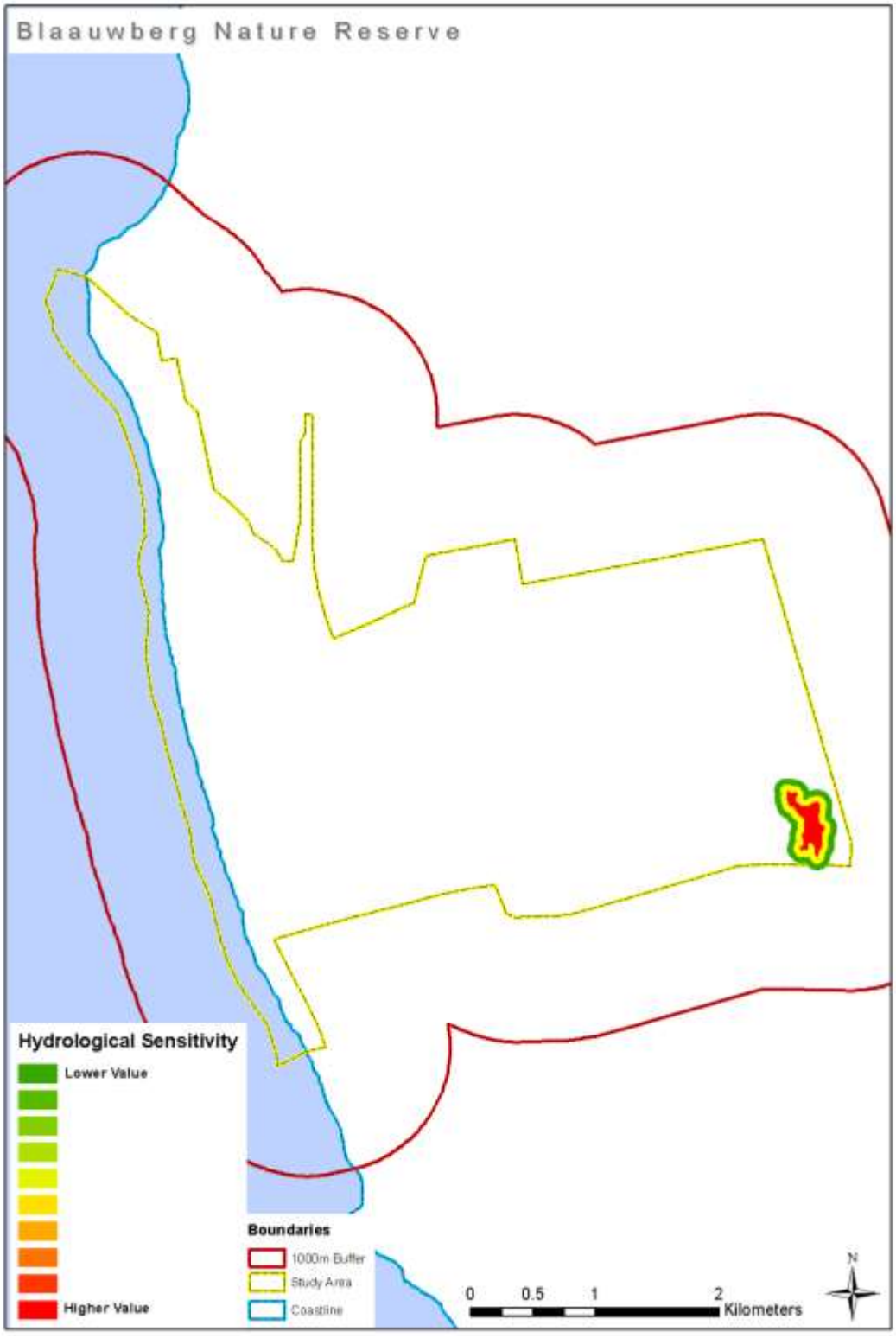


Figure 6: Hydrological Sensitivity

Interpretation in local context

There are no rivers in the Blaauwberg Conservation Area. There is one Sand Fynbos isolated depression wetland type in the reserve. The buffers applied in the analysis are generous and should be refined at a local, site level if required.

Showstoppers/fatal flaws and Special Management Area Informants

The one wetland in the reserve occurs in the old "Outspan" area at Blaauwberg Vlei and has been negatively affected by disturbances in proximity to the wetland. This is an important heritage site.

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		0-10	Analysis based on the TIN

interval; 62 points)		
❑ 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: BLAU_visual_sensitivity.shp

