

# **Nelson Mandela Bay Municipality**

## **Final Bioregional Plan**

Prepared for  
**Nelson Mandela Bay Municipality**  
**Public Health Directorate**  
**Environmental Management Sub-Directorate**

Report No 400919/3

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# **Nelson Mandela Bay Municipality Final Bioregional Plan**

Prepared for:

**Nelson Mandela Bay Municipality  
Public Health Directorate  
Environmental Management Sub-Directorate**

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## Executive Summary

This final Bioregional Plan relates to the Nelson Mandela Bay Municipality in the Eastern Cape Province of South Africa. As this is the first Bioregional Plan for the Nelson Mandela Bay Municipality it does not replace any previously published Bioregional Plan.

The purpose of the final Bioregional Plan is to provide a map of biodiversity priorities and accompanying guidelines to inform land-use planning, environmental assessment and authorisations, and natural resource management by a range of sectors whose policies and decisions impact on biodiversity.

The Bioregional Plan is a spatial plan that shows terrestrial and aquatic features that are critical for conserving biodiversity and maintaining ecosystem functioning. These areas are referred to as Critical Biodiversity Areas and Ecological Support Areas. In addition, the Bioregional Plan provides a profile of priority biodiversity in the bioregion, outlines other measures for effective management of biodiversity, and includes recommendations for review, monitoring and updating. The Bioregional Plan is underpinned by the *Conservation Assessment and Plan for the Nelson Mandela Bay Municipality* (SRK Consulting, 2010), a systematic biodiversity plan that was developed according to established protocols.

It is important to note that the conservation assessment was developed in a manner that attempts to minimise potential conflict between biodiversity and other forms of land-use to the greatest extent possible. Consequently, the final Bioregional Plan is consistent with the National Environmental Management: Biodiversity Act (Act No. 10 of 2004), and meets all the requirements of the *Guideline regarding the Determination of Bioregions and the Preparation and Publication of Bioregional Plans* (DEAT, 2008).

The National Environmental Management Act (NEMA; Act No. 107 of 1998) requires that all organs of state must take biodiversity considerations into account in their decision-making. The Bioregional Plan facilitates this by serving as the official reference for biodiversity priorities within the bioregion, superseding all the previous non-published spatial biodiversity plans.

The plan supports the principles of integrated development planning and sustainable development espoused by the NEMA by identifying the biodiversity conservation priority in the municipal area, as well as other natural areas that could potentially be made available for other land-uses. The plan is consistent with the NEM: Biodiversity Act (Act No. 10 of 2004), the National Biodiversity Framework (2009), and South Africa's commitments in terms of international agreements such as the Convention on Biological Diversity (1993) and the United Nations Framework Convention on Climate Change. Furthermore, the plan was developed in an integrated manner with the Municipal Spatial Development Framework (SDF), which is a spatial articulation of the Municipal Integrated Development Plan (IDP), in order to identify an optimal balance between biodiversity conservation and other sector needs.

The objectives of the Bioregional Plan are to:

- Form the primary biodiversity informant for land-use and resource use decision-making;
- Identify a network of Critical Biodiversity Areas that achieve national biodiversity thresholds on the least amount of land possible; and
- Act as the spatial framework and policy for sustainable development and to assist the municipality in complying with environmental and planning legislation requirements which promote the protection and management of biodiversity.

The Bioregional Plan should be used by all sectors that are involved in land-use planning and decision-making and multi-sectoral planning. The users of the Bioregional Plan include mandatory

users, i.e. those who are compelled to consider the Bioregional Plan, and other intended users for whom the Bioregional Plan will be a useful planning and developmental tool. The Bioregional Plan has three main uses:

1. Reactive decision-making, such as environmental impact assessment, agricultural land-use decisions and development control decisions through land-use legislation (e.g. rezoning, planning approvals etc.);
2. Proactive forward planning, such as IDPs, SDFs and zoning schemes; and
3. Proactive conservation, such as, biodiversity stewardship initiatives and the expansion of protected areas.

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## Disclaimer

The opinions expressed in this Report have been based on the information supplied to SRK Consulting (South Africa) (Pty) Ltd (SRK) by the Nelson Mandela Bay Municipality (NMBM). The opinions in this Report are provided in response to a specific request from NMBM to do so. SRK has exercised all due care in reviewing the supplied information. Whilst SRK has compared key supplied data with expected values, the accuracy of the results and conclusions from the report are entirely reliant on the accuracy and completeness of the supplied data. SRK does not accept responsibility for any errors or omissions in the supplied information and does not accept any consequential liability arising from commercial decisions or actions resulting from them. Opinions presented in this report apply to the site conditions and features as they existed at the time of SRK's investigations, and those reasonably foreseeable. These opinions do not necessarily apply to conditions and features that may arise after the date of this Report, about which SRK had no prior knowledge nor had the opportunity to evaluate.

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## List of Abbreviations

C.A.P.E.	Cape Action for People and the Environment Programme
CBA	Critical Biodiversity Area
CBD	Convention on Biological Diversity
CDF	Conservation Development Framework
ESA	Ecological Support Area
CETT	Corporate EIA Task Team
DEA	Department of Environmental Affairs (National)
DEAT	former Department of Environmental Affairs and Tourism (National)
DEDEAT	Department of Economic Development, Environmental Affairs and Tourism (Eastern Cape Province)
DFA	Development Facilitation Act, 1995 (Act No. 67 of 1995)
DMR	Department of Mineral Resources
DWS	Department of Water and Sanitation
ECBCP	Eastern Cape Biodiversity Conservation Plan
ECPTA	Eastern Cape Parks and Tourism Agency
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIP	Environmental Implementation Plan
EMF	Environmental Management Framework
EMP	Environmental Management Plan or Programme
ESA	Ecosystem Support Area
EPWP	Extended Public Works Programme
IDP	Integrated Development Plan
LUPO	Land Use Planning Ordinance, 1985 (Ordinance No. 15 of 1985)
MDTTT	Multi-Disciplinary Technical Task Team
MPRDA	Mineral and Petroleum Resources Development Act
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEM: BA	National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004)
NEM: PA	National Environmental Management Protected Areas Act, 2003 (Act No. 57 of 2003)
NMBM	Nelson Mandela Bay Municipality
SANBI	South African National Biodiversity Institute
SEA	Strategic Environmental Assessment
SDF	Spatial Development Framework
SPLUMA	Spatial Planning and Land Use Management Act, 2013 (Act No. 16 of 2013)
STEP	Subtropical Thicket Ecosystem Programme

## Glossary

Biodiversity	The variability among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part and also includes diversity within species, between species, and of ecosystems.
Biome	A biome is a regional-scale ecosystem characterized by distinct types of vegetation, animals, and microbes that have developed under specific soil and climatic conditions.
C.A.P.E.	Cape Action for People and the Environment Programme is a multi-party government and civil society initiative to conserve biodiversity, while creating benefits for all the people of the Cape Floristic Region.
CoastCare	The CoastCare programme consists of projects and products that contribute to the goals and objectives of the coastal policy.
Ecosystem	A dynamic system of plant, animal and micro-organism communities and their nonliving environment interacting as a functioning unit.
Ecosystem Protection Level	The extent to which the biodiversity target for a vegetation type is conserved via protected areas.
Ecosystem Threat Status	The classification of vegetation types based on the extent of remaining area (currently not transformed) of each vegetation type in relation to their biodiversity target.
LandCare	LandCare is a community based and government supported approach to the sustainable management and use of agricultural natural resources. The overall goal of LandCare is to optimise productivity and sustainability of natural resources so as to result in greater productivity, food security, job creation and better quality of life for all.
STEP	Subtropical Thicket Ecosystem Programme is a multi-party government and civil society initiative to conserve biodiversity, while creating benefits for all the people of the Subtropical Thicket biome.
Sustainable development	The integration of social, economic and environmental factors into planning, implementation and decision-making so as to ensure that development serves present and future generations.

# 1 Part A: Introduction and Scope of Report

The boundary of the bioregion for this Bioregional Plan is the boundary of the Nelson Mandela Bay Municipality (NMBM) in the Eastern Cape Province of South Africa. Since this is the first Bioregional Plan for the NMBM, it does not replace any previously published Bioregional Plans.

## 1.1 Purpose and Objectives of the Bioregional Plan

The purpose of the final Bioregional Plan is to provide a map of biodiversity priorities and accompanying guidelines to inform land-use planning, environmental assessment and authorisations, and natural resource management by a range of sectors whose policies and decisions impact on biodiversity. The Bioregional Plan is a spatial plan that shows terrestrial and aquatic features that are critical for conserving biodiversity and maintaining ecosystem functioning. These areas are referred to as Critical Biodiversity Areas (CBAs).

The National Environmental Management Act (NEMA; Act No. 107 of 1998) requires that all organs of state take biodiversity considerations into account in their decision-making. The Bioregional Plan facilitates this by serving as the official reference for biodiversity priorities within the bioregion, superseding all the previous non-published spatial biodiversity plans<sup>1</sup>.

The plan acts as the spatial framework for sustainable development by identifying the minimum set of areas that are required for biodiversity conservation, the continuation of ecological processes and the provision of ecosystem goods and services. The plan thereby supports the principles of integrated development planning and sustainable development espoused by the NEMA. It is also consistent with the NEM: Biodiversity Act (Act No. 10 of 2004), the National Biodiversity Framework (2009), and South Africa's commitments in terms of international agreements such as the Convention on Biological Diversity (1993) and the United Nations Framework Convention on Climate Change.

The objectives of the Bioregional Plan are to:

- Form the primary biodiversity informant for land-use and resource use decision-making;
- Identify a network of Critical Biodiversity Areas that achieve national biodiversity thresholds on the least amount of land possible; and
- Act as the spatial framework and policy for sustainable development and to assist the municipality in complying with environmental and planning legislation requirements which promote the protection and management of biodiversity.

The bioregional is underpinned by the Conservation Assessment and Plan for the Nelson Mandela Bay Municipality (SRK Consulting, 2010). The NMBM conservation assessment is a systematic biodiversity plan that was developed according to established protocols. Systematic biodiversity planning is a rigorous, data-driven approach for assessing the location, status and importance of a range of biodiversity features. It is widely accepted in South Africa, and internationally, as the best available science for identifying spatial biodiversity priority areas. It is important to note that the NMBM conservation assessment was developed in a way that attempts to minimise potential conflict between biodiversity and other forms of land-use.

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<sup>1</sup> The portions of the following plans pertaining to the NMBM are superseded by the NMBM Bioregional Plan: The Cape Action for People and the Environment (C.A.P.E.) (Cowling *et al.*, 1999 a & b); The Subtropical Thicket Ecosystem Plan (STEP) (Cowling *et al.*, 2003); and The Eastern Cape Biodiversity Conservation Plan (Berliner & Desmet, 2007).

## 1.2 Intended Users and Uses of the Bioregional Plan

The Bioregional Plan should be used by all sectors that are involved in land-use planning and decision-making or multi-sectoral planning. The users of the Bioregional Plan include mandatory users, i.e. those who are compelled to consider the Bioregional Plan, and those who will find it to be a useful planning and developmental tool. The users of the Bioregional Plan are described in Table 1-1.

The Bioregional Plan has three main uses:

1. Reactive decision-making, such as environmental impact assessment and agricultural land-use decisions, water-use licensing, and development control decisions through land-use legislation (e.g. rezoning, planning approvals etc.);
2. Proactive forward planning, such as IDPs, SDFs and zoning schemes; and
3. Proactive conservation, such as biodiversity stewardship initiatives and the expansion of protected areas.

**Table 1-1: The mandatory and recommended users of the Bioregional Plan**

User		Mandatory uses	Recommended uses
Nelson Mandela Bay Municipality		Must align the Bioregional Plan with its Integrated Development Plan (IDP) and Spatial Development Framework (SDF) and must demonstrate how the Bioregional Plan may be implemented. Must also take the Bioregional Plan into account in issuing planning authorisations.	Should integrate Critical Biodiversity Areas and other relevant guidelines and recommendations from the Bioregional Plan into Environmental Management Frameworks (EMFs) developed in terms of Chapter 8 of the EIA Regulations, and zoning schemes (also known as planning or land-use schemes).
Any organ of state that must prepare an Environmental Implementation Plan (EIP) or Environmental Management Plan (EMP) in terms of Chapter 3 of NEMA		Must consider the Bioregional Plan in developing the EIP or Environmental Management Plan.	-
Environmental decision-makers who are required by section 2(1)(c) of NEMA to apply the NEMA section 2 principles in their decision-making	Eastern Cape Department of Economic Development, Environmental Affairs and Tourism (DEDEAT)	Must consider the Bioregional Plan before issuing environmental authorisations.	Should take the Bioregional Plan into account when developing provincial supplements to the NEMA EIA regulations in terms of section 24A and in developing EMFs and Provincial Guidelines in terms of the Chapter 8 EIA regulations. Should require that Environmental Assessment Practitioners (EAPs) refer to the Bioregional Plan in Basic Assessment Reports and Environmental Impact Reports.
	Eastern Cape Parks and Tourism Agency	-	Should use the Bioregional Plan to guide their inputs into land-use planning, land-use decision-making and natural resource management and to inform their management actions and the development of an Eastern Cape Protected Area Expansion Strategy.

User		Mandatory uses	Recommended uses
	National Department of Agriculture, Forestry and Fisheries	Should take the Bioregional Plan into account in their authorisations (e.g. for ploughing virgin land and for the subdivision of agricultural land).	Should take the Bioregional Plan into account in their planning processes and in their programmes.
	National Department of Mineral Resources	Should take the plan into account in their authorisations for prospecting and mining.	-
	Eastern Cape Department of Rural Development and Agrarian Reform	Should take the Bioregional Plan and identified Critical Biodiversity Areas into account in their comments on applications.	Should take Bioregional Plan into account in planning and scheduling LandCare activities, and in any other planning activities (such as farm planning and Area-Wide Planning) Should take the Bioregional Plan into account in planning and implementing land reform programmes, and in the development of policy, legislation or guidelines for land-use planning and management.
	Eastern Cape Department of Roads and Public Works	-	Should take the Bioregional Plan into account when identifying locations and routes for roads and other infrastructure.
	Eastern Cape Department of Local Government and Traditional Affairs	-	Should take the Bioregional Plan into account in development of the Provincial Growth and Development Strategy and when identifying suitable sites for new housing developments.
	Eastern Cape Department of Human Settlement	-	Should take the Bioregional Plan into account in development of the Provincial Growth and Development Strategy and when identifying suitable sites for new housing developments.
	Catchment Management Agencies	Should integrate the Bioregional Plan in their decision-making about water applications	-
Organs of state preparing guidelines in terms of Reg. 74 of the EIA regulations		-	Should take the Bioregional Plan into account
Working for Water, Working for Wetlands, LandCare, CoastCare, and other programmes that deal with maintaining and restoring natural resources		-	Should take the Bioregional Plan into account in planning and scheduling their activities
Environmental and planning consultants		-	Should take the Bioregional Plan into account when undertaking Strategic Environmental Assessments and Environmental Impact Assessments or when developing IDPs, SDFs or EMFs for a municipality

User	Mandatory uses	Recommended uses
Conservation NGOs	-	Should use the Bioregional Plan to guide comments on planning tools such as SDFs and on development applications, and to direct on-the-ground conservation initiatives
Private landowners	-	Should use the Bioregional Plan if they want more information about the biodiversity value of their landholdings

### 1.3 Limitations

The following limitations must be considered during the application of the Bioregional Plan:

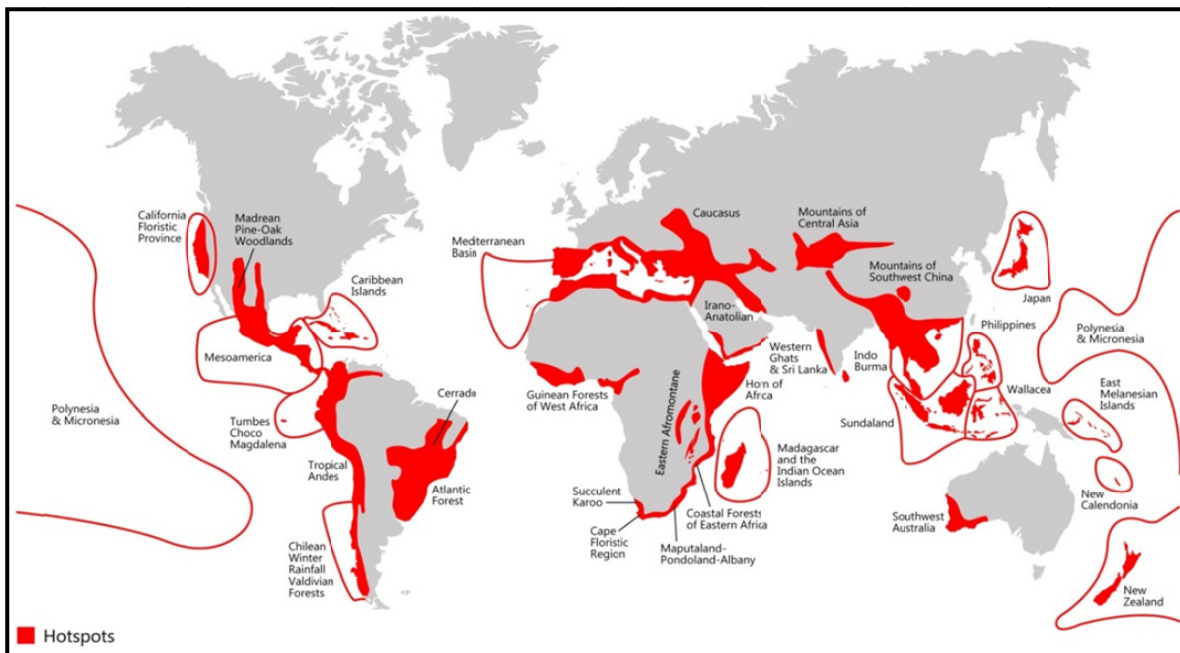
- The Bioregional Plan does not replace the need for site assessments. Although the systematic biodiversity plan, which underpins the Bioregional Plan, was developed at a fine-scale, **on-site verification of the map of Critical Biodiversity Areas is always required**. The findings of site assessments must be interpreted based on the associated guidelines for the categories of Critical Biodiversity Areas;
- The systematic biodiversity plan (the Conservation Assessment and Plan for the Nelson Mandela Bay Municipality), which underpins the Bioregional Plan, represents the best available knowledge at the time of its development – knowledge of some aspects of biodiversity, for example distribution of species of special concern, is not complete. In addition, our understanding of the biophysical features that are required to maintain essential ecological processes and to support the continued provision of important environmental goods and services continues to develop; and
- The landscape is constantly changing – significant changes in the landscape, for example large-scale loss of natural habitat, may impact on the location of areas that are required for conservation, and subsequently on the future configuration of the network of Critical Biodiversity Areas upon revision of the Bioregional Plan.