Outputs

See Figure 7

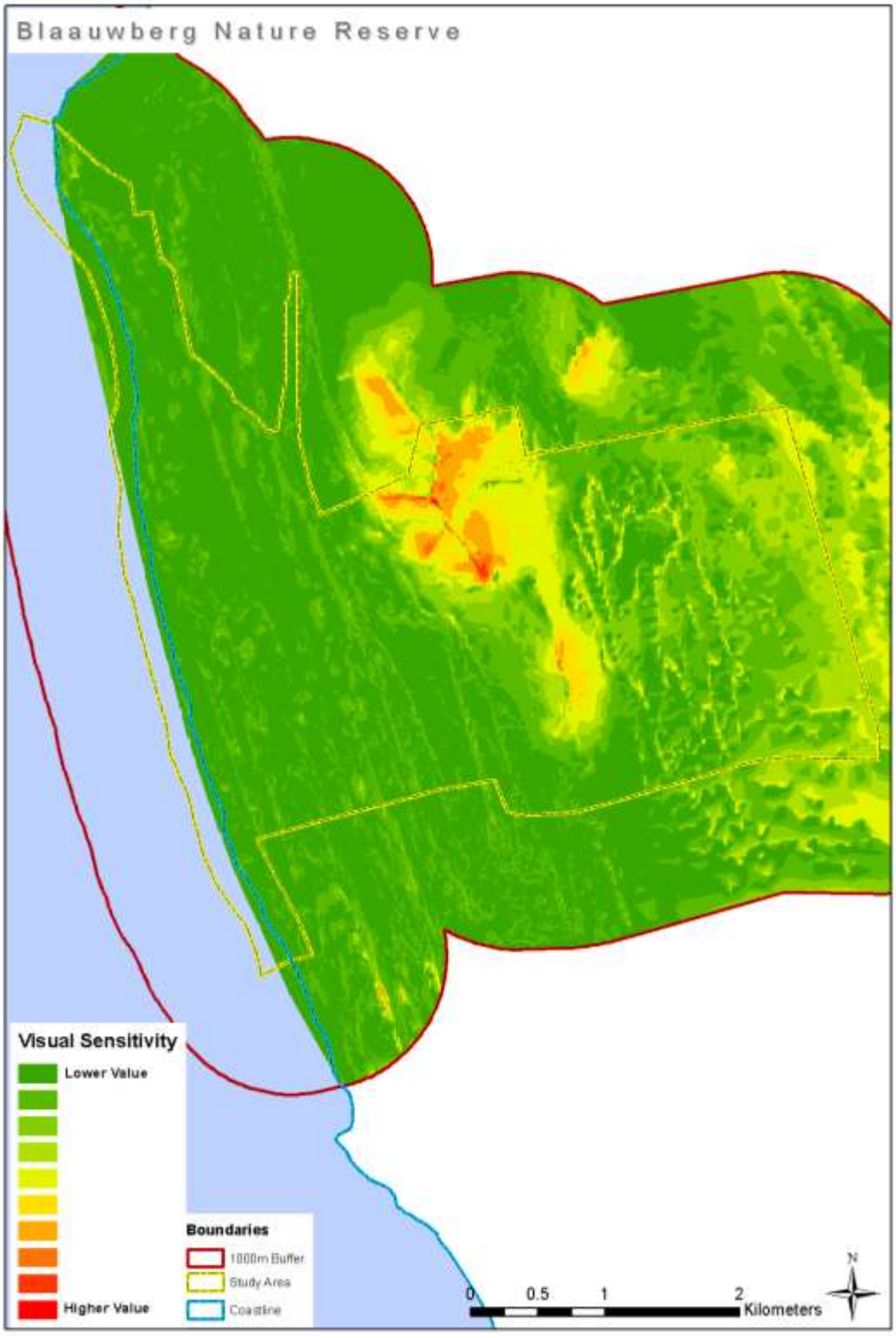


Figure 7: Visual sensitivity

Interpretation in local context

A 1km buffer was applied to the study area for the visual sensitivity analysis. The 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 and vice versa.

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

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.

Although there are several structures on the summit of Blaauwberg Hill, these are historical structures and are being preserved for their heritage value. Any further development or upgrading on the summit of Blaauwberg Hill needs very careful consideration and planning. It is important that structures do not break the skyline.

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 values would more than likely cover the entire reserve.

Interpretation in local context

The Heritage sensitivity will be applied as a Special Management Overlay, see **Figure 11**. This is due to the fact that many of the recorded heritage resources are not 100% accurately located in the landscape. The Battle site also encompasses much of the reserve.

Showstoppers/Fatal flaws and Special Management Area Informants

It is very important that any potential developments or activities that are planned inside the reserve take cognoscente of the Heritage resources located in and around the reserve.

A detailed heritage assessment would be required for any development or activity before implementation takes place. Reference must also be made to the report prepared by Setplan (2002) on the Inventory of Attributes and Sensitivity Analysis of the Blaauwberg Conservation Area.

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) +	This is the favoured layer which emphasizes

		Topographic Sensitivity + Hydrological Sensitivity + Visual sensitivity + Heritage Sensitivity	biodiversity value and aesthetic considerations, and de-emphasizes biodiversity sensitivities

*Not all layers may be present as in the table

Outputs **See Figure 8**

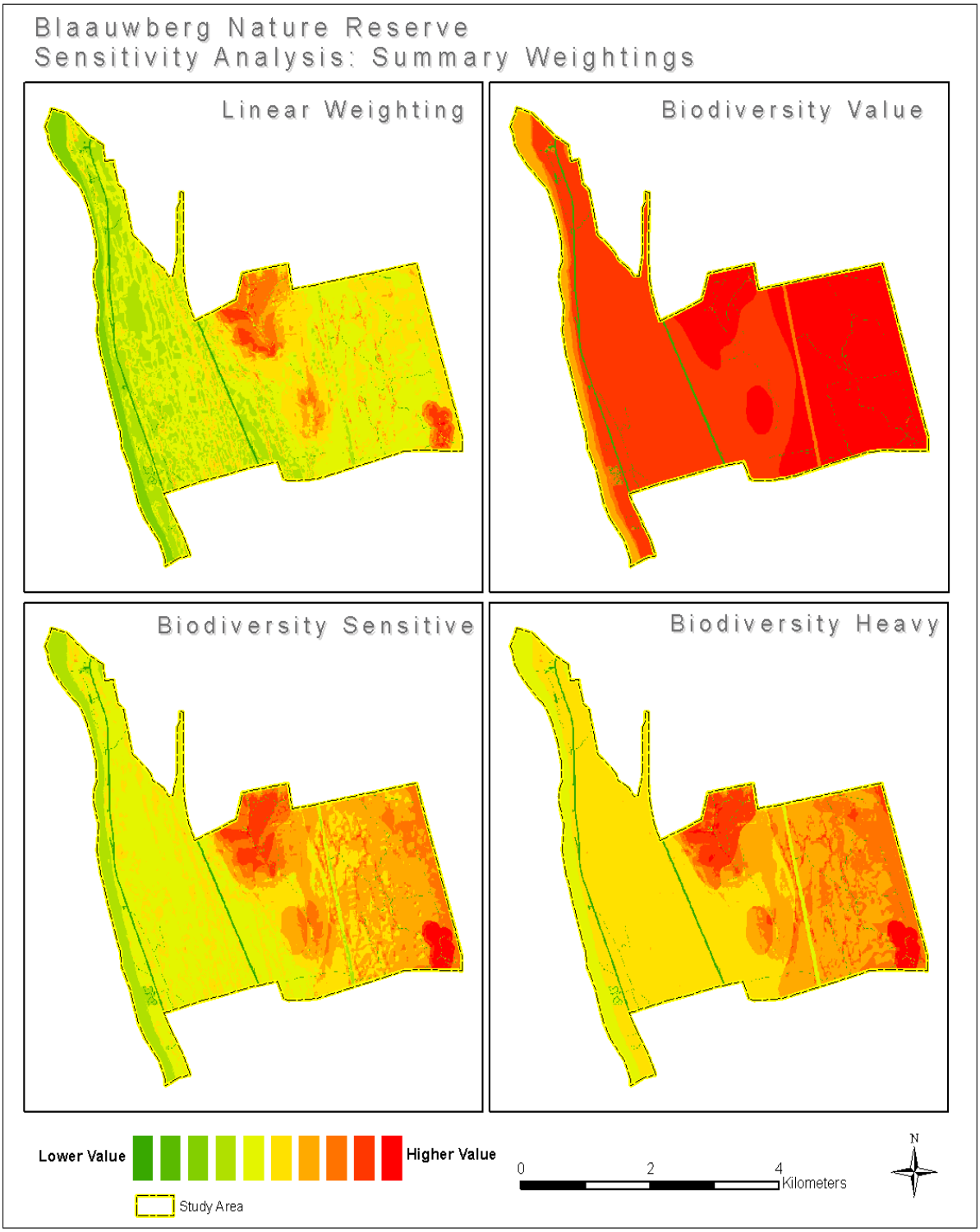


Figure 8: Examples from the outputs from the sensitivity –value analysis process using different weightings (See Table 6)