None of these limitations pose significant constraints to the application of the Bioregional Plan.

## 2 Part B: Biodiversity Profile

### 2.1 Significance of the Biodiversity within the Bioregion

The global significance of the biodiversity of the Nelson Mandela Bay municipal area is emphasized by the fact that the area falls within two recognised biodiversity hotspots<sup>2</sup> (Myers et al., 2000; Mittermeier, 2004). Biodiversity hotspots are the earth’s richest and most threatened reservoirs of plant and animal life (see Figure 2-1).



**Figure 2-1: Biodiversity hotspots of the world (Conservation International, 2005)**

The rich biological diversity of the Nelson Mandela Bay is partly attributed to the fact that it is an area of convergence of five of South Africa’s nine biomes<sup>3</sup> (see Figure 2-2): the Fynbos, Subtropical Thicket, Forest, Nama Karoo, and Grassland biomes (Low & Rebelo, 1998). Such a juxtaposition of biomes within a metropolitan municipality is unparalleled in the world (Conservation International, 2009).

<sup>2</sup> The Cape Floristic Region and the Maputaland-Pondoland-Albany Centre of Endemism

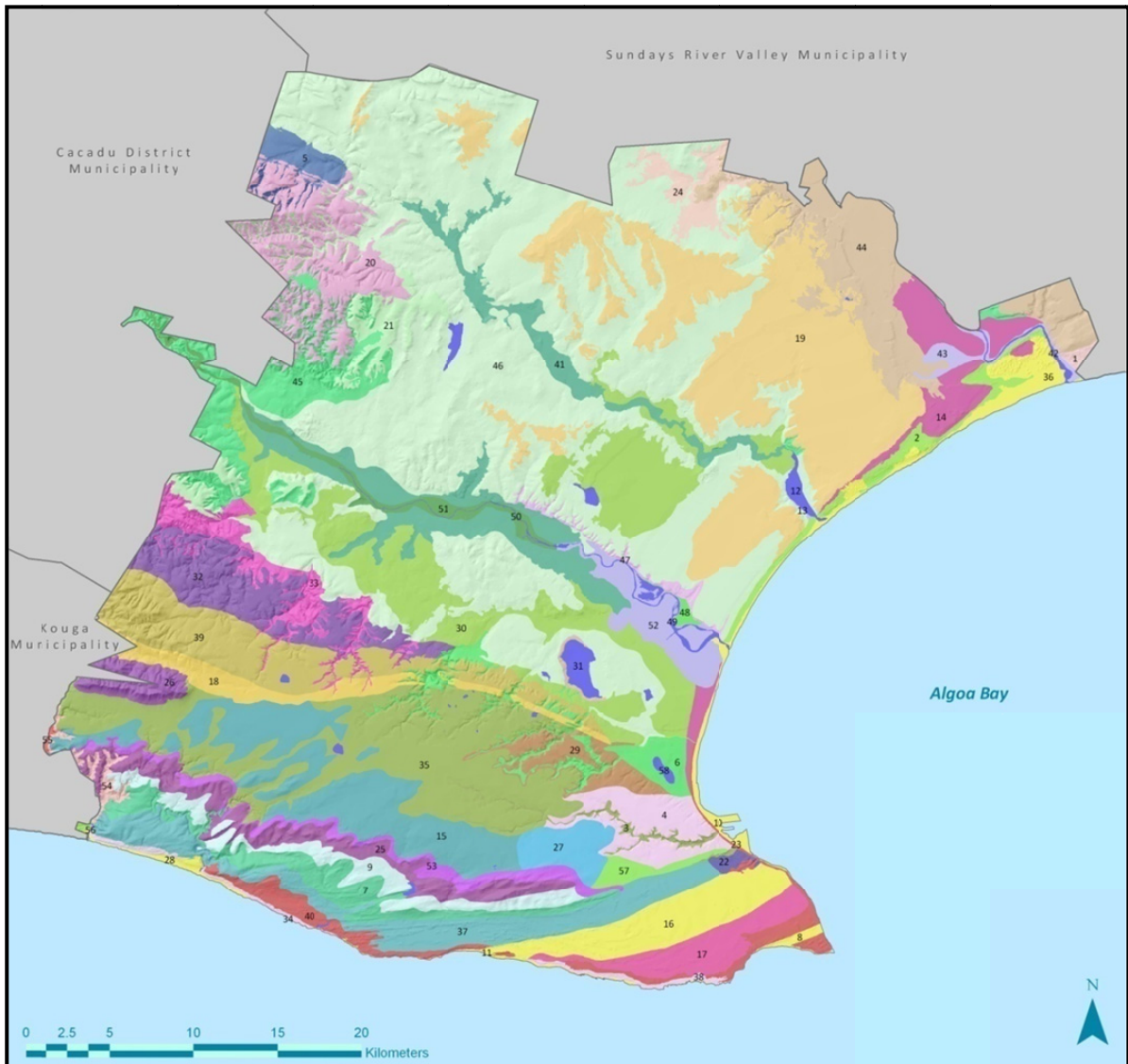
<sup>3</sup> A biome is a regional-scale ecosystem characterized by distinct types of vegetation, animals, and microbes that have developed under specific soil and climatic conditions.



**Figure 2-2: The biomes within Nelson Mandela Bay municipal area (Stewart *et al.*, 2008)**

## 2.2 Important Terrestrial Features

The NMBM Conservation Assessment identified a total of 58 vegetation types within the municipal area (see Figure 2-3 and Table 2-2).



**Figure 2-3: The historical distribution of natural vegetation types in the Nelson Mandela Bay municipal area (Stewart et al., 2008)**

**Table 2-1: Key to Figure 2-3 vegetation type numbers**

No.	Vegetation Type	No.	Vegetation Type	No.	Vegetation Type
1	Albany Dune Thicket	21	Groendal Fynbos Thicket	41	Sundays Doringveld Thicket
2	Algoa Dune Thicket	22	Humewood Dune Fynbos	42	Sundays River
3	Baakens Forest Thicket	23	Intermediate Beach	43	Sundays River Floodplain
4	Baakens Grassy Fynbos	24	Koedoeskloof Karroid Thicket	44	Sundays Spekboom Thicket
5	Baviaans Spekboom Thicket	25	Kragga Kamma Indian Ocean Forest	45	Sundays Thicket
6	Bethelsdorp Bontveld	26	Lady Slipper Mountain Fynbos	46	Sundays Valley Thicket
7	Bushy Park Indian Ocean Forest	27	Lorraine Transitional Grassy Fynbos	47	Swartkops Escarpment Valley Thicket
8	Cape Recife Bypass Dunefield	28	Maitlands Dunefield	48	Swartkops Estuarine Floodplain

No.	Vegetation Type	No.	Vegetation Type	No.	Vegetation Type
9	Chelsea Forest Thicket Mosaic	29	Malabar Grassy Fynbos	49	Swartkops Estuary
10	Coastal	30	Motherwell Karroid Thicket	50	Swartkops River
11	Coastal Hummock Dunes	31	Pan	51	Swartkops River Floodplain
12	Coega Estuary	32	Rocklands Renoster Bontveld	52	Swartkops Salt Marsh
13	Coega Estuary Floodplain	33	Rocklands Valley Thicket	53	Thornhill Forest and Thornveld
14	Colchester Strandveld	34	Rocky Beach	54	Van Stadens Afro. Ind. Ocean Forest
15	Colleen Glen Grassy Fynbos	35	Rowallan Park Grassy fynbos	55	Van Stadens Forest Thicket
16	Driftsands Bypass Dunefield	36	Sandy Beach	56	Van Stadens River
17	Driftsands Dune fynbos	37	Sardinia Bay Forest Thicket	57	Walmer Grassy Fynbos
18	Goudini Grassy Fynbos	38	Schoenmakerskop Rocky Shelf Fynbos	58	Wetland
19	Grass Ridge Bontveld	39	Skurweberg Grassy Fynbos		
20	Groendal Fynbos	40	St Francis Dune Fynbos Thicket Mosaic		

A high proportion of the vegetation types within the municipal area are threatened (twenty-three are *Critically Endangered* and a further ten are *Endangered*)<sup>4</sup> and now face collapse unless efforts are made to ensure their persistence (Stewart *et al.*, 2008) (see Table 2-2 and Figure 2-4).

**Table 2-2: An overview of the Ecosystem Threat Status of the vegetation types of the NMBM area (Stewart *et al.*, 2008)**

Ecosystem Threat Status	Number of Vegetation Types
Critically Endangered	23
Endangered	10
Vulnerable	15
Least Threatened	10
<b>Total</b>	<b>58</b>

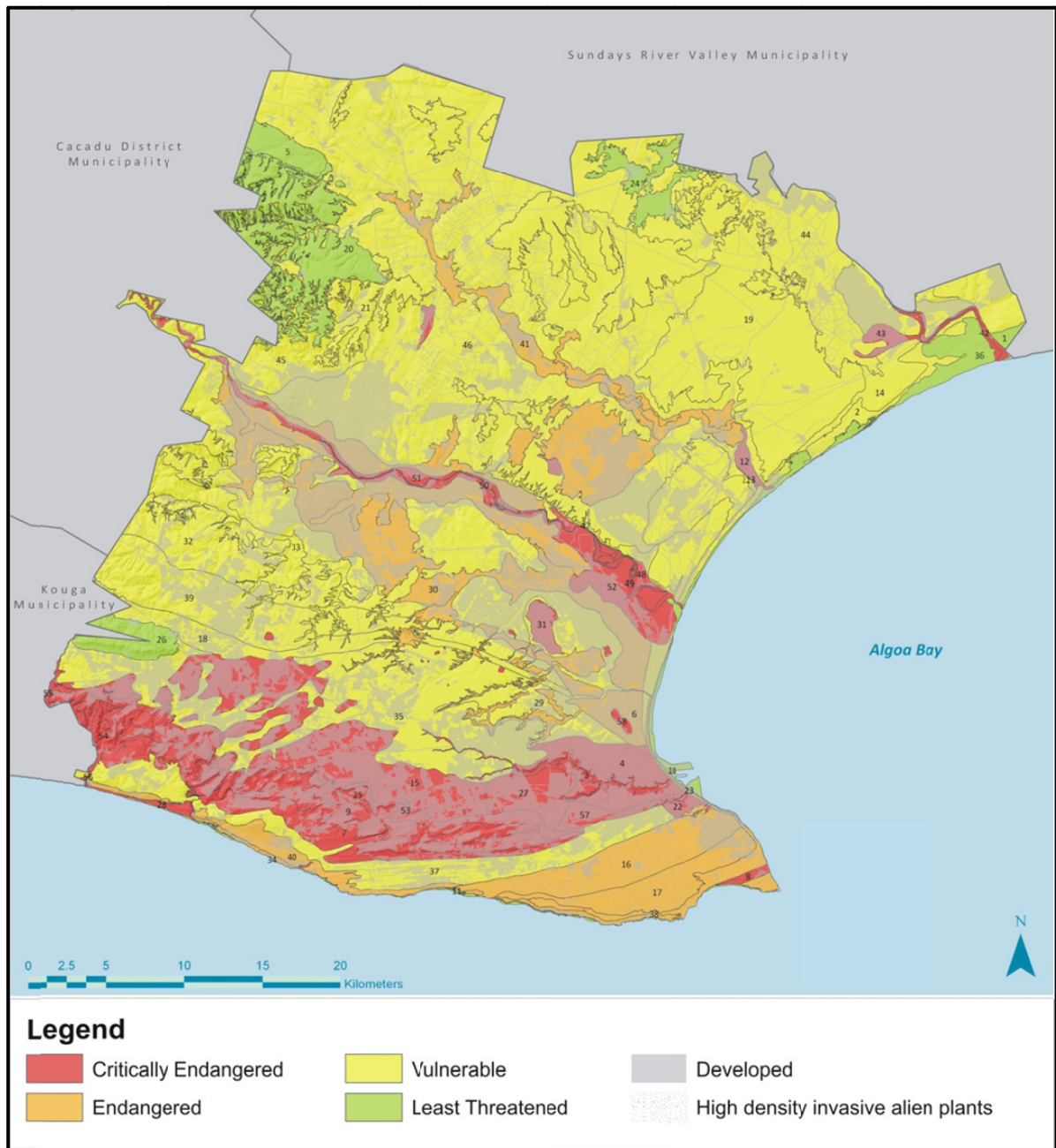
The threatened status of these habitats is mirrored by the number of threatened species within the municipal area – the Nelson Mandela Bay Municipality has the highest number of red listed species of all the municipalities in the Eastern Cape (CSIR, 2004).

The most threatened vegetation types within the NMBM area are Lowland Fynbos, Subtropical Thicket mosaic and Forest vegetation types.

The Lowland Fynbos vegetation types in the NMBM area are predominantly grassy fynbos systems. Due to the fact that much of the urban expanse of Port Elizabeth was developed on these ecosystems, they are also some of the most threatened vegetation types within the municipal area. The most threatened Lowland Fynbos vegetation types within the municipal area are Critically Endangered Colleen Glen Grassy Fynbos, Lorraine Transitional Grassy Fynbos, Baakens Grassy Fynbos and Walmer Grassy Fynbos. Threatened plant species in these systems include South Africa's national flower, the king protea *Protea cynaroides* (Critically Endangered), *Cyclopia*

<sup>4</sup> The Ecosystem Threat Status of the vegetation types in the Nelson Mandela Bay municipal area was assessed using biodiversity targets, which were based on the species-area curve method (Desmet & Cowling, 2004). The Ecosystem Threat Status of the vegetation types specify above for the NMBM (Stewart *et al.*, 2008) differs from the National List of Threatened Ecosystems in Notice 1002 of 2011 in Government Gazette No. 34809 dated 9 December 2011. This difference is due to the fine-scale spatial mapping of the NMBM vegetation types, as opposed to broader level mapping that informed the national listing.

*pubescens* (Critically Endangered) and *Brunsvigia litoralis* (Endangered). Pressures on the Lowland Fynbos within the NMBM area include invasion by alien vegetation, urban expansion, inappropriate fire regimes, habitat fragmentation and global climate change (Pierce-Cowling, 2009).



**Figure 2-4: The Ecosystem Threat Status of vegetation types within the Nelson Mandela Bay municipal area (Stewart et al., 2008)**

The most threatened Subtropical Thicket vegetation types occurring within the municipal area are those that form mosaics with vegetation that have affinities to other biomes and include *Endangered* Sundays Doringveld Thicket, Bethelsdorp Bontveld and Motherwell Karroid Thicket. Coastal Fynbos Thicket mosaics within the municipal area are confined to the southern coastline and are a mixture of fynbos and large-leaved subtropical shrubs. They include *Critically Endangered* Humewood Dune Fynbos and *Endangered* Schoenmakerskop Rocky Shelf Fynbos, Driftsands Bypass Dunefield, Driftsands Dune Fynbos and St Francis Dune Fynbos Thicket Mosaic. Threatened plant species in the Subtropical Thicket mosaics include *Critically Endangered* *Aspalathus recurvispina*, *Orthopterum coegana* and *Aloe bowiea*. The Albany adder *Bitis albanica* (*Critically Endangered*) also occurs in thicket and thicket mosaic habitat types. The mosaics are threatened by the development of informal

and formal housing, industrial development, plant harvesting for medicinal and cultural use, overgrazing and mining.

Forest in Nelson Mandela Bay occurs in a solid form and in a mosaic with thicket. The solid forest within the NMBM is mostly confined to steep riverine gorges, which are sheltered from fire, and confined to a band along the wetter southern portion of the municipal area. Threatened forest types within the municipal area include *Critically Endangered* Chelsea Forest Thicket Mosaic, Bushy Park Indian Ocean Forest, Van Stadens Afromontane Indian Ocean Forest, Van Stadens Forest Thicket, Kragga Kamma Indian Ocean Forest and Thornhill Forest and Thornveld. The protected milkwood *Sideroxylon inerme*, dwarf Cape Beach *Rapanea gilliana*, and yellowwood *Afrocarpus falcatus* trees are prominent in many of the forest types. The southern population of blue duiker *Philantomba monticola*, which is confined to the Maputaland-Pondoland-Albany hotspot, occurs in the southern forested portions of Nelson Mandela Bay. The forest within the municipality is threatened by increased prevalence of fire, harvesting of forest products and the development of informal and formal housing.