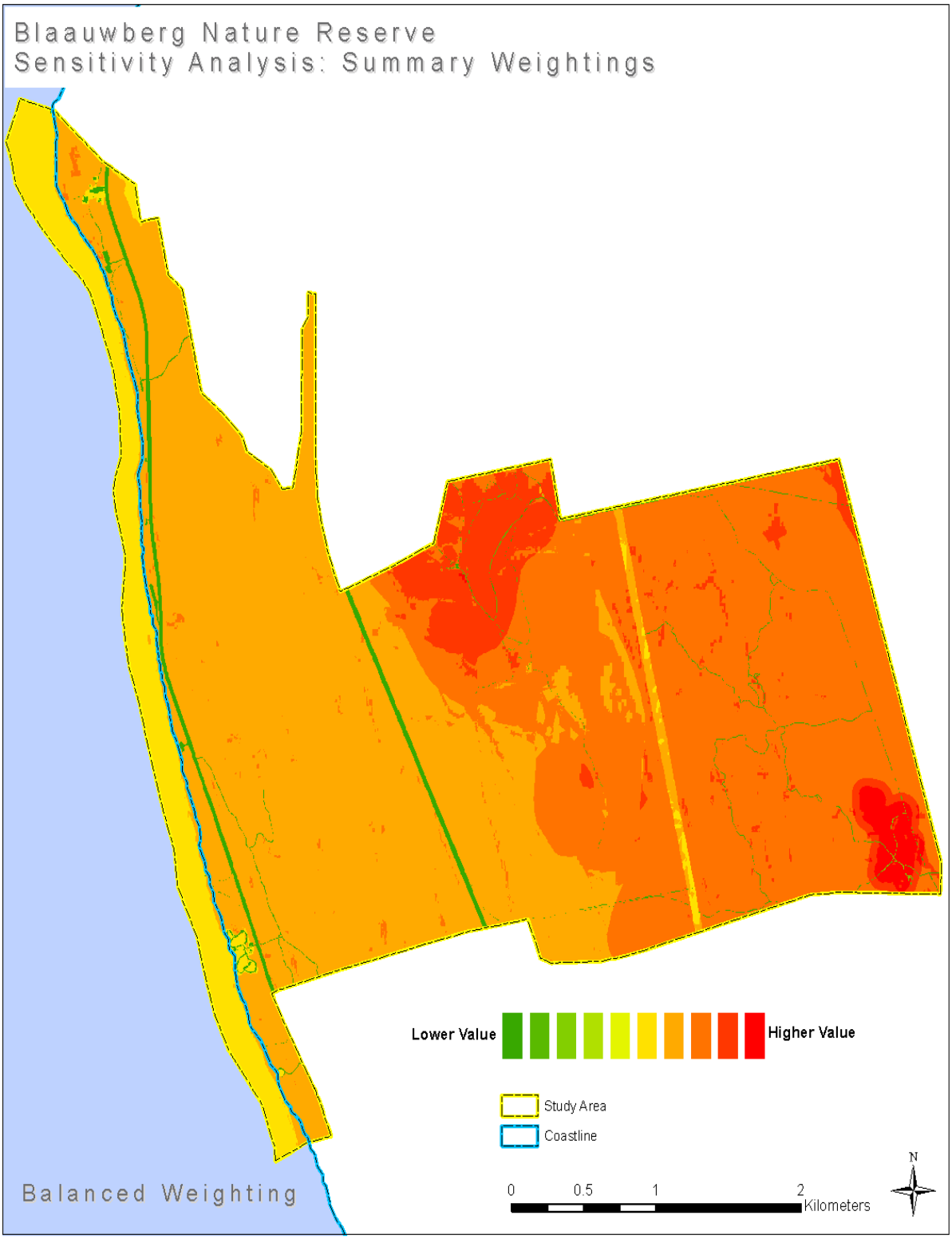


Figure 9: Balanced weighting from the sensitivity –value analysis process (See Table 6)

Interpretation in local context

The combined range of weightings presented in Table 6 and Figure 8 & Figure 9 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

- No developments should be permitted outside of existing development footprints.
- The existing development footprints should be reduced to the absolute minimum and all sites not required must be rehabilitated and restored.
- The sighting of amenities and ecotourism facilities should take place outside of the conservation area and within the proposed buffer area surrounding the conservation area.

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 10 shows the draft zonation for Blaauwberg Conservation Area. The percentage area for each zonation category is shown in Table 8.

Table 8: Breakdown (in HAs and % of Area) of the 5 Zonation Categories in the reserve

Zonation category	Area HA	% of Total Area
Conservation	1023.23	67.50
High Intensity Use	6.15	0.41
Low Intensity Use	51.27	3.38
Primary Conservation	411.82	27.16
Utility	23.29	1.54

The significant remaining areas of Critically Endangered Cape Flats Sand Fynbos are well protected within the inland Primary Conservation and Conservation areas. Almost all of the remaining reasonably intact Endangered Cape Flats Dune Strandveld is contained within the Conservation Zone.

The roads and Eskom servitudes are catered for in the utility zone (although the road reserve is outside of the reserve boundary).

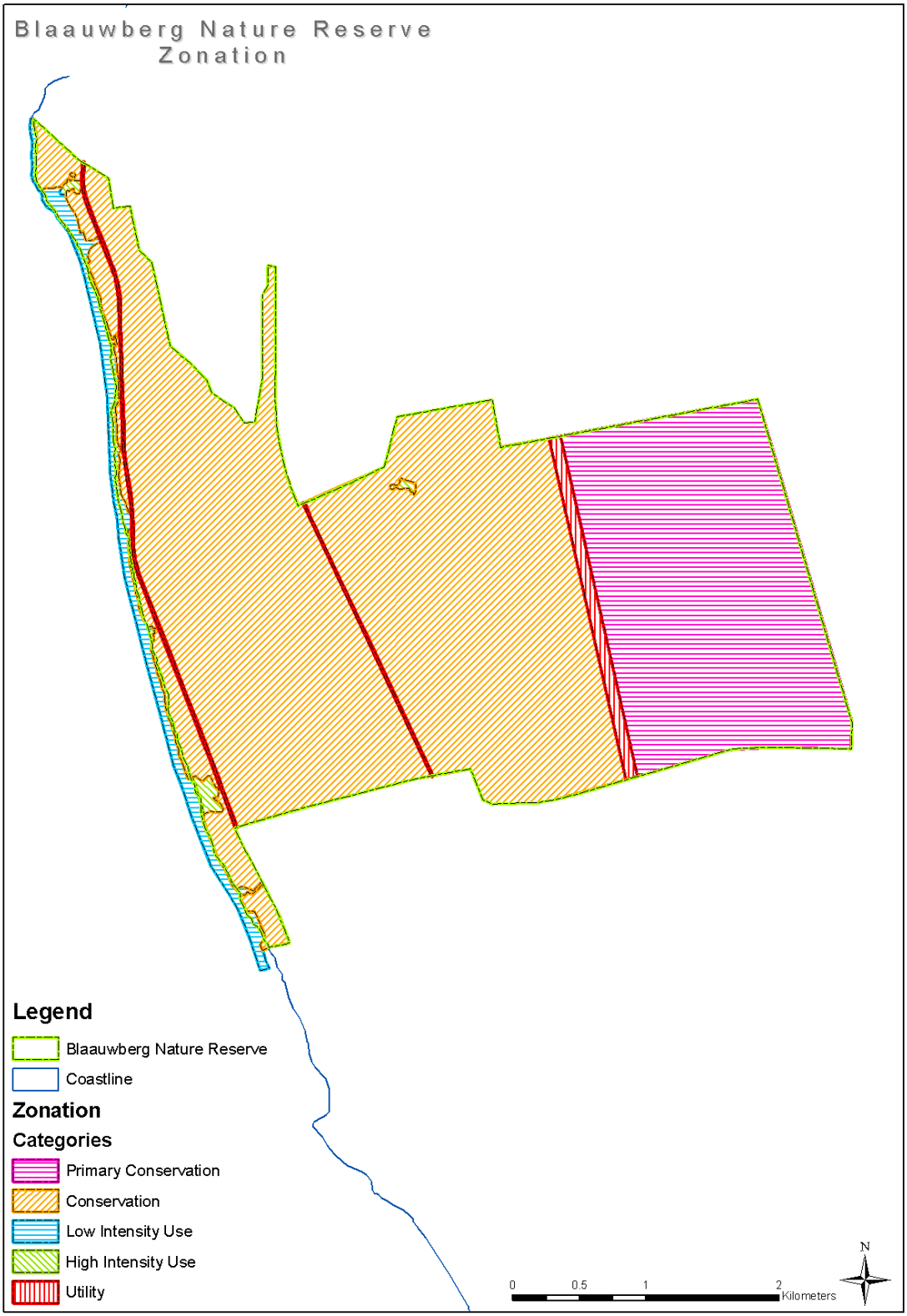


Figure 10: Blaauwberg Nature Reserve – Draft Zonation

5.3 Zoning Definitions and Descriptions

Table 10 (see Appendices) outlines the draft 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

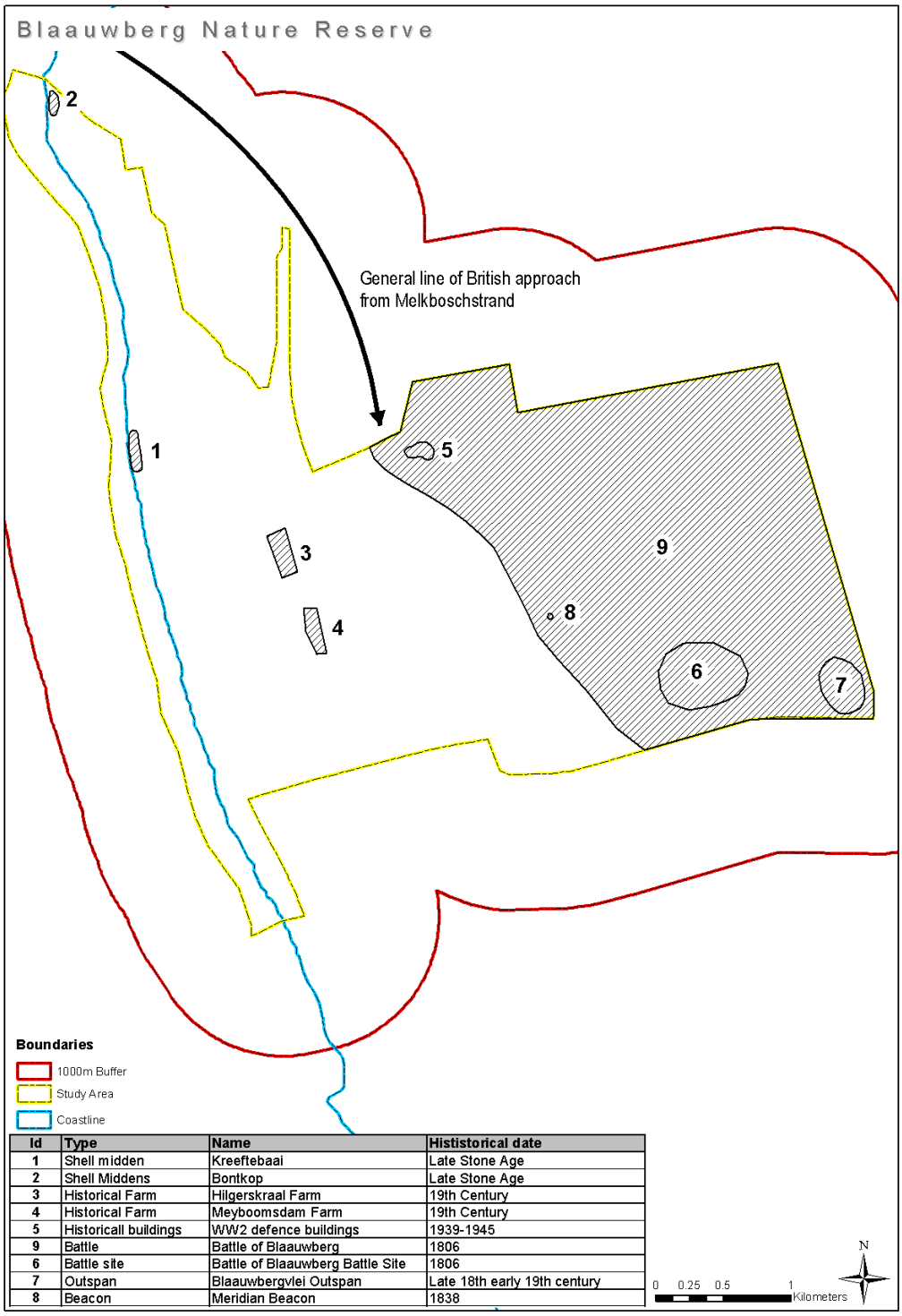
Overlay zones are applied to different areas of the reserve requiring special management intervention. Overlay management zones are applied to areas of national, regional or reserve based importance for example: RAMSAR SITE or IBA (Important Bird Areas), NB cultural sites or natural resource consumptive use areas (e.g. medicinal plants).