## 2.3 Important Freshwater Features

Nelson Mandela Bay has ten main rivers, each with a unique ecosystem (Roux *et al.*, 2002), of which four are deemed to no longer be intact (SRK Consulting, 2010). Since all of the main rivers in Nelson Mandela Bay are unique, they all require some degree of safe-guarding.

Of particular importance is the Swartkops River system. The Swartkops River catchment contains two main rivers systems, the Elands and the Kwazunga, and two subsidiary tributaries, the Brak and Chatty. The Groendal Wilderness Area constitutes almost a third of the catchment of this river system, and the Groendal Dam supplies almost two-thirds of Uitenhage's domestic water. A number of threatened and rare species occur in Groendal, including the Cape redbin minnow *Pseudobarbus afer*, which is restricted to the area, and the possible presence of Hewitt's ghost frog *Heleophryne hewitti* (Critically Endangered) (Cunningham *et al.*, 2003; Conradie *et al.*, 2013).

Cultivation and invasive alien plants along this river system have impacted on its functioning by respectively increasing sedimentation and reducing the volume of water within the river. Alien species, such as the largemouth bass *Micropterus salmoides*, are a threat to the survival of indigenous fish species.

A number of small vleis and pans occur within the municipal area, particularly in grassy Fynbos, Subtropical Thicket, and coastal areas. These provide distinct habitats for species, including both threatened and common amphibian species such as the African bullfrog *Pyxicephalus adspersus*<sup>5</sup> and the yellow-striped reed frog *Hyperolius semidiscus*<sup>6</sup>. In addition to providing habitat, these wetlands are also important for the functions that they provide, such as flood attenuation, water filtration and erosion reduction. The main pressures on wetlands are through infilling or draining (e.g. for urban development and grazing), erosion, water abstraction and diversion (e.g. through dams and weirs).

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<sup>5</sup> Regionally the African Bullfrog is regarded as rare and of conservation concern. Its current official IUCN Red List rating is Least Concern (Measey, 2011). The population in the Bridgemead area is of conservation concern as this is the most southern distribution of the species (Minter *et al.*, 2004).

<sup>6</sup> The Yellow Striped Reed Frog is common and widespread along the east coast of South Africa (Minter *et al.*, 2004). They reach a most southern/western distribution in the Port Elizabeth area. They are sensitive to disturbance and only occur in deep wetlands/streams with dense vegetation.

## 2.4 Important Coastal Features and Estuaries

The coastal zone of Nelson Mandela Bay provides an array of recreational and sustainable resource utilisation opportunities and underpins a substantial segment of the municipality's economy.

The Swartkops Estuary lies about 8 km north of the Port Elizabeth city centre and is an important nursery for marine fish, including several angling species. The estuary forms the basis of an informal bait collecting industry and is ranked as South Africa's top temperate estuary in terms of subsistence value (Turpie & Clark, 2007). The bait collecting industry is also, however, responsible for destruction of the mudflats, leading to significant impacts on the functioning of the system (Baird *et al.*, 1988). The functioning of the estuary is also threatened by pollution, enrichment, sand mining, overfishing, insufficient inflow of freshwater due to damming, and inappropriate development. Relevant sections of the Swartkops River and Estuary are currently proposed for declaration as either a Protected Environment or Nature Reserve in terms of the NEM: Protected Areas Act, 2003 (Act No. 57 of 2003). Declaration thereafter as a RAMSAR site is also being considered. Under the auspices of the Department of Water and Sanitation (DWS), a Catchment Management Forum has been formed with the objective of safeguarding the welfare of the Swartkops River and Estuary from source to sea (T Potts 2014, pers. comm., 30 Oct).

The foredune vegetation along the Nelson Mandela Bay coastline helps to buffer against the high energy influences of the tides, wind and waves. These systems are sensitive to disturbance and are susceptible to the formation of blow-outs. The coastal area is often targeted for development, primarily due to the desirability of ocean views. The protection of the coastal foredune system is important in order to safeguard the scenic attributes of the coastal zone and to provide protection against the natural coastal agents of change, particularly in light of the implications of global sea-level rise.

The Alexandria Dunefield has its beginnings at the north-eastern extent of the municipal area. The dunefield is considered to be one of the largest and most pristine active coastal dunefields in the world. Larger and more extensive dunefields are only found in desert areas. As such, it has been incorporated into the Addo Elephant National Park and was nominated by South African National Parks as a World Heritage Site (UNESCO, 2009).

The Maitlands Dunefield, between the resort villages of Beachview and Blue Horizon Bay on the south-western part of the Nelson Mandela Bay coastline, supports what is believed to be the highest density of black oystercatcher in the country (Bornman & Klages, 2003). The black oystercatcher is *Near Threatened* and is highly susceptible to disturbance during its breeding cycle. The Maitland area, in general, is one of the most visually spectacular areas in the municipality and has significant value in terms of recreation and tourism.

Although the prohibition of off-road vehicles on the dunefields has substantially reduced threats to these systems, they continue to be threatened principally by encroachment of invasive alien plants and are vulnerable to insensitive recreational use.

## 2.5 Important Ecological Corridors

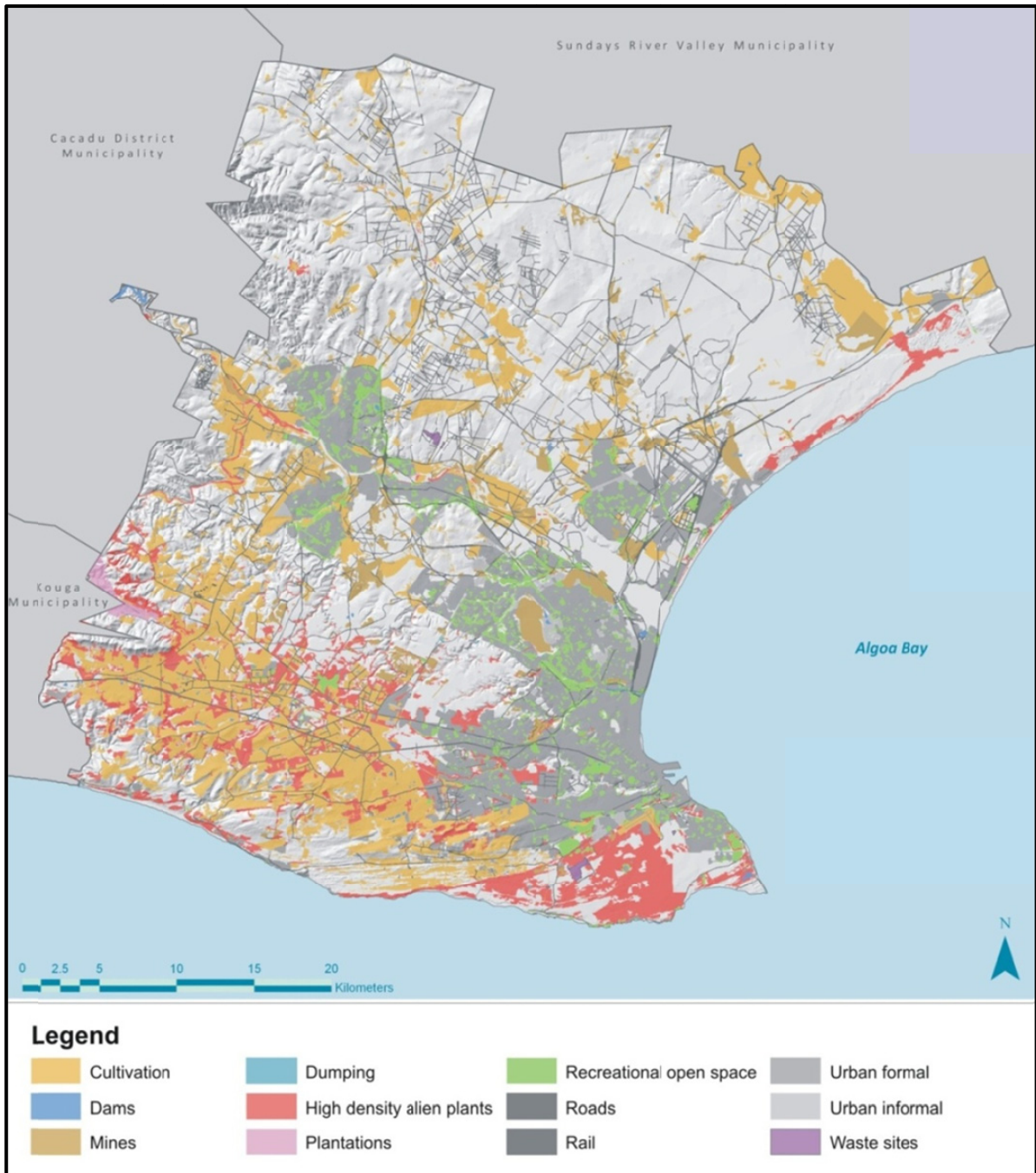
A number of ecological corridors were identified as part of the NMBM conservation assessment. These corridors were designed to promote connectivity between natural areas in order for ecological processes (such as migration and seed dispersal) to continue.

While all of the identified corridors are important, the Baakens River Valley, which forms an east-west corridor through the urban expanse of the municipal area, deserves a special mention. It is the municipality's most extensive corridor through fynbos habitats and is of critical importance for the continuation of ecological processes that sustain biodiversity. The area also provides numerous

ecosystem services, playing an important role in flood attenuation, storm water management, environmental education and nature-based recreation.

## 2.6 Patterns of Land-Use

A large proportion (62 %) of Nelson Mandela Bay is in a natural state (SRK Consulting, 2010), making it the metropolitan municipality with the highest proportion of natural habitat in the country.



**Figure 2-5: Patterns of land-use in the Nelson Mandela Bay municipal area (SRK Consulting, 2010)**

This creates opportunities that most metropolitan municipalities no longer have for capitalising on ecological infrastructure and for natural ecosystems to support human well-being (e.g. through maintenance of ecosystem goods and services and ecosystem-based adaptation to climate change).

Urban development is primarily concentrated on the coastal and inland lowlands in the east and north-west of the municipal area. Cultivation is concentrated on the ancient dunes in the south of Nelson Mandela Bay and the inland Fynbos and Subtropical Thicket lowlands (see Figure 2-5).

From 2003 development within the coastal zone has increased substantially. The extent of habitat loss within the coastal zone is of concern not only due to impacts on ecological processes and biodiversity but also due to the impacts on the natural character of this zone, which is a key component of the municipality's tourism economy (SRK Consulting, 2010).

## 2.7 Ecosystem Protection Level within the Nelson Mandela Bay Municipal Area

The existing network of conservation areas within the NMBM area totals approximately 10,500 ha, or approximately 5 % of the municipal area. Of this, only 4,700 ha (2 % of the municipal area) is recognised as protected areas in terms of the NEM: PA Act. The remaining conservation areas (approximately 5,800 ha in extent) have weak legal protection and are not necessarily managed for biodiversity conservation purposes.

The current protected area system in the municipal area is therefore highly deficient, particularly in terms of its limited size and connectivity, and urgently requires expansion in order to achieve biodiversity targets (SRK Consulting, 2010). Due to the extent of remaining natural habitat, the NMBM is unique amongst the metropolitan municipalities in terms of opportunities for expanding the protected area network to the benefit of biodiversity as well as its people (see Table 2-3).

**Table 2-3: Distribution of conservation areas within the municipal area (SRK Consulting, 2010)**

Protected Areas	Area (ha)	Conservation Areas	Area (ha)
Greater Addo Elephant National Park	752	Grassridge Private Nature Reserve	1,320
Groendal Wilderness Area	14	NMMU Private Nature Reserve	840
Island Forest Nature Reserve	496	Witteklip Private Nature Reserve	29
Cape Recife Nature Reserve	323	Van Stadensberg Natural Heritage Site	579
Lady Slipper Nature Reserve	365	Seaview Game Park	31
Maitland Nature Reserve	132	Kragga Kamma Game Park	203
Sardinia Bay Nature Reserve	249	Paardekop Game Farm	679
Settlers Park Nature Reserve	75	Tregathlyn Game Farm	2,099
Swartkops Valley Nature Reserve	940	<b>Total</b>	<b>2462</b>
Sylvic Nature Reserve	91		
The Springs Nature Reserve	929		
Van Stadens Nature Reserve	339		
<b>Total</b>	<b>4705</b>		

## 2.8 Description of Critical Biodiversity Areas

Critical Biodiversity Areas within the municipal area are the portfolio of sites that are required to meet the municipality's biodiversity targets<sup>7</sup>. Such areas should be maintained in their natural state in

<sup>7</sup> The biodiversity targets for each of the vegetation types in the municipal area were assigned according to the targets for corresponding broad habitat units or vegetation types as identified in the C.A.P.E. and STEP Programmes.

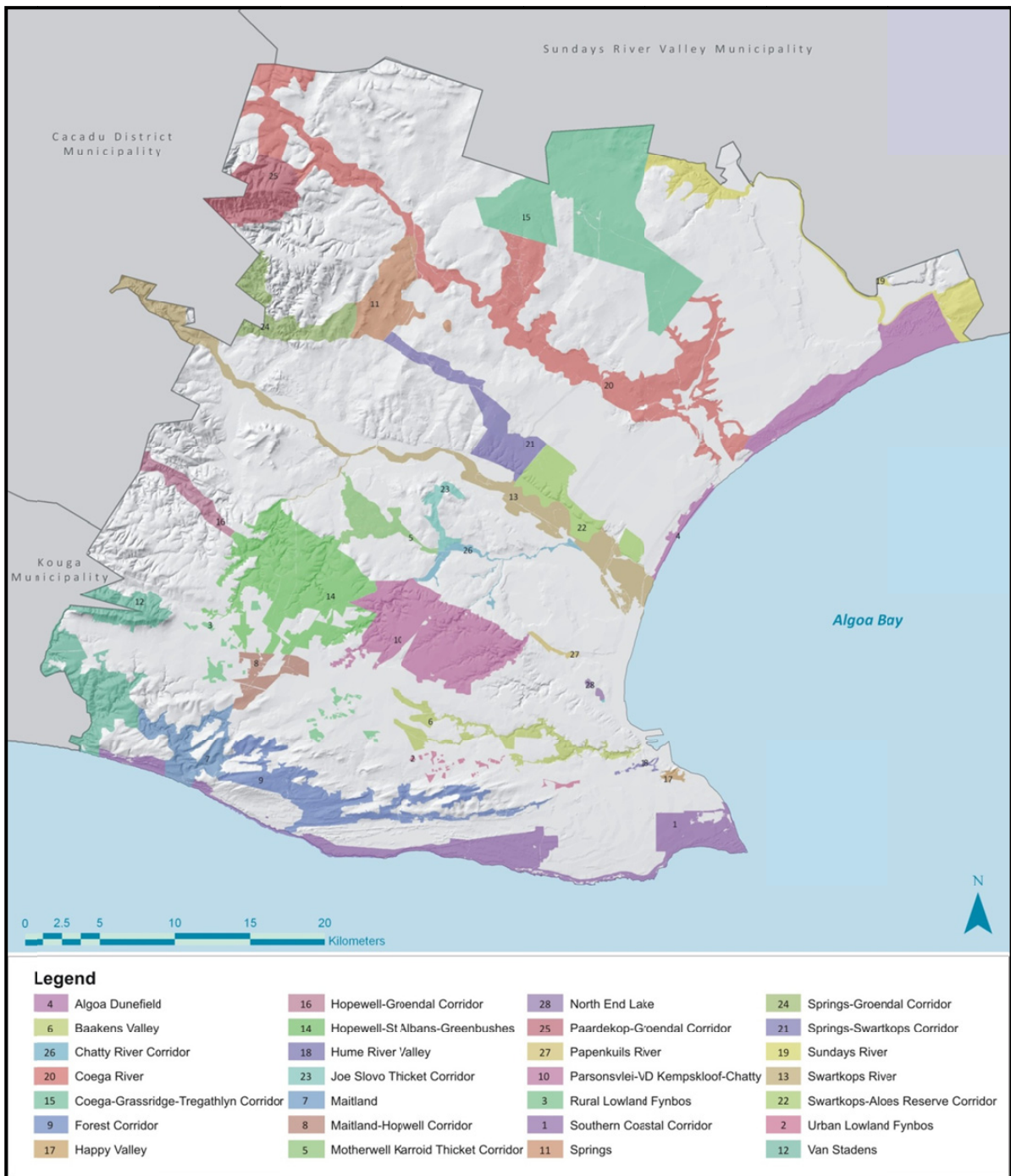
perpetuity. A map of CBAs<sup>8</sup> was produced as part of the NMBM's Conservation Assessment and Plan (SRK Consulting, 2010) and sites were assigned to CBA categories based on their biodiversity characteristics and Ecosystem Threat Status (see Figure 3-1 and Table 2-4).

**Table 2-4: Description of Critical Biodiversity Areas and other categories**

Category	Code	Description	Land Management Objective
<b>Protected Area 1</b>	PA 1	Protected areas managed by SAN Parks, provincial or local authorities, parastatals (e.g. NMMU), or the private sector. Includes National Parks, Provincial, Local and Private Nature Reserves.	To be maintained as Protected Areas.
<b>Protected Area 2</b>	PA 2	National Parks, Provincial, Local, Private Nature Reserves pending declaration.	To be declared and maintained as Protected Areas.
<b>Critical Biodiversity Areas</b>	CBAs	All <i>Critically Endangered</i> habitats, ecological process areas, ecological corridors, habitats for Species of Special Concern, and some <i>Endangered</i> , <i>Vulnerable</i> or <i>Least Threatened</i> habitats.	Such areas must be managed for biodiversity conservation purposes and incorporated into the protected area system.
<b>Ecological Support Area 1</b>	ESA 1	Agricultural or partly degraded land that plays an important role in ecosystem functioning and / or provides connectivity between natural areas.	Such areas must be maintained for extensive agricultural or similar low intensity purposes and managed to promote ecological connectivity.
<b>Ecological Support Area 2</b>	ESA 2	Areas severely disturbed or transformed by human activities (e.g. mining), requiring restoration or rehabilitation.	Such areas must be restored or rehabilitated to support ecological connectivity. Such areas must not be developed or utilised for medium to high intensity purposes (e.g. crop production, residential, industry etc.).
<b>Other Natural Areas</b>	ONA	Natural areas that are not required to meet biodiversity targets.	As per the Municipal SDF or local SDFs.
<b>Areas where no natural habitat remains</b>	DEV	Areas severely disturbed or transformed by human activities with no natural habitat remaining, including airfields, cultivated lands, forestry plantations, industry, mines and quarries, severe overgrazing, and urban and rural development.	As per the Municipal SDF or local SDFs.

<sup>8</sup> The CBA network within the Coega Industrial Development Zone and Ngqura Port was designed based on the target requirements for the various components of biodiversity within this area and the Coega Development Corporation's Open Space Management Plan Version 9 (as approved by DEA at the time of completion of the Final Bioregional Plan). A new version of the Coega OSMP has been submitted by the CDC to DEA, but is still under considered for approval and has therefore not been integrated into the CBA network yet. If approved, it will be incorporated into the next version of the Bioregional Plan.

The CBAs were clustered into twenty-nine implementation sites (see Figure 2-6) and were prioritised according to their overall Ecosystem Threat Status and current land-use. These implementation areas should form the focus for the investment of the limited resources of the NMBM for the implementation of the Bioregional Plan.



**Figure 2-6: Implementation sites in the Nelson Mandela Bay municipal area (SRK Consulting, 2010)**

### 3 Part C: Critical Biodiversity Areas Map

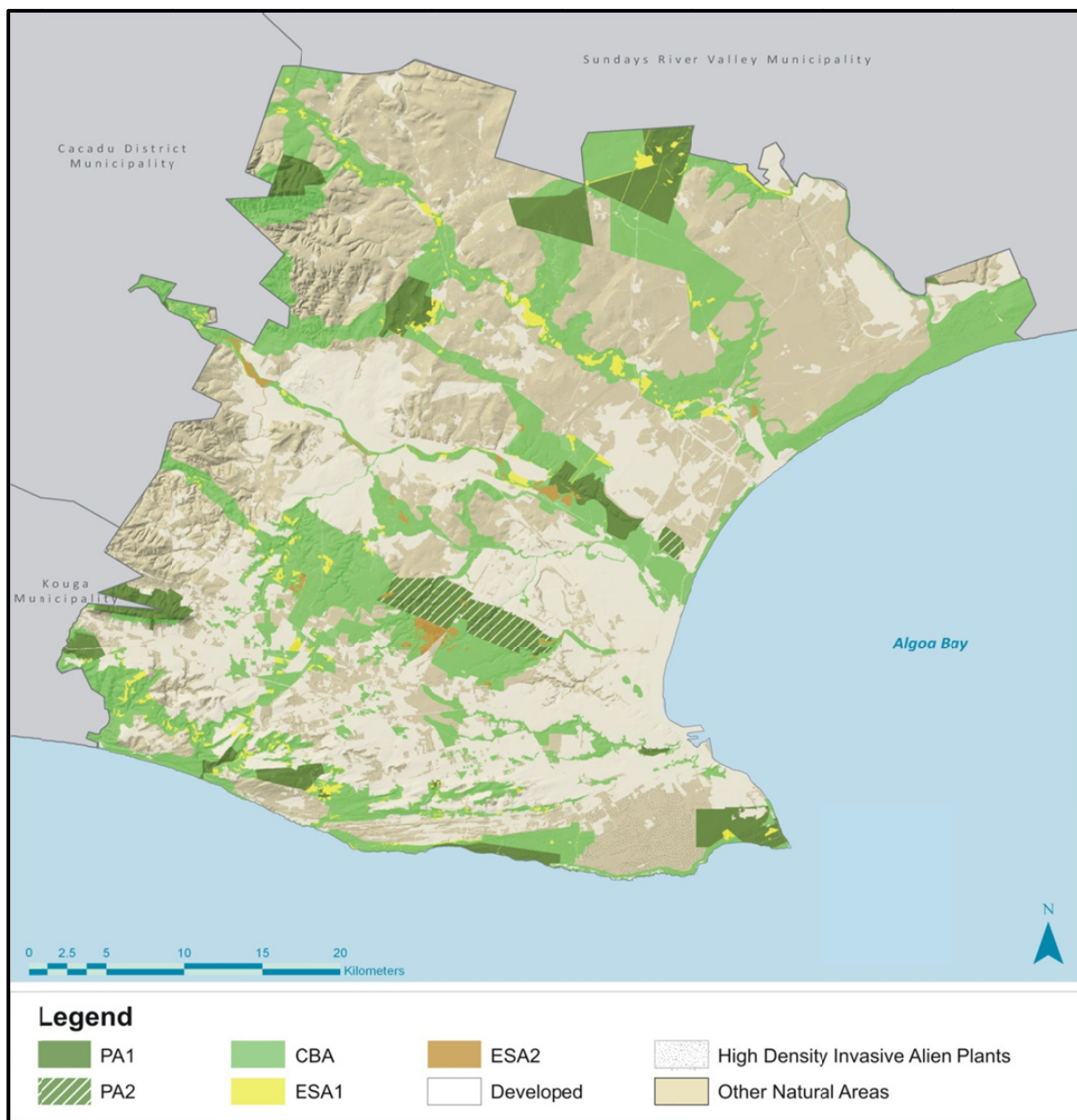


Figure 3-1: Map of Critical Biodiversity Areas within the municipal area<sup>9</sup>

<sup>9</sup> Discussions and negotiations between the NMBM and PPC are ongoing regarding the re-alignment of part of the CBA and ESA network across the land owned by PPC in the Grassridge area. The intention is to reach agreement on an alternative CBA and ESA network across these properties that achieves equivalent conservation targets to the current network on this land, but presents fewer constraints to PPC’s current and future operations. It is hoped that the negotiations will be finalised during 2015 and the agreed re-alignment reflected in a revision to the NMBM Systematic Conservation Assessment and Plan and proposed revisions to the Bioregional Plan scheduled for 2015.

## 4 Part D: Guidelines

Table 4-1: Biodiversity-compatible land-use guidelines matrix - Category descriptions and management objectives<sup>10</sup>

Category on the CBA Map	Description	Land Management Objective	Land Management Recommendations	General Land-Use	Associated NMBM Rural Development Policy and SDF Categories
<b>Protected Areas (PA 1 &amp; 2)</b>	Formal Protected Areas (PA1) and Protected Areas pending declaration (PA2), in terms of the NEM: Protected Areas Act and ECA.	Maintain or restore NATURAL structure and ecosystem functioning.	Maintain formal conservation protection.	Conservation (non-consumptive).	Critical Biodiversity Zone 1 (CBZ1)
<b>Critical Biodiversity Areas (CBAs)</b>	ANY land or aquatic site required to meet biodiversity pattern (features), process (ecological), or species targets.	Maintain or restore NATURAL structure and ecosystem functioning.	Obtain formal conservation protection for highest priority sites and institute conservation management for all sites.	Conservation (non-consumptive).	Critical Biodiversity Zone 1 or 2 (CBZ1 or 2)
<b>Ecological Support Area 1 (ESA1)</b>	Agricultural or partly degraded land essential for connectivity in the landscape, particularly between CBAs.	Maintain existing extensive land-uses (e.g. sustainable livestock grazing) where these facilitate ecological functioning and connectivity between adjacent CBAs; or restore NATURAL structure and ecosystem functioning; or rehabilitate to near natural state to facilitate connectivity between adjacent CBAs.	Maintain existing extensive land-uses to facilitate ecological connectivity or manage for conservation.	Extensive agriculture or similar low intensity purposes that promote conservation and ecological connectivity (sustainable consumptive or non-consumptive).	Critical Biodiversity Zone 2 (CBZ2)

<sup>10</sup> With acknowledgement to Deborah Vromans (Garden Route Initiative [GRI], SAN Parks) who compiled initial draft guidelines for the Garden Route Initiative, which were used as a template during the development of these guidelines.

Category on the CBA Map	Description	Land Management Objective	Land Management Recommendations	General Land-Use	Associated NMBM Rural Development Policy and SDF Categories
<b>Ecological Support Area 2 (ESA2)</b>	Severely disturbed or degraded sites (e.g. mines, overgrazed areas) essential for ecosystem connectivity in the landscape, particularly between CBAs.	Restore NATURAL structure and ecosystem functioning or rehabilitate to facilitate connectivity between adjacent CBAs.	Manage for conservation or low intensity use that supports ecological connectivity once existing land-use has ceased.	Conservation (sustainable consumptive or non-consumptive) or low intensity use that supports ecological connectivity once existing land-uses causing degradation have ceased.	Critical Biodiversity Zone 2 (CBZ2)
<b>Developed Areas: Non-restorable land with no natural habitat remaining (Dev)</b>	Irreversibly developed / degraded areas (areas that cannot be rehabilitated): <ul style="list-style-type: none"> <li>• Intensive agriculture (excluding ESA1s);</li> <li>• Urban development;</li> <li>• Industry; and</li> <li>• Waste sites etc.</li> </ul>	As per Municipal SDF, local SDF and NMBM Urban Densification and Rural Development Policy.	As per Municipal SDF, local SDF and NMBM Urban Densification and Rural Development Policy.	Preferred sites for development, but always subject to conditions in terms of NMBM SDF, Urban Densification and Rural Development Policy and 'sustainable human settlement' principles.	Various
<b>Other Natural Areas (ONA) (TERRESTRIAL and AQUATIC) Including degraded areas (e.g. high density alien plants) not part of CBAs and ESA 1 &amp; 2.</b>	Natural & intact but not required to meet targets.	As per Municipal SDF, local SDF and NMBM Urban Densification and Rural Development Policy.	As per Municipal SDF, local SDF and NMBM Urban Densification and Rural Development Policy.	Preferred sites for development, but always subject to conditions in terms of NMBM SDF, Urban Densification and Rural Development Policy and 'sustainable human settlement' principles <sup>11</sup> .	Various

<sup>11</sup> Sustainable Human Settlement Principles refer to the following key criteria that should be integrated into planning, namely: Poverty alleviation – meeting basic needs; focus on special needs groups – HIV/AIDS affected persons, children, the aged and people with disabilities; Gender equality and equity; The environment – physical, social and economic; Participation and demographic processes; Local economic development; and Accessibility – public transport and pedestrian focus; Mixed use development; Corridor development; Safety and security; Variation and flexibility; Densification; and Reducing urban sprawl. It is envisaged that each sustainable community unit shall have the following functional elements, namely: Housing, work, services, transport, community, character and identity. Further information can be obtained by downloading the NMBM Sustainable Community Planning Guide at <http://www.nelsonmandelabay.gov.za/Documents.aspx?cmd=browse&objID=85&catID=28>

**Table 4-2: Recommended land and resource (water) use management guidelines in Critical Biodiversity Areas and other categories on the CBA map**

<p align="center"><b>CRITICAL BIODIVERSITY AREAS (TERRESTRIAL ECOSYSTEMS)</b></p> <p align="center"><b>INCLUDES: ALL Critically Endangered vegetation types in terms of the NMBM Conservation Plan and Best Design sites of Endangered, Vulnerable &amp; Least Threatened vegetation types, ecological processes and species of special concern that satisfy biodiversity targets</b></p>
<p align="center">Keep in a <b>NATURAL STATE</b></p>
<p align="center"><b>Biodiversity Friendly Land-Use Types (Land-Use Type 1-4)</b></p>
<p align="center"><b>CBA PATTERN</b></p>
<p><b>General Recommendations</b></p>
<ul style="list-style-type: none"> <li>• No further loss of natural habitat should occur i.e. all land in this category should be maintained as natural vegetation cover;</li> <li>• These areas of land can act as possible <b>biodiversity offset receiving</b> areas;</li> <li>• Mimic or maintain natural ecological processes; for example fire in Fynbos and Dune Thicket vegetation types;</li> <li>• Determine the vegetation type and then consult the Fynbos Forum Ecosystem Guidelines (de Villiers <i>et al.</i>, 2005) for detailed management guidelines;</li> <li>• Priority for DEDEAT, NMBM and DAFF (Agriculture and Forestry Sections) to carry out regular environmental monitoring and reporting, for biodiversity and / or change of land-use, to prevent unauthorized development or degradation by neglect or ignorance (monitoring guidelines are required);</li> <li>• Prioritise CBAs for land care projects, Working for Water (WfW) and NGOs to direct their conservation projects, programmes and activities; and</li> <li>• An Ecological Management Plan should be compiled by landowner for CBAs. EMP to include alien plant control, fire management etc.</li> </ul>
<p><b>Protection</b></p>
<ul style="list-style-type: none"> <li>• CBAs under public ownership to be declared in terms of NEM: Protected Areas Act. Privately owned erven to be incorporated into the protected area network through Biodiversity Stewardship Agreements. Privately owned erven to be declared in terms of NEM: Protected Areas Act where landowners are willing to do so. CBAs not formally protected (public or private) should be rezoned to Open Space 3<sup>12</sup> and title deed restrictions attached where possible. Rates rebates to be provided in return where possible.</li> </ul>
<p><b>Fire Management</b></p>
<ul style="list-style-type: none"> <li>• An appropriate fire management plan for fire dependant ecosystems must be implemented, namely Fynbos and Dune Thicket.</li> </ul>
<p><b>Rehabilitation / Restoration</b></p>
<ul style="list-style-type: none"> <li>• Degraded or disturbed CBAs will require restoration or rehabilitation through programmes such as Working for Water, Working for Wetlands etc.</li> </ul>
<p><b>In Urban Areas</b></p>
<ul style="list-style-type: none"> <li>• Maintain and legally protect the Urban Open Space System that maintains CBAs; and</li> <li>• Compatible land-uses adjacent to and within CBAs &amp; management guidelines could include – <ul style="list-style-type: none"> <li>○ Community projects such as passive recreation for eco-tourism, employment of security officers (visible 'policing') etc.</li> <li>○ Where necessary, provide fencing or locate institutional / educational 'barriers' where high density, high canopy vegetation types create a security risk.</li> </ul> </li> </ul>

<sup>12</sup> Open Space 3 in terms of the proposed NMBM Integrated Zoning Scheme refers to the utilisation and management of an area for nature reserve purposes, irrespective of whether the area has been declared in terms of the NEM: Protected Areas Act. Open Space 1 refers to Public Open Space for recreational or cemetery purposes. Open Space 2 refers to Private Open Space for recreational (sports facility), cemetery or telecommunication purposes.