The potential special management overlays are:

1. Heritage and Cultural
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

5.3.1. (a) Heritage Special Management Overlay

The Blaauwberg Conservation Area is a place of high landmark quality related to the overall topography of Table Bay and a place of high visibility from strategic points such as Table Mountain and Robben Island; It is also a symbolic marker of a highly significant event in South Africa's colonial history, namely the transition from Dutch to English rule (Setplan, 2002). Figure 11 outlines the significant heritage assets in the BCA.



Id	Type	Name	Hististorical date
1	Shell midden	Kreeftebaai	Late Stone Age
2	Shell Middens	Bontkop	Late Stone Age
3	Historical Farm	Hilgerskraal Farm	19th Century
4	Historical Farm	Meyboomsdam Farm	19th Century
5	Historicall buildings	WW2 defence buildings	1939-1945
9	Battle	Battle of Blaauwberg	1806
6	Battle site	Battle of Blaauwberg Battle Site	1806
7	Outspan	Blaauwbergvlei Outspan	Late 18th early 19th century
8	Beacon	Meridian Beacon	1838

Figure 11: BCA Heritage Overlay

6. CONCLUSIONS AND RECOMMENDATIONS

- Once the additional land parcels and access routes for the reserve have been identified and implemented the zonation will need to be revised.

- Any further development requirements should be accommodated outside of the conservation area.
- The coastal zone is the most utilised area in the reserve and care should be taken to ensure that the impact of visitors accessing the coastline is minimised through the construction of boardwalks and parking areas that are clearly delineated.
- Access to the Blaauwberg Hill is currently restricted, but the future development plans are accommodated in a high intensity use zone. This may need to be revised once the proposed development/ecotourism usage is determined.
- Alien vegetation management within the Primary Conservation area should be a management priority.

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9. 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	Least	4			Well Protected	-1

Lowland Freshwater Wetlands	threatened					
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 Afrotempe	Least threatened	4			Well Protected	-1

rate Forest						
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

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	proclaimed Protected	extent from current extent in Bionet	Remaining from historic extent	15% of historic extent	% Target 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			

Table 11: 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 prioritised 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 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	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	Facilities are managed to facilitate and promote appropriate visitor activities and educational use of the reserve. Administration; provides appropriate	Entertainment	Events, self guided walks, wheelchair accessible trails, parking, picnicking. In reserves where access to water bodies is allowed, this area is appropriate for high intensity uses such as power boating and waterskiing in accordance	Very frequent	Very high	Small - Large	Picnic areas, parking areas, restaurants, information centers, ablutions, environmental education facilities, nurseries etc. Provides parking from which pedestrian access is gained to other zones.	Motorised Access People movers & Pedestrian access	Access roads and associated parking. Footpaths constructed to a higher standard for the comfort of the user. Design standards to be set in the footpath and road management plan Wheelchair access	High Intensity Leisure

		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.	rehabilitated.	management infrastructure to facilitate other objectives of the reserve.		with the Vlei By-Laws.						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 13 – MANAGEMENT EFFECTIVENESS TRACKING TOOL (METT-SA) FOR THE BLAAUWBERG NATURE RESERVE

REPORTING PROGRESS IN URBAN PROTECTED AREAS

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

Blaauwberg Conservation Area

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	Blaauwberg Conservation Area		
Location of protected area (country and if possible, map reference)	South Africa, Western Cape Province, 25km between Big Bay/Bloubergstrand in the south and Melkbosstrand in the north		
Date of establishment (distinguish between agreed and gazetted	*Agreed* 2005	*Gazetted*	local authority: Oct 2006 provincial
Ownership details (i.e. owner, tenure rights etc.)	City of Cape Town / Public Works department.		
Management Authority	City of Cape Town		
Protected area size (ha)	953 ha proclaimed, approximately 1 200 ha still to be consolidated		
Staff numbers	*Permanent* 3	*Temporary* 12	
Budget	R250 000 ex staff costs		
Designation (ICUN category), World Heritage, Ramsar etc	Local and Provincial Nature Reserve status. Also part of the Cape West Coast Biosphere Reserve Southern Core		
Reason for designation			
Brief detail of World Bank funded project or projects in PA	Startup funding for the BCA 2003 from the Critical Ecosystem Partnership Fund of which World Bank is a partners.		
Brief detail of WWF funded project or projects in PA	Funding for a conservator was from the Table Mountain Fund for the period July 2005 to June 2006		
Brief detail of other relevant projects in PA	Alien clearing from Working for Water 2004/2005, working for wetlands 2005 - 2007		
List two of the primary protected area objectives			
Objective 1	Conservation of maximum biodiversity.		
Objective 2	Facilitate the maximum number of user grioups and visitors in a sustainable and compatible way.		
List the top two most important threat to the PA (and indicate reasons why they are selected)			
Threat 1	Alien vegetation - on critically endangered Sand Fynbos as well as essential clearing required post 2005 fire.		
Threat 2	Development of critical parcels of land within the BCA which are still in private ownership.		
List top two critical management activities			
Activity 1	Land Consolidation		
Activity 2	Alien vegetation clearing		
Date assessement carried out:	**24-May-07**		