<p><b>Sand Movement (Ecological) Corridors</b></p> <ul style="list-style-type: none"> <li>• No development should be allowed in sand movement corridors (littoral active zone), frontal dunes or dynamic dune systems;</li> <li>• Mobile dunes must not be stabilized, unless where existing development requires it;</li> <li>• Maintain an indigenous vegetation buffer zone between the inland boundary of the youngest fixed dune trough and the seaward boundary of existing development; and</li> <li>• Strict control should be maintained over the use of off-road vehicles on beaches.</li> </ul>
<p><b>Coastal Ecological Corridors</b></p> <ul style="list-style-type: none"> <li>• Due to expected sea level rise from climate change, no development should occur within the coastal CBAs and the NMBM Coastal Development Set-back Lines.</li> </ul>
<p><b>Development Guidelines</b></p> <p><b><i>Where infrastructure is proposed, the following guidelines should be implemented -</i></b></p> <ul style="list-style-type: none"> <li>• Rezoning of properties to afford additional land-use rights that will result in increased biodiversity loss should not be granted;</li> <li>• Permitted number of units per erf or per ha to be based on existing land-use rights and NMBM Rural Development and Urban Edge Policy;</li> <li>• Developments should be limited to existing developed / degraded footprints, if present and appropriate<sup>13</sup>;</li> <li>• Units carefully dispersed or clumped to achieve least impact, particularly with regard to habitat loss and fragmentation;</li> <li>• The following minimum buffers are recommended between CBAs and proposed development nodes - <ul style="list-style-type: none"> <li>○ Forest: outside urban edge: minimum of 100 m, urban areas minimum of 30 m; and</li> <li>○ Other biomes: minimum of 50 m;</li> </ul> </li> <li>• The installation of infrastructure in CBAs is not desirable and should only be considered if all alternative alignment and design options have been assessed and found to be non-viable. Under such conditions, at least a Basic Assessment (BA) should be undertaken, and if approved, a comprehensive EMP must be developed and best-practice restoration efforts strictly implemented;</li> <li>• Protected Area infrastructure to be limited to existing developed or degraded sites, unless determined otherwise via a Conservation Development Framework planning process for the reserve;</li> <li>• Ecological Specialist to conduct the ecological assessment;</li> <li>• Where the infrastructure is within close proximity to aquatic ecosystems refer to 'CBA – Aquatic Ecosystems' below to ensure appropriate buffers;</li> <li>• Temporary structures are preferred e.g. raised wooden structures, tents, raised boardwalks or alternatively porous materials / design concepts preferred; and</li> <li>• A site-specific Construction and Operational Environmental Management Plan to be compiled and implemented.</li> </ul> <p><b>Where development proposals other than the preferred biodiversity-compatible land-uses (see definitions below in Table 4-3, Table 4-4, Table 4-5 and Table 4-6) are submitted in terms of the NEMA: EIA regulations or Spatial Planning and Land Use Management Act (SPLUMA)/Land Use Planning Ordinance (LUPO)/Development Facilitation Act (DFA)/Black Communities Development Act (Act No. 4 of 1984):</b></p> <ul style="list-style-type: none"> <li>• A Screening Exercise should be undertaken by a Biodiversity Specialist/Ecologist to verify the CBA map category on site;</li> <li>• If the site is verified as a CBA, developments other than Conservation Use should be identified as inappropriate;</li> <li>• If an application in terms of the NEMA EIA Regulations or any planning legislation is pursued, it should be informed by a biodiversity specialist study; and</li> <li>• Developments outside of the Urban Edge are also subject to the NMBM Rural Development Policy.</li> </ul>

<sup>13</sup> Existing disturbance should not be viewed as implying that development of such areas is appropriate, particularly due to the potential for restoration or rehabilitation of such sites.

<p><b>CRITICAL BIODIVERSITY AREAS (AQUATIC ECOSYSTEMS)</b>  <b>*Critically Endangered and Critical Ecological Process sites – in terms of NMBM pattern &amp; ecological process targets</b>  <b>INCLUDES wetland types, river reaches, estuaries and catchments</b></p>
<p>Keep in a NATURAL or NEAR NATURAL state</p>
<p>Conservation Resource Use – HIGH resource PROTECTION  Adjacent Land-Use – CONSERVATION or buffer to adjacent development</p>
<p><b>BIODIVERSITY OFFSETS</b></p>
<ul style="list-style-type: none"> <li>• No realistic biodiversity offsets.</li> </ul>
<p><b>ECOLOGICAL RESERVE</b></p>
<p><b>Water Quantity</b></p>
<ul style="list-style-type: none"> <li>• Maintain mean annual run-off as close to natural as possible;</li> <li>• Where abstraction is absolutely necessary, off channel dam construction ONLY with the highest Ecological Reserve possible;</li> <li>• Improve regulation of abstractions from these rivers &amp; encourage efficient water use throughout the area (i.e. demand control, recycling, use of grey water, rainwater tanks); and</li> <li>• Where water abstraction is licensed, all effluent must be treated and returned to natural water courses in order to obtain maximum utilization of scarce water resources.</li> </ul>
<p><b>Environmental Flow Requirements</b></p>
<ul style="list-style-type: none"> <li>• Flow regimes as close to natural as possible Retaining natural flow regimes (both in terms of magnitude and variability); Management actions to maintain natural flow regime should include: <ul style="list-style-type: none"> <li>○ Abstraction should occur during high flow seasons, not during low flow seasons;</li> <li>○ Water release from dams should take note of the ecological requirements of CBA rivers. This includes at least one annual flood release (at most appropriate time of year for each system), even if the dam is not full; and</li> <li>○ Optimal use should be made of existing abstractions through demand-management measures. Water must be correctly priced to prevent abuse and wastage.</li> </ul> </li> </ul>
<p><b>Water Quality</b></p>
<ul style="list-style-type: none"> <li>• Water quality as close to NATURAL as possible;</li> <li>• The Target Water Quality Range (TWQR) (range of concentrations or levels) should ensure that no measurable adverse effects are expected on the health of aquatic ecosystems, and should therefore ensure their protection;</li> <li>• All effluent is treated and returned to natural water resources in order to obtain maximum utilization of scarce water resources (as per DWS Policy); and</li> <li>• A precautionary approach is required to protect the health of aquatic ecosystems, which means that active measures are taken to avert or minimise potential risks of undesirable impacts on the environment.</li> </ul>
<p><b>Monitoring &amp; Management</b></p>
<ul style="list-style-type: none"> <li>• A management plan should developed for each biodiversity feature or site, for example – red data species, specific river reach habitat and</li> <li>• NMBM to investigate establishment of aquatic reserves (e.g. Swartkops Estuary).</li> </ul>
<p><b>Buffer Recommendations (CBA Buffers are 'NO-GO' areas)</b>  <i>Where an aquatic CBA is situated within an Ecological Corridor CBA, the width of the CORRIDOR will apply in concert with the buffers recommended below. UNLESS other land-uses (e.g. Agriculture) exist already OR a conservation land-use is proposed, the buffers recommended below will apply and should be actively enforced.</i></p>

It is important to NOTE that the following buffer recommendations DO NOT REPLACE a SITE LEVEL investigation.

**River Buffers**

To protect river integrity the following general buffers will apply:

- Mountain streams and upper foothills of all 1:500,000 (major) **rivers** = 50 m (these rivers generally have more confined riparian zones than lower foothills and lowland rivers; and are generally less threatened by agricultural practices);
- Lower foothills and lowland rivers of all 1:500,000 **rivers** = 100 m (these rivers generally have less confined riparian zones than mountain streams and upper foothills; and are more threatened by agricultural practices. These larger buffers are particularly important to lower the amount of pesticides etc. reaching the river); and
- All remaining 1:50,000 **streams** = 32 m (these rivers are generally the smaller upland streams corresponding to mountain streams and upper foothills. They are generally smaller rivers than those designated in the 1:500,000 rivers layer, and are assigned the riparian buffer required under South African legislation).

**Alternatively**

- If the 1:100 year flood line (or if flooding has occurred > 1:100 year flood line) is greater than the buffers prescribed above, then these flood lines will apply (i.e. it is important to re-evaluate flood lines to cater for the impact of climate change and reduce flood damage on new developments); and
- Enforcing the above riparian buffer zones along aquatic CBAs is crucial. The buffers will apply to crops, since rivers and their associated biota are highly susceptible to crop pesticides. It also applies to excluding livestock, which cause considerable bank erosion, with subsequent degradation of water quality. The access areas for livestock should be demarcated and all alien invasive plants within this zone should also be eradicated.

**Estuary Buffer**

- It is recommended that no new development around an estuary be permitted below 500 m from the high water mark or the 1:100 year flood line, whichever is the greatest;
- Where known flooding has occurred (e.g. Swartkops River Estuary) the highest flood line will apply (i.e. re-evaluate flood lines to cater for the impact of climate change and reduce flood damage on new developments); and
- Estuarine salt marshes should be protected and no activities allowed there.

**Wetland Buffers**

- Wetlands classified as CBA and that are largely intact (natural to near natural), namely rank 1 and 2 wetlands, require a minimum buffer of 75 - 200 m;
- Ensure that delineation of the wetland boundary is undertaken by a specialist ecologist according to 'A practical field procedure for identification and delineation of wetlands and riparian areas' (DWAF, 2003);
- No roads should be permitted to traverse these wetlands & their buffers; and
- Where a road or other water channelling structure runs close to a wetland and its buffer, and channels water into it, such water should be dispersed via multiple entry points with energy-dispersing structures. These drains must be small, dispersed low-volume, low-velocity structures. They must also be set back from the wetland and its buffer zone and be designed to spill into undisturbed natural vegetation at ground level. These provisions also apply to all urban storm-water outlets that spill into a wetland or up-slope of a wetland.

The following buffers are recommended for rank 1 and 2 wetlands, which vary according to size and wetland integrity (rank):

Size of Wetland	Rank 1	Rank 2
>20 ha	200 m	150 m
5 – 20 ha	150 m	100 m
< 5 ha	100 m	75 m

**General Recommendations regarding Buffers -**

- Do not permit infilling, excavation, drainage, hardened surfaces (including buildings and asphalt), intensive agriculture or any new developments within a **river, wetland or estuary**, their buffers, the 1:100 year flood line or highest flood line of the delineated edge, whichever is the greatest.
- The “buffers” may need to be wider than the above recommendations, for example due to the presence of an important amphibian species. This should be determined on a case-by-case basis by a specialist ecologist in consultation with the DWS, NMBM and DEDEAT to reflect site-specific factors. The approach for determining buffer width should consider the current condition of the aquatic ecosystem, as well as the functioning of the system in the broader landscape, plus an assessment of the impacts to the ecosystem of the existing and proposed adjacent land-use and climate change impacts i.e. increased flooding at higher levels than previously recorded.

**REHABILITATION**

- Areas that are degraded or disturbed should be rehabilitated, through programmes such as Working for Water, Working for Wetlands and a systematic alien vegetation eradication programme implemented to improve biodiversity and water supply, especially upstream areas of estuaries and wetlands;
- Prohibit the stocking of farm dams (even off-stream dams) with alien fish;
- Remove alien fish where possible to allow for natural recovery of indigenous fish in consultation with DWS, DEDEAT, ECPTA and NMBM;
- Stock dams with indigenous fish in consultation with DWS, DEDEAT, ECPTA and NMBM; and
- Rehabilitate riparian zones to act as a buffer between the river and surrounding agricultural areas in consultation with the DAFF, DWS, DEDEAT and NMBM.

**MANAGING CUMULATIVE IMPACTS THROUGH TRANSFORMATION THRESHOLDS WITHIN CBA CATCHMENTS**

- Development in CBA catchment areas should be biodiversity-friendly land-uses that discourage the following activities in upstream catchment areas to prevent unacceptable transformation levels & impacts on inland wetlands, estuaries and lowland rivers:
  - Large-scale abstraction, river diversion, impoundments, urban development, extensive woody alien invasion, river diversion / water transfer, Waste Water Treatment Works (WWTW) discharges, poorly serviced informal settlements, cultivation, impacts to floodplain hydrology, changes in water table (resulting from catchment-scale water transfers), catchment hardening.
- Catchment Developments (e.g. forestry) remain subject to standard DWS requirements regarding limits to reduction in mean annual runoff.

**OTHER GENERAL MANAGEMENT GUIDELINES**

- Aquaculture projects associated with aquatic CBAs e.g. off-stream dams, should not be permitted;
- Hydrological connections between systems (surface or groundwater) should not be disrupted (includes the need to manage post-development high flow and low flow runoff volumes);
- Manage jetties and structures on rivers and estuaries;
- Manage bio-physical and recreational carrying capacity of rivers and estuaries;
- Manage estuary mouth dynamics as close to natural as possible;
- Most of the estuaries & downstream wetlands are highly threatened by loss of freshwater inflows from upstream and by development encroachment. Management of these issues is considered critical;
- An Environmental Management Plan to be compiled for adjacent land-uses and should address the following issues: buffers, water quality, water flow, abstraction thresholds, alien fauna control, storm water etc.; and
- The Fynbos Forum Ecosystem Guidelines for Environmental Assessment in the Western Cape (de Villiers *et al.*, 2005) includes a section on river, estuary and wetland ecosystems that complements these guidelines.

<b>ECOLOGICAL SUPPORT AREAS 1 (ESA1 - AGRICULTURAL OR PARTLY DEGRADED LAND)</b>
<p>Supporting zone required for maintaining connectivity between CBAs, continued ecosystem functioning within the CBA corridors, and preventing degradation of Critical Biodiversity Areas. These require high protection.</p> <p><b>INCLUDES</b> extensive agricultural or partly degraded land immediately adjacent to CBAs</p>
<p>Maintain agricultural or partly degraded land in an EXTENSIVE state or rehabilitate or restore to a natural or semi-natural state.</p>
<p><b>General Recommendations</b></p>
<ul style="list-style-type: none"> <li>• No further loss of natural habitat should occur and all land in this category currently in an extensive agricultural or low intensity use state should be maintained as such, or rehabilitated or restored to a natural or semi-natural state;</li> <li>• The maintenance of connectivity between CBAs, continued ecosystem functioning within the CBA corridors, and the prevention of degradation of adjacent Critical Biodiversity Areas must be achieved;</li> <li>• All natural ecological processes on adjacent CBAs to be maintained e.g. fire in Fynbos, Dune Thicket vegetation types;</li> <li>• No agri-industry, urban residential, mining, or more intensive land-uses (e.g. cultivation, pastures etc.) other than the current state to be permitted;</li> <li>• Development limitations as per the NMBM Rural Development Policy must be applied (e.g. max. subdivision size, max. residential density, maximum cluster footprint size etc.);</li> <li>• Priority for DEDEAT, NMBM and DAFF to carry out regular environmental monitoring and reporting, for biodiversity and / or change of land-use, to prevent unauthorized development or degradation by neglect or ignorance (monitoring guidelines are required);</li> <li>• Prioritise these areas for land care projects, Working for Water, Working for Wetlands and NGOs to direct their rehabilitation / restoration projects, programmes and activities; and</li> <li>• An Environmental Management Plan should be compiled, where possible, to include, e.g. alien plant control, fire management.</li> </ul>
<p><b>Development Guidelines</b></p>
<p><i>Where infrastructure is developed, the following guidelines should apply -</i></p> <ul style="list-style-type: none"> <li>• Permitted number of units per erf or per ha to be based on existing land-use rights and NMBM Rural Development Policy and Urban Edge;</li> <li>• Rezoning of properties to afford additional land-use rights that will result in increased biodiversity loss should not be granted, unless significant nett conservation gains can be achieved, ecosystem functioning and connectivity of Ecosystem Support Areas (ESAs) will not be compromised, and biodiversity impacts with regard to species and habitats <u>outside of CBAs</u> are also of an acceptable significance;</li> <li>• Developments should be limited to existing developed / degraded footprint, if present<sup>14</sup>;</li> <li>• Units carefully dispersed or clumped to achieve least impact;</li> <li>• Protected Area infrastructure to be limited to existing developed or degraded sites, unless determined otherwise via a Conservation Development Process for the reserve;</li> <li>• If the cadastre is located partially or entirely outside of a CBA / ESA, development should be located outside the CBA / ESA;</li> <li>• Ecological Specialist to conduct the ecological assessment;</li> <li>• Where the infrastructure is within close proximity to aquatic ecosystems refer to 'CBA – Aquatic Ecosystems' below to ensure appropriate buffers;</li> <li>• Temporary structures are preferred e.g. raised wooden structures, tents, raised boardwalks or alternatively porous materials / design concepts; and</li> <li>• A site-specific Construction and Operational Environmental Management Programme to be compiled and implemented.</li> </ul>

<sup>14</sup> Existing disturbance should not be viewed as implying that development of such areas is appropriate, particularly due to the potential for restoration or rehabilitation of such sites.

ECOLOGICAL RESERVE			
<b>Water Quantity</b>			
<ul style="list-style-type: none"> <li>Maintain mean annual run-off to ensure Eco-status depending on the feature or process being protected.</li> </ul>			
<b>Environmental Flow Requirements</b>			
<ul style="list-style-type: none"> <li>Preferable to abstract during high flow seasons.</li> </ul>			
<b>Water Quality</b>			
<ul style="list-style-type: none"> <li>Water quality to reflect the recommended Eco-status depending on the feature or process being protected.</li> </ul>			
<b>Monitoring &amp; Management</b>			
<ul style="list-style-type: none"> <li>Site level studies will need to be conducted to determine what Eco-Status is required to appropriately protect the relevant feature or process.</li> <li>As per CBA</li> </ul>			
<b>Buffer Recommendation</b>			
Both the NEMA 32 m buffer and CARA 10 m buffer to be applied.			
<b>Wetland Buffers</b>			
Inland wetland (excluding estuaries) buffers were determined according to size and wetland integrity, and are recommended as follows:			
<b>Wetland Size</b>	<b>Rank 3</b>	<b>Rank 4</b>	<b>Rank 5</b>
>20ha	75m	75m	50m
5 – 20ha	75m	50m	50m
< 5ha	50m	50m	50m
<u>Activities discouraged within the 1: 20 year flood line of inland wetlands:</u>			
<ul style="list-style-type: none"> <li>Creation of berms, roads, culverts, canalisation, channelisation, alien vegetation, impoundment, abstraction, well points, storm-water or other point source inflows, irrigation return flows, grazing / trampling, agriculture, golf courses, suburban gardens, artificial deepening, drainage, aquaculture, recreational activities, salt mining.</li> </ul>			
<u>Activities discouraged within the 1: 100 year flood line of inland wetlands:</u>			
<ul style="list-style-type: none"> <li>Intensive agriculture, intensive livestock grazing, sports-fields that require draining / infilling, market gardening (where nutrient enrichment is an issue), creation of flood control berms, roads that interrupt flood flows, poorly serviced informal settlements, alien vegetation, suburban gardens, golf course greens, catchment hardening, roads, culverts, raised or lowered water table.</li> </ul>			
<b><u>General Recommendations regarding buffers:</u></b>			
<ul style="list-style-type: none"> <li>Do not permit infilling, excavation, drainage, hardened surfaces (including buildings and asphalt), intensive agriculture or any new developments within a <b>river or wetland</b>, their buffers, the 1: 100 year flood line or highest flood line of the delineated edge, whichever is the greatest; and</li> <li>The “buffers” may need to be wider than the above recommendations. This should be determined on a case-by-case basis by a specialist ecologist in consultation with the DWS, NMBM and DEDEAT to reflect site-specific factors. The approach for determining buffer width should consider the current condition of the aquatic ecosystem and any existing or proposed buffer, as well as the functioning of the system in the broader landscape, plus an assessment of the impacts to the ecosystem of the existing and proposed adjacent land-use and climate change impacts i.e. increased flooding at higher flood lines.</li> </ul>			

<b>ECOLOGICAL SUPPORT AREAS 2 (ESA 2 - IMPORTANT DEVELOPED / DEGRADED SITES)</b>
<p>Supporting zone required for maintaining connectivity between CBAs, continued ecosystem functioning within the CBA corridors, and preventing degradation of Critical Biodiversity Areas. These sites require high protection.</p> <p>INCLUDES developed / degraded land immediately adjacent to CBAs that was or is presently utilised for intensive purposes (e.g. mining)</p>
<p>Management and land-uses that ensure <b>SUSTAINABLE DEVELOPMENT</b>; Resource Use – <b>HIGH</b> resource PROTECTION</p>
<p><b>General Recommendations</b></p>
<ul style="list-style-type: none"> <li>• No further loss of natural habitat should occur and all land in this category currently in a degraded / developed state must be rehabilitated or restored to a natural or semi-natural state once the current land-use has ceased (e.g. mining operation);</li> <li>• Legal requirements for restoration / rehabilitation must be enforced by the relevant competent authority (e.g. DMR, DEDEAT, DEA) and the NMBM;</li> <li>• The maintenance of connectivity between CBAs, continued ecosystem functioning within the CBA corridors, and the prevention of degradation of adjacent Critical Biodiversity Areas must be achieved;</li> <li>• All natural ecological processes on adjacent CBAs to continue e.g. fire in Fynbos and Dune Thicket vegetation types.</li> <li>• Priority for DMR, DEDEAT, NMBM and DAFF to carry out regular environmental monitoring and reporting, for biodiversity and / or change of land-use, to prevent unauthorized development or degradation by neglect or ignorance;</li> <li>• Prioritise these areas for land care projects, Working for Water, Working for Wetlands and NGOs to direct their rehabilitation / restoration projects, programmes and activities;</li> <li>• A site-specific Environmental Management Plan should be developed and implemented, and should include the following aspects, amongst others: alien plant control, fire management etc.</li> </ul>
<p><b>Development Guidelines</b></p>
<p><i>Where infrastructure is developed, the following guidelines should apply:</i></p> <ul style="list-style-type: none"> <li>• Permitted number of units per erf or per ha to be based on existing land-use rights and NMBM Rural Development Policy and Urban Edge Strategy;</li> <li>• Rezoning of properties to afford additional land-use rights should not be granted, unless significant nett conservation gains can be achieved, ecosystem functioning and connectivity of ESA's will not be compromised, and biodiversity impacts with regard to species and habitats <u>outside of CBAs</u> are also of an acceptable significance;</li> <li>• Developments should be limited to existing developed / degraded footprint, if present<sup>15</sup>;</li> <li>• Units carefully clustered or dispersed to achieve least impact;</li> <li>• Other degraded areas to be restored / rehabilitated;</li> <li>• Protected Area infrastructure to be limited to the most developed or degraded sites, unless determined otherwise via a Conservation Development Process for the reserve;</li> <li>• If the cadastre is located partially or entirely outside of a CBA / ESA, development should be located outside the CBA / ESA.</li> <li>• Ecological Specialist to conduct the ecological assessment;</li> <li>• Where the infrastructure is within close proximity to aquatic ecosystems refer to 'CBA – Aquatic Ecosystems' below to ensure appropriate buffers;</li> <li>• Temporary structures are preferred e.g. raised wooden structures, tents, raised boardwalks or alternatively porous materials / design concepts; and</li> <li>• A site-specific Construction and Operational Environmental Management Plan to be compiled and implemented.</li> </ul>
<p style="text-align: center;"><b>ECOLOGICAL RESERVE</b></p>
<p><b>Water Quantity: Minimum Standards , Environmental Flow Requirements, Rehabilitation etc.</b></p>
<p>Recommendations: same as for ESA 1s</p>

<sup>15</sup> Existing disturbance should not be viewed as implying that development of such areas is appropriate, particularly due to the potential for restoration or rehabilitation of such sites.

**Table 4-3: Definitions of biodiversity-compatible land-use types**

Definitions	Example of Biodiversity-compatible Zoning, as per the proposed NMBM Integrated Zoning Scheme (not existing land-use rights)	Impact on Biodiversity
<b>BIODIVERSITY FRIENDLY LAND-USES</b>		
<p><b>Conservation</b></p> <p>This is a land-use where conservation is the major objective:</p> <ul style="list-style-type: none"> <li>• Areas which are currently legally protected; and</li> <li>• Areas which are designated CBA but are not yet legally protected and should be, either through declaration or through a biodiversity stewardship agreement, where possible.</li> </ul> <p>Appropriate uses:</p> <ul style="list-style-type: none"> <li>• Non-impact directly related activities such as research, outdoor recreation and environmental education;</li> <li>• Non-consumptive activities, for example, low-intensity recreation and eco-tourism (e.g. hiking trails, bird watching and overnight accommodation) with limited access points; and</li> <li>• Sustainable consumptive activities, such as wildflower harvesting (for the medical, culinary or flower industry), subject to an Environmental Management Plan (EMP) demonstrating the sustainability of harvesting.</li> </ul> <p>Land-use densities and footprints as per NMBM Rural Management and Urban Edge Policy, and NMBM integrated Zoning Scheme. Where existing infrastructure or a development footprint already exists, such areas should be used for development, but within sustainable limits and as the Policy.</p>	<p>Open Space Zone 3</p>	<div data-bbox="1290 443 2056 571" style="background-color: #00FF00; text-align: center; padding: 10px; border: 1px solid black;"> <p><b>Very Low</b></p> </div> <p><b>a. Conservation Management</b>, which is the most biodiversity-compatible land-use specifically aimed at maintaining and enhancing biodiversity in Protected Areas. As a form of land-use it extends to include production where, for instance, game animals are hunted or captured. CM occurs on private land when legally binding, written formalities are in place to ensure such management extends beyond the scope of current ownership.</p> <p><b>b. Low impact eco-tourism</b> development on extensive areas of natural intact vegetation. Good management practices are implemented with small, low density footprints, determined via a Conservation Development Framework or similar process. Impacts are low due to size, technology (operational activities) and design concepts e.g. enviro-loos, temporary structures, green architecture, use of natural materials. Passive recreation, such as hiking, horse riding, bird watching, game watching etc. reduces the impact of this land-use. This land-use should be coupled with rezoning of the undeveloped areas to Open Space 3 and declaration as a Nature Reserve or Protected Environment in terms of the NEM: Protected Areas Act.</p> <p><b>c. Sustainable consumptive activities</b>, which include the sustainable harvesting of natural resources, such as wildflower harvesting (for the medical, culinary or flower industry), fishing in riverine reserves &amp; bee farming. These activities will require stringent management of harvesting volumes. It will require a specialist to conduct a study on carrying capacity and develop a management plan to ensure appropriate stocking rates, harvesting techniques &amp; volumes are implemented &amp; managed. The land-use must be based on strict management guidelines and sustainable resource use principles, as advised by a specialist or the conservation body (NMBM, ECPTA or DEDEAT).</p>

Definitions	Example of Biodiversity-compatible Zoning, as per the proposed NMBM Integrated Zoning Scheme (not existing land-use rights)	Impact on Biodiversity
<p><b>Extensive Game Farming</b></p> <p><u>Includes:</u> Game production and related tourism activities on extensive land portions of natural land cover; sustainable commercial hunting along with other consumptive and non-consumptive use of wild natural resources.</p> <p>Game reserve, including lodge and other accommodation infrastructure, with strict limits on the level of development considered acceptable.</p> <p><u>Assumes:</u> Minimum size criteria for economic and ecological sustainability are applied in terms of carrying capacity; strictly limited development for revenue generating purposes such as intensified tourism or sectional ownership.</p> <p><u>Stringent management conditions applied, such as</u></p> <p>=</p> <ul style="list-style-type: none"> <li>• Faunal specialist to undertake carrying capacity study;</li> <li>• Indigenous or ecologically benign extra-limital species only;</li> <li>• Site-specific Environmental Management Plan;</li> <li>• Fire management measures, if necessary; and</li> <li>• Avoidance of areas containing Critically Endangered or Endangered ecosystems and Red listed species.</li> </ul> <p>Land-uses and densities must comply with the NMBM Rural Management and Urban Edge Policy.</p>	<p>Agriculture Zone AND Resort Zone</p>	<div style="background-color: #00b050; color: white; text-align: center; padding: 10px; font-weight: bold; font-size: 1.2em;">Very Low</div> <p>This land-use utilises extensive areas of natural veld. These areas need to be well managed to prevent negative impact e.g. determining veld carrying capacity, stocking rates &amp; stocking with indigenous game. Any intensification or overdevelopment (e.g. for tourism) of these areas will increase the negative impacts</p>

**Table 4-4: Definitions of moderate impact rural land-use types**

<b>MODERATE IMPACT RURAL LAND-USE TYPES</b>		
<b>Land-use type</b>	<b>Example of zoning in terms of the proposed NMBM Integrated Zoning Scheme (not existing land-use rights)</b>	<b>Biodiversity Impact</b>
<p><b><u>Extensive Sustainable Livestock Production</u></b></p> <p><u>Includes:</u> Mainly cattle, goat and sheep production on extensive areas of natural areas; mixed livestock / wildlife options; tourism.</p> <p><u>Assumes:</u> Ecologically and economically sustainable management applied to farm portions above a certain minimum size, based on ecological and economic viability. Agricultural areas covered with natural vegetation, providing for sustainable low-impact agriculture-related land-uses.</p> <p><u>Stringent management conditions applied, such as</u></p> <ul style="list-style-type: none"> <li>• Fire management measures, if necessary;</li> <li>• Ecologically sustainable stocking rates (i.e. potentially lower than standard stocking rates);</li> <li>• If mixed with wildlife, only indigenous or ecologically benign extra-limital species permitted;</li> <li>• Resting cycles (rotational grazing);</li> <li>• Avoidance of areas containing RDB species;</li> <li>• Sensitive areas (e.g. wetland and river banks) to be protected from over-grazing and trampling, which can cause bank erosion and destabilisation, with subsequent degradation of water quality. The access areas for livestock should be demarcated and all alien invasive plants within this zone should also be eradicate; and</li> <li>• Development and implementation of an Environmental Management Plan.</li> </ul> <p>Densities and development footprints as per the NMBM Rural Management and Urban Edge Policy apply.</p>	<p>Agriculture Zone AND Resort Zone – where existing / proposed</p>	<div style="background-color: yellow; padding: 10px; text-align: center; font-weight: bold; font-size: 1.2em;">Moderate</div> <p>The ecological impacts of Extensive Livestock Production and Extensive Game Farming can be similar and are dependent on the quality of veld management, i.e. a well managed cattle ranch may have less negative impact than a badly managed game farm, whereas with good management the reverse would be expected.</p> <p>However, because Extensive Livestock Production does not closely mimic the previous nature state, which extensive game farming does, it is recognized as having a slightly higher impact. These areas can also include sustainable low-impact agriculture-related land-uses, e.g. indigenous plant harvesting.</p>

<b>MODERATE IMPACT RURAL LAND-USE TYPES</b>		
<p><b><u>Resort</u></b>  <u>Includes:</u> Holiday accommodation, Private Open Space for large-scale tourism purposes, nature conservation. The objective of the resort is to promote tourist and holiday facilities in areas with special environmental or recreational attributes, and to encourage access to these facilities by the general public.</p>	<p><u>Resort Zone</u>                      WITH                      Open Space Zone 1 or 3</p>	<div style="background-color: yellow; padding: 10px; border: 1px solid black; text-align: center;"> <p><b>Moderate</b></p> </div> <p>Resorts of this kind have a moderate impact due to the large scale nature of the development relative to Low Impact Eco-Tourism type developments. This land-use seeks to conserve the natural landscape and sense of place to ensure sustainability of the tourist attraction.</p>
<p><b><u>Small holdings</u></b>  <u>Includes:</u> Agriculture, dwelling house, home and occupation. Such properties often occur close to cities, towns and villages, and may only occur within a demarcated urban edge or peri-urban zone. Development of this type should conform to the NMBM Rural Management and Urban Edge Policy for smallholdings near the urban edge. Some of these criteria prevent the further sub-division of small holdings in certain areas.</p> <p>Small holdings of a residential character should ensure the maximum protection of indigenous veld, limited cultivation for household purposes, utilisation of existing buildings of development footprints where possible, use of existing infrastructure (roads) where possible and limited densification and expansion of the development footprint as per the NMBM Rural Management and Urban Edge Policy</p> <p>Note - Applications in terms of Act 70 of 1970 for sub-division of residential type small holdings, which are zoned for agricultural purposes and located outside the urban edge, are subject to authorization from DAFF to prevent the loss of agricultural land and fragmentation thereof.</p>	<p><u>Agriculture Zone or Residential Zone 1 within:</u>                      Peri-urban Zone 1 &amp; 2: Smallholdings                      Or                      Rural Zone 1: Smallholdings (RZ1)</p>	<div style="background-color: yellow; padding: 10px; border: 1px solid black; text-align: center;"> <p><b>Moderate</b></p> </div> <p>Smallholdings do deplete natural resources, but can maintain areas of intact vegetation, amongst areas allocated for vegetables, horse paddocks or other farm animals. The small size of the property in the larger landscape does tend to result in fragmentation of natural areas, reducing the movement of wild animals and important pollinators. Smallholdings increase the extent of cumulative impacts as they require infrastructure (e.g. roads, pipelines &amp; power lines) often beyond existing urban infrastructure.</p> <p>Agricultural small holdings will often have a higher impact on biodiversity than rural residential small holdings, as the purpose will generally be for more extensive agricultural activities that are more destructive, but may still conserve the integrity of the natural environment and prevent the loss of agricultural land.</p>

**Table 4-5: Definitions of high impact agricultural land-uses**

Land-use type	Example of zoning in terms of the proposed NMBM Integrated Zoning Scheme (not existing land-use rights)	Biodiversity Impact
<b>HIGH IMPACT AGRICULTURAL LAND-USES</b>		
<p><b><u>Arable Agriculture (forestry, dry land &amp; irrigated cropping) with associated Rural Settlement</u></b></p> <p><b>Forestry (Timber Production) -</b>  <u>Includes:</u> All timber plantations, mainly <i>Pinus spp.</i>  <u>Assumes:</u> Monoculture of alien timber species with heavy impact on hydrology and soil erosion and for introduction and spread of a variety of the most aggressive alien invasive plants.</p> <p><b>Irrigated Crop Cultivation -</b>  <u>Includes:</u> All irrigated crops (vegetables) and irrigated tree crops (orchards).  <u>Assumes:</u> Intensive production activity with high nutrient and agro-chemical inputs and often two crops per year; ploughing, with no use of chemicals, results in irreversible loss of natural habitat.</p> <p><b>Dryland Crop Cultivation -</b>  <u>Includes:</u> All tillage cultivation of non-irrigated crops, mostly single-season annuals, but including perennial and orchard-type tree crops if cultivated with an indigenous grass layer.  <u>Assumes:</u> Crop production methods that conserve water and protect against soil erosion; limited and responsible use of fertilisers, pesticides and other agrochemicals and Genetically Modified Organisms (GMOs).</p>	<p style="text-align: center;"><u>Agriculture Zone</u> within Rural Zone 2</p>	<div style="text-align: center; background-color: #f4a460; padding: 10px; border: 1px solid black; margin-bottom: 10px;"> <p><b>High</b></p> </div> <p><b>These farming activities have significant impacts on biodiversity.</b> They are mutually incompatible with biodiversity conservation, often accelerating degradation by causing extensive habitat loss, soil erosion and hydrological changes. Their impacts vary from moderate to significant depletion of natural flora &amp; fauna and associated ecosystem functioning. Irrigated Crops and Timber Production impose particularly heavy impacts on environmental services such as water production. Their actual impact can be considerably reduced by factors such as small scale, dispersed and sensitive placement and general good land husbandry.</p> <p>Timber, certain other crops and alien plant infestations substantially lower water-tables and reduce stream flows. These land-uses consume large quantities of water potentially available for other uses, including the minimal flow required for ecosystem maintenance – i.e. the ‘ecological reserve’. As a result, a complex authorisation protocol is in place to issue water-use licenses to approved land users wanting to grow such crops (see ‘water extraction’ above). The licensing process is based on EIA procedures.</p> <p><b>In Contrast -</b></p> <p>These land-use types can be improved by maintaining natural corridors within the landscape and adopting biodiversity-friendly agricultural / farming practices e.g. water conservation, organic fertilizers, minimal tillage etc.</p> <p>Irrigated and dryland crop cultivation can provide opportunities for movement of species and connectivity between CBAs under certain conditions.</p>