Howard Langley Paul Britton 22 May 2007

MANAGEMENT EFFECTIVENESS TRACKING TOOL

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		All City and Public owned portions have status.	Extend the boundaries of the reserve as new parcels of land are consolidated
	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		Staff available to enforce bylaws and the NC Ordinance but no shift or overtime allowance to enable enforcement during peak afterhours periods when most illegal activities occure.	Critical to obtain shift and overtime budget
	Legal mechanisms for controlling inappropriate land use activities in the PA exist but are not being implemented.	1			
	Legal mechanisms for controlling inappropriate land use and activities in the PA exist but there are some problems in effectively implementing them	2	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		Staff available to enforce bylaws and the NC Ordinance but no shift or overtime allowance to enable enforcement during peak afterhours periods.	Critical to obtain shift and overtime budget
	There are major deficiencies in capacity/resources to enforce regulations & bylaws (e.g. lack of skills, no patrol budget)	1			
	PA has acceptable capacity/resources to enforce regulations & bylaws but some deficiencies remain	2	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		Finalisation of entire boundry dependent on finalising land consolidation process with private land owners.	Appropriate signage on major arterials needs to be constructed erected.
	The boundary of the PA is known by the management authority but is not known by local residents/neighbouring land users	1			
	The boundary of the PA is known by both the management authority and local residents but is not appropriately demarcated	2	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		A sensitivity ananlysis conducted for the reserve area in 2000. Baseline surveys have been conducted for fauna and flora components. Some regular faunal monitoring taking place as well as adhoc botanical surveys for selected species but no formal monitoring programme in place.	Set up fixed point photography plots to assess erosion control, movement of dunes etc over time. Set up monitoring plots for long term vegetation analysis. Compile a monitoring programme for the reserve.
	Information on critical habitats, species and cultural values of the PA is not sufficient to support planning and decision making	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	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	11		

MANAGEMENT EFFECTIVENESS TRACKING TOOL

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		Proposed boundaries exist for the reserve and a land consolidation programme is in place. Conceptual corridors have been identified but in certain areas this still needs to be delineated on the ground.	Delineat corridor between BCA and Koeberg Nature Reserve (contractor being appointed through CWCBR). Corridor between BCA and Rietvlei defined and manager in place since 2 April 2007. Corridor between BCA and Tygerberg has been ground truthed but further work still required.
	Inadequacies in design mean that achievement of major objectives are constrained to some extent	1			
	Design is not significantly constraining achievement of major objectives, but could be improved	2	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	0	A framework management plan has been prepared in order to enable proclomation of the reserve but needs to be converted to standard plan across the city and expanded.	Compile a standard management plan for the BCA.
	A standard Management Plan is being prepared or has been prepared, but is not yet approved.	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	0	The boundaries of the BCA are not yet finalised as there are three portions of private land which we would still like to incorporate. This will effect where infrastructure will be placed.	Finalise land consolidation programme (medium term goal). Draw up CDF for the accessible portions of BCA keeping future land portions in mind.
	A CDF is being prepared or has been prepared but is not being implemented	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			
Supplementary items	The planning process allows adequate opportunity for key stakeholders to influence the management plan	1	1		
	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	4		

MANAGEMENT EFFECTIVENESS TRACKING TOOL

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		Conservation students conduct research into priorities stipulated by management annually.	
	Research needs have been identified, but other than for ad hoc research, no management orientated research is being done.	1			
	There is considerable research work but only limited "management" orientated research is being done.	2	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		Staff are adequate although 12 strong labour team needs to be made permanent (process underway).Training is required for staff especially district Law Enforcement officers.	
	HR capacity is inadequate for critical management activities	1			
	HR capacity is sufficient, but there are deficiencies in necessary skills for critical management activities	2	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	Traditionally there were two dedicated budgets in the north district (Rietvlei and BCA). These were merged into area budgets but no new funds have been allocated for the additional sites which are being incorporated in the north district. Available budgets do not reflect the need for the area especially with regards to maintenance of infrastructure and tools and equipmentand overtime or shift allowances.	
	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			
Supplementary items	The budget is secure/guaranteed for the PA on an annual cycle	1			
	The budget is secure/guaranteed on a three year cycle	2			
	The PA is not reliant on external funding	2			
Subtotal		14	4		

MANAGEMENT EFFECTIVENESS TRACKING TOOL

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		APO is approved by the area manager but does not reflect budget.	Standardise an APO for the branch which incorporates budgets.
	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	2		
	Actions are monitored against the approved APO's targets and most or all prescribed activities are completed	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		Good on site management is hampered by lack of funding for veld management and the fact that essential interventions need to occur on land which is still privately owned.	
	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		Law enforcement training should be expanded on once appointment certificates area obtained. Various levels of fire fighting training is required for the team and reserve management. The reserve manager requires training in the Cities SAP system.	Ensure that training needs are considered and taken up at the branches Focus group meetings with regards to skills development and training.
	Staff training and skills are low relative to the needs of the PA	1			
	Staff training and skills are adequate, but could be further improved to fully achieve the objectives of management	2	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		Reserve manager needs to be responsible for a dedicated budget and requires trainning in our procurment system.	Reserve manager to obtain training with regards to the cities SAP and procurement policies and proceedures.
	Budget management is poor and constrains effectiveness	1	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		Adequate fencing of the reserve is a major constraint but is hampered by the land acquisition process.	Fencing is being procured so that this infrastructure can be erected as soon as strategic land parcels are incorporated (namely Garden Cities properties and Joyces Dairy Farm)
	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 concern regarding new facilities which are being taken over from different departments (namely Eersteseen) however no additional funds are available for this activity.	Acquire funding for the maintenance of Eersteseen
	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			