Land-use type	Example of zoning in terms of the proposed NMBM Integrated Zoning Scheme (not existing land-use rights)	Biodiversity Impact
<p><b><u>Intensive Animal Farming with associated Rural Settlement</u></b></p> <p><u>Includes:</u> All intensive animal production systems, of domestic or 'wild' species that are primarily dependent on imported foodstuffs and confinement; <b>dairy farming</b> and all areas in production support for dairy, including pastures, fodder and grain crops, much of which is usually irrigated.</p> <p><u>Assumes:</u> Intensive production areas with relatively dense development; not dependent on the use of natural vegetation for production and associated settlements for the farming work force.</p>	<p><u>Agriculture Zone</u> with consent use required within Rural Zone 2</p>	<div data-bbox="1290 316 2060 432" style="background-color: #f4a460; text-align: center; padding: 10px; border: 1px solid black;"> <p><b>High</b></p> </div> <p>Impact of <b>dairy farming</b> and similar production systems can be reduced by <u>not developing planted pastures</u> and applying:</p> <ul style="list-style-type: none"> <li>• Ecologically sustainable stocking rates (i.e. potentially lower than standard stocking rates);</li> <li>• Resting cycles (rotational grazing);</li> <li>• Avoidance of areas containing Red Database species;</li> <li>• Sensitive areas (e.g. wetland and river banks) to be protected from over-grazing and trampling, which can cause bank erosion and destabilisation, with subsequent degradation of water quality. The access areas for livestock should be demarcated and all alien invasive plants within this zone should also be eradicate; and</li> <li>• Development and implementation of an Environmental Management Plan.</li> </ul>

**Table 4-6: Definitions of high impact urban and industrial land-uses**

Land-use type	Example of zoning in terms of the proposed NMBM Integrated Zoning Scheme (not existing land-use rights)	Biodiversity Impact
<b>HIGH IMPACT URBAN &amp; INDUSTRIAL LAND-USES</b>		
<p><b><u>Urban land-uses (residential, business, community, industrial, and other land uses associated with urban developments)</u></b></p> <p><u>Includes:</u> All residential, commercial, industrial and tourism development at densities typical of urban land use.</p>	<p>Residential Zone 1, 2, 3 or 4            Business Zone 1, 2, 3 or 4            Industrial Zone 1 or 2            Community Zone 1 or 2            Open Space Zone 1, 2 or 3            Transport Zone 1, 2 or 3            Undetermined</p>	<div data-bbox="1290 363 2060 485" style="background-color: #800000; color: white; text-align: center; padding: 10px; font-weight: bold; font-size: 1.2em;">Very High</div> <p>These land-uses destroy and / or sterilise natural vegetation and soil. In urban areas whole landscapes are modified in this way. Where biodiversity exists or is deliberately protected, such as in urban nature reserves, it can be negatively affected by its small scale and ecological isolation.</p> <p><b>Dams</b> built for water supply can have significant impacts on aquatic biodiversity by changing hydrological regimes, such as water volume, velocity and temperature, which modify downstream habitats e.g. freshwater inflow into estuaries required for organisms present in the estuary, natural flood events required for opening of estuary mouths etc. Construction within rivers creates barriers to fish migration routes. Off channel construction may also impact negatively on important terrestrial biodiversity.</p> <p><b>In Contrast:</b></p> <p><b>Metropolitan Open Space Systems</b> – can improve the conservation of biodiversity in urban &amp; peri-urban areas by maintaining natural corridors, thereby creating a biodiversity network for important ecosystem services. Maintaining and planting indigenous plant species will also encourage a more natural landscape.</p> <p><b>Mining</b> should be undertaken in a phased manner to allow restoration or rehabilitation of disturbed areas over the length of the project.</p> <p><b>Infrastructure</b> e.g. pipelines, roads etc. should be designed to avoid Critical Biodiversity Areas and aligned with existing infrastructure or on developed / degraded footprints where possible.</p>
<p><b><u>Infrastructure (roads, power lines, pipelines)</u></b></p> <p><u>Includes:</u> All hardened roads, railways, canals and pipelines, including power and telephone lines, which can have a measurable impact on habitats and particular species e.g. power lines on birds.</p>	<p>Transport Zone 1, 2 or 3</p>	
<p><b><u>Mining &amp; Quarrying</u></b></p> <p><u>Includes:</u> All strip and opencast mining excavations or quarrying (sand mining); plus the visual, physical and chemical impacts of these activities, particularly on ground water reserves; all mine waste and refuse dumps, urban waste sites and landfill sites for whatever purposes.</p>	<p>Industry Zone 3: Extractive Industry</p>	
<p><b><u>Dams</u></b></p> <p><u>Includes:</u> All substantial impoundments, dams and weirs, with associated pipelines, canals, access roads and bulk water transfer schemes.</p>	<p>Agricultural Zone</p>	

## 5 Part E: Other measures for effective management

### 5.1 Planning

#### 5.1.1 Protected Area Expansion

Only about 2.4 % (approximately 4,700 ha) of the municipal area enjoys some form of statutory protection. Three additional formal protected areas are proposed for declaration by the NMBM, namely the van der Kempkloof (778 ha), Chatty (1,161 ha), and Aloes (226 ha) Nature Reserves. A large portion of the Hopewell Conservation Estate (2,547 ha) is currently proposed for formal declaration by Hopewell Conservation (Pty) Ltd as a Nature Reserve in terms of the NEM: PA Act. In the interim, Hopewell Conservation (Pty) Ltd entered into a Biodiversity Stewardship Agreement with the ECPTA in February 2012, which is associated with 2,341 ha of Hopewell's land.

However, the inclusion of these public and private areas will not be a sufficient to secure a representative proportion of all the municipality's biodiversity. The NMBM owns a relatively limited amount of land (approx. 72,700 ha) within the municipal area, with the majority of its 195,400 ha being under private ownership (62.78 %). Since insufficient funds exist for NMBM to acquire and manage all of the property required for conservation, protected area expansion will require the conservation of a combination of privately-owned and municipally-owned land parcels. A range of mechanisms need to be developed in order to support protected area expansion within the municipal area, including the implementation of biodiversity offsets and the development of biodiversity stewardship agreements with private landowners. The rezoning of municipally and other state-owned properties located within the network of Critical Biodiversity Areas and Ecosystem Support Areas to Open Space 3 is a further priority.

#### **Biodiversity Offsets**

Where development proposals will result in biodiversity impacts after mitigation that range from moderate to severe, biodiversity offsets should be considered to compensate for the residual impacts of the development. To date, biodiversity offsets have only been used in a few cases in the municipality, but due to the extent of habitat loss during the last ten years, the need to consider the application of biodiversity offsets is expected to increase substantially.

*For a biodiversity offset to contribute effectively to protected area expansion and biodiversity conservation in the Nelson Mandela Bay Municipality, biodiversity offsets should be located in a 'biodiversity offset receiving area', which in the context of the NMBM will be the Critical Biodiversity Areas.*

Biodiversity offsets, where appropriate, can comprise either single or composite areas in order to compensate adequately for residual biodiversity loss. An acceptable measure of the residual loss is obtained as a point of departure for determining an appropriate biodiversity offset. Biodiversity offsets are calculated by multiplying this measure by a basic biodiversity offset ratio linked to the Ecosystem Threat Status of the affected ecosystem.

The following ratios are recommended with regard for biodiversity offsets (DEA&DP, 2008):

- A 30:1 ratio for *Critically Endangered* ecosystems and *Critical Ecosystem Process Areas*, where a biodiversity offset would be appropriate in exceptional circumstances only;
- A 20:1 ratio for *Endangered* ecosystems;
- A 10:1 ratio for *Vulnerable* ecosystems; and
- No biodiversity offset for *Least Threatened* ecosystems.

The area determined by the basic biodiversity offset ratio should then be adjusted by a range of context-specific considerations, such as:

- The condition of the affected habitat;
- The significance of residual impacts on threatened species;
- The significance of residual impact on special habitats;
- The significance of residual impact on important ecological corridors or process areas; and
- The significance of residual impact on biodiversity underpinning valued ecosystem services.

The National Wetland Offset Guideline should also be consulted. The guideline links directly to spatial biodiversity information and includes methodologies for wetland offset site selection, compensation ratios and hectare equivalents used to determine the size and functionality of wetland offset (Macfarlane *et al.*, 2014).

### **Biodiversity Stewardship**

The NMBM Environmental Services Business Unit has developed and is piloting a biodiversity stewardship programme based on the approach trialled in the Western Cape and KwaZulu-Natal, and adopted by the National Biodiversity Framework (2009) as a preferred mechanism for protected area expansion. The programme provides for formal, legally-recognised agreements (potentially also linked to declaration of land as Nature Reserve and Protected Environments in terms of the NEM: PA Act) between the municipality and landowners to conserve biodiversity. In order to support this programme, the NMBM has adopted a property rates policy that allows for rebates for private landowners who enter into agreements with the municipality to conserve their land.

Current private landowner conservation initiatives are primarily centred in the Hopewell, Sardinia Bay, Bushy Park area (i.e. Sardinia Bay Conservancy) and Blue Horizon Bay areas. However, in most instances legal protection of natural habitats of high conservation value outside of statutory protected areas in Nelson Mandela Bay is not in place.

A formal protected area expansion strategy has not been developed for the Nelson Mandela Bay and the NMBM currently has no targets set for protected area expansion. Spatial priority areas for protected areas expansion should be aligned to the network of Critical Biodiversity Areas and associated Implementation Sites map (see Figure 2-6 and Figure 3-1) described in the Bioregional Plan.

The following recommendations are made with regard to protected area expansion:

- A Protected Area Expansion Strategy to be developed for the NMBM, in alignment with the Bioregional Plan and Eastern Cape Protected Area Expansion Strategy;
- The implementation of the NMBM's Biodiversity Stewardship Programme should be supported as this approach is recognised as being one of the most cost-effective mechanisms for protected areas expansion;
- In order to improve the status of all the current and proposed local authority conservation sites in the municipal area, they should be assessed in terms of their biodiversity value and the requirements of the NEM: Protected Areas Act and then declared as either Nature Reserves or Protected Environments based on this assessment where such declarations are not in place;
- The corridor between the Maitlands Nature Reserve and the Island Nature Reserve should be consolidated;

- The coastal corridor between Sardinia Bay Nature Reserve and Nelson Mandela Metropolitan University Private Nature Reserve should be consolidated. The NMMU should be encouraged to seek declaration for their reserve in terms of section 23 of NEM: PA Act;
- The entire extent of municipal land within the Baakens Valley should be declared as a Nature Reserve in terms of NEM: PA Act. Private owners of land along the valley should be encouraged to enter into biodiversity stewardship agreements with the NMBM;
- The corridor between the Van Stadens Wildflower Reserve, Lady Slipper Nature Reserve and Van Stadensberg Natural Heritage Site should be consolidated. The Van Stadensberg Natural Heritage Site should be declared as a Nature Reserve in terms of the NEM: PA Act. The Van Stadens River Conservancy initiative should be supported by the NMBM biodiversity stewardship programme in an effort to link the Van Stadens Wildflower Reserve to the coast;
- Protected Environment status should be investigated for the Sardinia Bay, Bushy Park and Horizon Bay area's to support the efforts of landowners and to restrict certain activities which would be detrimental to the important biodiversity of these areas;
- The NMBM land at Van Der Kemp's Kloof / Parsonsvelei / Chatty Kloof should be declared as a Nature Reserve. The Anglican Church land should be incorporated into this Nature Reserve through a biodiversity stewardship agreement. This Nature Reserve should link to the Joe Slovo Thicket Corridor and the Hopewell Conservation Estate, which in turn should be linked to the Groendal Wilderness area; and
- The corridor between the Springs Nature Reserve and the Groendal Wilderness area should be consolidated.

### 5.1.2 Ecosystems and Species Requiring Biodiversity Management Plans

Biodiversity management plans are one of the planning tools provided for by the NEM: Biodiversity Act. The act provides for any person, organisation or organ of state to submit to the Minister a draft biodiversity management plan for an ecosystem or indigenous species which warrants special conservation species. Before approving a draft biodiversity management plan, the Minister must identify a suitable person, organisation or organ or state which is willing to be responsible for the implementation of the plan. Importantly, the existence of a biodiversity management plan for an ecosystem or species enables the Minister to enter into a biodiversity management agreement with a person, organisation or organ regarding its implementation. Landowners that are party to a biodiversity management agreement are eligible for the income tax deductions, as provided for by the Income Tax Act (Act 58 of 1962), as amended by the Revenue Laws Amendment Act (Act 60 of 2008). The development of biodiversity management plans in terms of Biodiversity Act is therefore a useful pursuit to support the NMBM's emergent biodiversity stewardship programme.

Within the NMBM area the following ecosystems are recommended for the development of biodiversity management plans in terms of the Biodiversity Act:

- The Swartkops River system (Implementation site 13) – due to the value of this system in terms of both the ecological processes that occur and the environmental goods and services that it provides, and due to the threats this system faces; and
- Urban lowland fynbos (Implementation site 2) – including the *Critically Endangered* Algoa grassy fynbos complex ecosystems: Walmer Grassy Fynbos, Baakens Grassy Fynbos, Lorraine Transitional Grassy Fynbos and Colleen Glen Grassy Fynbos systems. The natural extent of these ecosystems has been severely reduced by urban development and, without appropriate management intervention, these systems may collapse.

Species that are recommended for the development of biodiversity management plans in terms of the Biodiversity Act are:

- *Cyclopia pubescens* (*Critically Endangered*) – a rare and highly localised species, occurring from the foot of the Van Stadens Mountains to just west of Port Elizabeth, which is under threat from urban expansion. A management plan for this species was produced by the NMMU Centre for African Conservation Ecology;
- *Aloe bowiea* (*Critically Endangered*) – a highly restricted species, only known from three sites near Motherwell, that is threatened by expansion of informal and formal housing, harvesting, overgrazing;
- *Aspalathus recurvispina* (*Critically Endangered*) – thought to be extinct. The species rediscovered in the wild near Humewood, but is highly threatened by habitat loss through urban development. Only a single population of this plant is known to occur;
- *Orthopterum coegana* (*Critically Endangered*) – a succulent that was restricted to three populations occurring on sandstone outcrops around Coega Kop, east of Port Elizabeth. One of these populations had to be relocated when the western portion of Coega Kop was targeted for mining for the construction of Coega deepwater port;
- FitzSimons' whip lizard *Tetradactylus fitzsimonsi* (*Vulnerable*) – is restricted to the Algoa basin (Bates *et al.*, 2014); and
- Albany adder *Bitis albanica* (*Critically Endangered*) – one of South Africa's rarest snakes. It is restricted to the Algoa basin, threatened by habitat loss, principally due to mining, and has been classified as *Critically Endangered* (Bates *et al.*, 2014).

Biodiversity management plans should be developed in conjunction with the relevant NMBM and ECPTA Conservation Area Managers, and actions should be incorporated into the key performance indicators for managers and into the NMBM Environmental Management's Service Delivery Improvement Plan.

### 5.1.3 Tracking of biodiversity loss

Wise land-use decision making is greatly enabled by the availability of accurate, up-to-date information. The provision of such information to land-use planning and environmental decision-makers in Nelson Mandela Bay is vital.

A system to regularly record changes in land use / rezoning approvals that impact on biodiversity is vital. It is recommended that a "land use / rezoning approval" data base be kept by the Municipality, which should be updated on at least an annual basis, to track the loss of biodiversity and inform day-to-day decision-making

## 5.2 Operation and management

There is a need to increase budgetary provision to enable the NMBM to adequately meet its ecological management obligations.

Management actions that are required to effectively conserve biodiversity within the municipal area include invasive alien species management and rehabilitation and restoration of impacted areas.

### 5.2.1 Invasive Alien Species Management

An invasive alien plant clearing strategy was developed for the NMBM in April 2009 (SSI, 2009). Areas that were identified as priorities were the Swartkops River, Chatty River, Baakens River,

Paapenkuis River, Sardinia Bay and Vans Stadensberg corridor – all Critical Biodiversity Areas. The strategy schedules areas within the priority areas for clearing, and provides an estimate of the cost and effort to clear.

The following is recommended with regard to invasive alien species management:

- The NMBM should ensure that adequate budget is provided for invasive alien plant control operations on municipal land;
- Private landowners should be encouraged to control invasive alien plants on their properties (e.g. through the provision of property rates rebates for landowners who adequately control invasive alien plants on their properties);
- The NMBM to support invasive alien plant control operations on private land where Biodiversity Stewardship Agreements between the landowners and the NMBM are in place, where possible;
- The NMBM's invasive alien plant clearing strategy, in alignment with the Bioregional Plan, should be used to direct investment in alien plant control; and
- The NMBM's invasive alien plant clearing strategy, in alignment with the Bioregional Plan, to be updated every five years.