MANAGEMENT EFFECTIVENESS TRACKING TOOL

4.7. Education and awareness programme Is there a planned education programme?	There is no education and awareness programme	0		There is no dedicated EE officer for the site. This person is responsible for EE in the north district	
	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		Cooperation varies between different land owners. A management agreement exists with Cape Nature where their portions of land are incorporated into the reserve and managed as a whole by the city of cape town. There is good communication with garden cities, limited interaction with Joyces Dairy and almost no interaction with Klein Meilkbosch farm.	
	There is limited contact between managers and neighbouring official or corporate land users	1			
	There is regular contact between managers and neighbouring official or corporate land users, but only limited co-operation	2	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		The BCA has an Implementation and Coordination Committee which involves private and public partners. It will evolve into an advisoary board	
	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		There is a good working relationship with the Friends of BCA however there is litte to no interaction with local businesses.	
	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	0	Currently only the coastal section of the reserve is open to the public. There is no interaction with tour operators which may utilise this portion of the reserve as destination points. A business plan and feasibility study is being conducted which will help to highlight future potential of the reserve.	
	There is contact between managers and tourism operators but this is largely confined to administrative or regulatory matters	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		Monitoring is limited to a few projects annually (namely oyster catcher counts, CWAC counts, inspection and review of erosion gullies) but needs to be extended and a monitoring and evaluation programme needs to be developed.	
	There is some ad hoc monitoring & evaluation, but no overall strategy and/ or no regular collection of results	1	1		
	There is an agreed and implemented monitoring & evaluation system but results are not systematically used for management	2			
	A good monitoring & evaluation system exists, is well implemented and used in adaptive management	3			
Supplementary items	There is open communication and trust between local stakeholders and PA managers	1	1		
Subtotal		37	21		

MANAGEMENT EFFECTIVENESS TRACKING TOOL

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		Land consolidation hampers unlocking the potential of the reserve. Facilities are being inherited by other city departments but no additional funding is received for the maintenance of these areas. A business plan and feasibility study is being conducted and will highlight future potential of reserve.	Complete Business Plan and feasibility study and implement appropriate recommendations where possible. Complete land consolidation process.
	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	1	Capital funds have been allocated for renovating WWII buildings as well as a	Continue motivating for funds for improvement of facilities
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		Inappropriate access to the inland coastal section of BCA as well as portions of surroundin private land by off road vehicles.	
	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		Limited entrance permits are provided Blaauwberg Hill and the coastal section is open to the public 24hrs a day. There are no permits granted for the coastal flats section between R27 and Otto du Plessis drive with this area demarcated with some fencing and sign boards. Limited illegal entry takes place into these areas.	
	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	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		Capacity building programmes has resulted in youth from nearby surrounding communitiees obtaining training and work. This is however limited to a few individuals.	
	The existence of the PA has neither damaged nor benefited the economy of the local economy	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	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		With increasing development along the West Coast the BCA offers green open space for various recreational activities. Once the Blaauwberg hill portion of the reserve is open to the public this will open new activities and opportunities.	
	The existence of the PA has delivered some minor short term community benefits	1			
	The PA delivers some quantifiable long term community benefits that make a difference to the lives of local communities	2	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		18	8		

1: CONTEXT	VALUE	SCORE	
1.1. Legal status	3	3	
1.2. Protected Area regulations	3	2	
1.3. Law enforcement	3	2	
1.4. Protected area demarcation	3	2	
1.5. Resource Inventory	3	2	
Subtotal	**15**	**11**	
2: PLANNING			
2.1. Protected area design	3	2	
2.2. Management plan	3	0	
2.3. Conservation Development Framework	3	0	
Supplementary items	3	2	
Subtotal	**12**	**4**	
3: INPUTS			
3.1. Research	3	2	
3.2. Staff numbers	3	2	
3.3. Current budget	3	0	
Supplementary items	5	0	
Subtotal	**14**	**4**	
4: PROCESS			
4.1. Annual Plan of Operation	3	2	
4.2. Resource management	3	2	
4.3. Staff training	3	2	
4.4. Budget management	3	1	
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	2	
4.9. Advisory committee	3	2	
4.10. Community partners	3	2	
4.11. Commercial Tourism	3	0	
4.12. Monitoring & Evaluation	3	1	
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	2	
5.4. Economic benefit assessment	3	2	
5.5. Community benefit assessment	3	2	
Supplementary items	1	1	
Subtotal	**16**	**9**	
TOTAL SCORE	**94**	**49**	**52%**

Summary and comment on score.
The PA has been well planned in terms of establishment and design. This needs to be followed up by the compilation of a management plan with a CDF. This should be backed up by a research and monitoring programme to ensure that objectives are being met.

Howard Langley Paul Britton 22 May 2007