## 5.2.2 Priority Areas for Rehabilitation and Restoration

The following areas are recommended as priorities for rehabilitation and restoration in order for these areas to support the network of critical biodiversity sites within the NMBM municipal area:

- The Swartkops River system – areas along the KwaZunga River (upper reaches of the Swartkops River system) have been impacted by sand-mining, which has been described as the second-most significant impact on the river and has downstream impacts on the Swartkops River (IWR, undated);
- The Parsonsvele / van der Kempkloof / Chatty Kloof / Hopewell area – this area has been impacted by mining, the old and existing quarries, and illegal and/or unapproved grazing will require rehabilitation. Dumping of domestic rubble is particularly problematic in this area and efforts should be made to remove such materials and prevent the reoccurrence of dumping. Illegal and/or unapproved grazing of livestock and occupation of land is also to be controlled by the NMBM;
- The coastal belt, particularly from the Sardinia Bay and Sylvic Nature Reserves to the Cape Recife and NMMU Nature Reserves is highly invaded by invasive alien plants. Active rehabilitation may be required in this area on removal of the invasive alien plants in order to prevent accelerated soil erosion and destabilisation of dunes; and
- The Grassridge area is currently mined for limestone. This area harbours both Grassridge Bontveld and the Albany adder *Bitis albanica* and will require rehabilitation on completion of mining activities.

## 5.3 Mainstreaming

### 5.3.1 Institutional Arrangements

The NMBM has instituted an internal organisational structure, the Corporate EIA Task Team (CETT), to facilitate the coordination of EIA applications and broader environmental issues. CETT enables review by the various directorates within the NMBM of the findings of EIAs and allows for mainstreaming of environmental issues, including the NMBM Conservation Plan, into operations of

the directorates. This existing structure can be used to mainstream biodiversity management considerations into the operations of the various municipal directorates for new projects.

A Multi-Disciplinary Technical Task Team (MDTTT) also exists to facilitate co-operative decision-making between the relevant municipal directorates on strategic projects. It is recommended that the relevant sub-directorates (e.g. Transportation Planning, Water and Sanitation etc.) be requested to provide quarterly updates at the MDTTT meetings on proposed short, medium and long-term projects that may be in conflict with the Bioregional Plan or result in impacts on the network of Critical Biodiversity Areas. The MDTTT is also an ideal structure to identify opportunities for collaboration between directorates regarding socio-economic projects linked to biodiversity, and construction projects where rehabilitation and / or restoration are required.

Monthly bilateral meetings between the NMBM and DEDEAT also take place and serve as a mechanism for coordination of EIA applications and broader environmental issues. These meetings provide further opportunity to address potential conflicts between proposed land-uses and the Bioregional Plan.

### **5.3.2 Awareness-raising**

The engineering industry as a whole, in particular contractors that undertake site clearing and construction, has illustrated a limited awareness of the importance of biodiversity conservation and/or legal requirements associated with the natural environmental and water.

Awareness-raising, training and capacity building amongst this sector, particularly amongst contractors, is essential to minimising construction impacts on CBAs and ESAs within the municipal area.

## **5.4 Building a Biodiversity Economy**

Building a biodiversity economy involves promoting economic activity that uses biodiversity in a sustainable way. This includes the creation of opportunities through biodiversity for economic development in previously disadvantaged communities, the promotion of sustainable agriculture and fisheries, and the promotion of land-uses that are compatible with biodiversity (for example, sensitive ecotourism and game farming).

### **5.4.1 Ecotourism**

The NMBM is unique in South Africa in that it is an area of convergence for five of South Africa's biomes. Thus, by visiting the NMBM, the eco-tourist can experience a small taste of what the country as a whole has to offer from a natural perspective.

The NMBM has undergone a process of developing Conservation Development Frameworks (CDFs) for many of its local authority nature reserves. One of the functions of the CDFs is to identify areas within the reserves that are appropriate for sensitive development, such as ecotourism facilities. The NMBM will look to enter into partnerships with the private sector in order to unlock the economic potential of these reserves. Conservation Development Frameworks have been developed for the proposed Van Der Kemp's Kloof / Chatty Nature Reserve, Aloes / Swartkops Nature Reserve, Settlers Park Nature Reserve, the Target Kloof / William Moffet section of the Baakens Valley, Maitlands Nature Reserve, Springs Nature Reserve and the Van Stadens Wildflower Reserve.

The following is recommended with regard to the development of ecotourism within the municipal area:

- The concept of the "Five Biome City" should be further promoted, including the route that was established to guide tourists through the various biomes within the municipal area; and

- The NMBM should implement mechanisms, such as the development of public-private partnerships, to unlock the ecotourism potential of its local authority reserves, specifically through the sensitive and appropriate development (e.g. restaurants, tea-gardens and lodges) of areas identified in the Conservation Development Frameworks.

### **5.4.2 Nature-based Development Models**

During the period between approximately 2002 and 2008, marked growth occurred in the number of actual and proposed rural lifestyle residential developments within the municipal area. These developments have the potential to support biodiversity conservation objectives if they are appropriately planned and managed.

Development models that support the conservation of Critical Biodiversity Areas, in alignment with the NMBM's land-use policies, and are underpinned by a legitimate conservation management ethic should be encouraged.

### **5.4.3 Game Reserves and Game Farming**

The northern portion of the NMBM is well suited to the development of the game reserve and game farming industry. Farming with game in the thicket biome has the potential to be more ecologically and economically sustainable than farming with livestock. The main activity for which game is utilised is hunting, including both recreational and trophy hunting. With the Eastern Cape being recognised as the most preferred destination for overseas hunters (Smith & Wilson, 2002), this industry has potential to contribute to a biodiversity based economy in the NMBM, provided that it is correctly managed and controlled (for example, preventing or limiting the introduction of non-indigenous species).

The following is recommended with regard to game reserves and game farming:

- Game reserves and game farming should be promoted in areas that are suitable for these activities (areas within the thicket biome) within the NMBM, provided that such operations are managed in a way that supports biodiversity conservation (e.g. stock only indigenous species and appropriate densities).

### **5.4.4 Skills Development and Training**

The development of a biodiversity economy within the municipal area will create a demand for a new set of skills within the workforce. Skills development and training opportunities linked to biodiversity include those associated with the development of indigenous plant nurseries, ecotourism establishments and secondary industries centred on invasive alien plant biomass.

An opportunity for skills development is the creation of indigenous plant nurseries to supply plants for cultural and medicinal use. The nurseries should be linked to the establishment of a training college, potentially supported by the SANBI Green Futures Programme, in order to train previously disadvantaged individuals in horticulture. An additional benefit of the nurseries would be the reduced demand on natural systems for plants of cultural, landscaping and medicinal use.

Ecotourism establishments, such as game lodges, require staff skilled in the hospitality sector and in ecological management. Skills development programmes linked to biodiversity conservation that seek to train and employ youth displaced by HIV / AIDS and poverty should be encouraged.

The development of industries within the municipal area that utilise invasive alien plant material will result in some economic return for the investment spent on control operations and also the development of skills and creation of jobs. Opportunities exist to create new industries and produce

various products from invasive alien plant biomass. The following is recommended with regard to skills development and training:

- Skills development models that link biodiversity conservation to improving the capacity of disadvantaged individuals should be encouraged.

#### **5.4.5 Natural Resource Use**

A proportion of the NMBM's population makes use of natural resources for cultural and medicinal purposes, as a source of fuel, and as a means to supplement income. Unsustainable use of natural resources will impact on biodiversity and on the ability of the environment to supply goods and services to the population.

The following is recommended with regard to natural resource use:

- Areas of natural vegetation, outside of the existing protected area and CBA/ESA network, should be set aside for traditional practises to continue;
- In order to reduce the impact of resource use on natural areas, the development of nurseries for indigenous plants of cultural and medicinal value should be encouraged; and
- The impacts of the bait collecting industry at Swartkops should be monitored and the industry should continue to be regulated to ensure that harvesting is sustainable.

#### **5.4.6 Payment for Ecosystem Services**

Payment for Ecosystem Services is the practice of offering incentives to farmers or landowners in exchange for managing their land to provide some sort of ecological service. Amongst the ecosystem services receiving the most attention worldwide is climate change mitigation and, related to this, there is an opportunity to develop the carbon sequestration industry within the NMBM.

Spekboom *Portulacaria afra*, which is a dominant species in many thicket types, is being increasingly used to restore plant cover in degraded thicket. This plant has the ability to sprout from replanted cuttings, making it a good candidate for large-scale restoration of degraded land. Furthermore, there is evidence that spekboom has extraordinary carbon storing capabilities. Restoration of degraded subtropical thicket would achieve the combined aims of improving rural livelihoods, restoring biodiversity, and replenishing natural capital and ecosystem services (Powell et al., undated). Already, private companies have begun offering services to support the restoration of thicket by landowners.

Opportunities for thicket restoration projects are in the north of the municipal area, in places where subtropical thicket has been degraded or transformed by human activities.

The following is recommended with regard to payment for ecosystem services:

- The development of thicket restoration projects within the NMBM should be encouraged

#### **5.4.7 Expanded Public Works Programme**

The Expanded Public Works Programme (EPWP) is a government programme to provide poverty and income relief through temporary work for the unemployed to carry out socially useful activities. Programmes active within the municipal area include the Working for Water, the Working for Woodlands and CoastCare Programmes.

The Working for Water Programme collaborates with local communities on projects to control invasive alien plants. At the same time, the programme creates an enabling environment for skills training and invests in the development of the communities through the implementation of HIV and AIDS projects and other socio-development initiatives. Short-term contract jobs (with an emphasis on recruiting women, youth, and the disabled) are created through the clearing activities undertaken.

The following is recommended with regard to Expanded Public Works Programmes within the NMBM:

- The efforts of the EPWP programmes should be aligned to the network of Critical Biodiversity Areas and Ecological Support Areas, where possible.
- Where private landowners enter into conservation agreements with the NMBM, these landowners should be prioritised for assistance by EPWP programmes.

## 6 Part F: Monitoring, reviewing and updating

The Nelson Mandela Bay Municipality is the lead implementing agent of the Bioregional Plan for the bioregion. As such, the NMBM is responsible for overseeing the implementation of the plan and future review thereof, including:

- Its application in land-use planning and decision-making;
- Revision and amendment of the underlying systematic biodiversity plan (Conservation Assessment and Plan for the Nelson Mandela Bay Municipality) at least every five years; and
- An update of the published Bioregional Plan at least every five years.

However, it is important to note that SANParks, the Eastern Cape Parks and Tourism Agency (ECPTA), and private landowners (e.g. Mountains to Oceans, PPC, Coega Development Corporation etc.) are responsible for the management of certain protected areas and conservation areas within Nelson Mandela Bay and the above lead agency responsibilities assigned to the NMBM do not in any way remove or transfer existing and future management responsibilities from these management agencies.

### 6.1 Review

The Bioregional Plan is to be reviewed every five years and following immediately thereafter by a revision process to ensure that it remains appropriately up-to-date. Such reviews and revisions should be linked to the similar process for the NMBM SDF.

Furthermore, the NMBM has put various organisational structures in place to facilitate the integration of the NMBM CBA Network into land-use planning and decision-making (see Section 5.3.1). The effectiveness of these structures in achieving this objective should be reviewed bi-annually. The land-use guidelines (see Section 4) associated with this Bioregional Plan are additional instruments to support the application of the plan in planning and decision-making. The guidelines should be reviewed at the same intervals as the Bioregional Plan.

### 6.2 Monitoring

Various monitoring instruments and indicators were considered, in addition to the availability of necessary resources to measure achievement of the *Planning, Operation and Management, Mainstreaming* and *Building a Biodiversity Economy* objectives of the Bioregional Plan. It is recommended that monitoring be undertaken on a five-yearly cycle, in alignment with the revision of the Bioregional Plan.

Implementation of the various recommended measures for effective management and monitoring should commence immediately upon gazetting of the Bioregional Plan.

#### 6.2.1 Monitoring instruments

The following instruments were identified as being viable to generate reliable data for monitoring purposes:

- Previous and future systematic biodiversity plans;
- NMBM Alien Invasive Plant Control Strategy;
- NMBM Environmental Management Sub-Directorate SDIP;
- Biodiversity Management Plans;
- Protected Area Management Plans;
- NMBM State of the Environment Reports;
- Biodiversity Stewardship agreements;
- Development of a system of tracking NEMA EIA Regulations and MPRDA applications that do not correctly refer to the NMBM Bioregional Plan, as well as NMBM project proposals that present conflicts with the Bioregional Plan that have not been evaluated via the MDTTT;
- Future NMBM Protected Area Expansion Strategy; and
- Progress Reports for NMBM and other biodiversity projects in the municipal area.

### 6.2.2 Monitoring Indicators

Due to the limited number of instruments available to generate reliable data for monitoring purposes, only the following final indicators were selected per category (DEAT, 2005; SANBI, 2009):

#### Planning

- Ecosystem Protection Level of NMBM vegetation types (hectares and percentage protected per vegetation type and associated protected area categories);
- Ecosystem Threat Status of NMBM vegetation types (remaining hectares per vegetation type and percentage thereof requiring protection);
- Terrestrial Habitat Loss (hectares / vegetation type);
- Threatened amphibian species (hectares and number of populations / threatened species);
- Threatened bird species (hectares and number of populations / threatened species);
- Threatened mammal species (hectares and number of populations / threatened species);
- Threatened reptile species (hectares and number of populations / threatened species);
- Biodiversity management plans for ecosystems (number of plans);
- Biodiversity management plans for species (number of plans);
- NMBM Biodiversity Stewardship Policy and Implementation Plan updated; and
- NMBM Protected Area Expansion Strategy developed and updated.

#### Operation and Management

- Budgetary provision for conservation management (percentage in relation to required budget);
- Area of municipal, other state and private land declared in terms of the NEM: PA Act and rezoned to Open Space 3;
- Area of invasive alien species cleared (hectares / Ecosystem Threat Status or CBA-ESA category); and

- Area of natural vegetation restored or rehabilitated (hectares / Ecosystem Threat Status or CBA-ESA category).

### **Mainstreaming**

- EIA, Land Use (e.g. LUPO, DFA, SPLUMA etc.) and Mining applications that do not refer to the NMBM Bioregional Plan appropriately (percentage); and
- Municipal project proposals that are in conflict with the Bioregional Plan, which have not been reviewed by the MDTTT (percentage).

### **Building a Biodiversity Economy**

- Temporary and permanent employment opportunities created through biodiversity initiatives (number of jobs);
- Protection status of ecosystems and species as a direct result of development projects (hectares / vegetation type or species);
- Individuals trained in biodiversity-related industries (number); and
- Areas restored or rehabilitated as a direct result of payment for ecosystem services (hectares / vegetation type or species).

## **6.3 Updating**

The updating of a systematic biodiversity plan is a data intensive and time consuming process. In light of the requirement for municipal SDFs to undergo full revisions every five years, it is recommended that the NMBM systematic biodiversity plan also be updated on a five-yearly cycle. The revision should be scheduled such that a draft (revised) biodiversity plan is completed by the commencement date of the SDF revision process; thereby facilitating an integrative planning process and the incorporation of the Critical Biodiversity Areas map into the SDF.

Due to ongoing changes in land-use rights and the implications of development on the NMBM CBA network, a biennial update of the Critical Biodiversity Areas map should also be considered. The revision should be made available as a digital map and in GIS via the NMBM's website. The revised map must be submitted to the MEC of DEDEAT, in consultation with the SANBI and the Minister of DEA, for gazetting.

Updates of the entire Bioregional Plan should be undertaken on a five-yearly cycle, once the revision of the NMBM systematic biodiversity plan and SDF have been completed. However, more frequent updates to specific components of the Bioregional Plan could be undertaken when necessary.

## 7 Part G: GIS files

A data package of the principal spatial layers that were used in the development of the Bioregional Plan has been assembled. For ease of reference, an outline of the shapefiles (.shp), associated layer files (.lyr), and important fields in the attribute tables is included in Table 7-1. The shapefiles were created in ESRI ArcMap 9.3.1 and include metadata (.xml files) according to the ISO Metadata Standard, which conforms to the SANBI Biodiversity GIS metadata standards.

**Table 7-1: Outline of the shapefiles included in the data package**

Folder	Shapefiles	Layer files	Description	Important fields	Description
FINAL_CRITICAL_BIODIVERSITY AREAS_2010	400919_NMBM_CRITICAL_BIODIVERSITY AREAS_FINAL_07122010.shp	400919_NMBM_CRITICAL_BIODIVERSITY AREAS_FINAL_07122010.lyr	Final shapefile of Critical Biodiversity Areas (CBAs) for the NMBM	CONSERVATN	Classification of the CBAs
PROTECTED_AREAS_2009	PROTECTED_AREAS_2007.shp	367380_NMBM_PROTECTED_AREAS_161107.lyr	The statutory protected areas and non-statutory conservation areas of the NMBM	RESNAME	Protected area name
ECOSYSTEM_STATUS_2009	367380_VEGTYPES_FINAL_050309.shp	367380_NMBM_VEGETATION_TYPES_2009.lyr	The vegetation types of the NMBM	VEGTYPE	The vegetation type classification
		367380_NMBM_ECOSYSTEM_STATUS_2009.lyr	The Ecosystem Threat Status classification of the NMBM vegetation types	ECOSYSTEM_	The Ecosystem Threat Status classification
SPECIES_2009	367380_SPECIES_OF_SPECIAL_CONCERN_NUMBERED_010307.shp		The species of special concern layer for the NMBM. In order to prevent misuse of the data, the names of the species are not shown – a code is instead assigned to each species of special concern	SPP_NUMBER	Reference code for the species of special concern occurring
CRITICAL_ECOLOGICAL_PROCESSES_2009	367380_NMBM_CRITICAL_ECOLOGICAL_PROCESSES_051007.shp	367380_NMBM_CRITICAL_ECOLOGICAL_PROCESSES_161107.lyr	The critical ecological processes within the NMBM	ECOSYSTEM_	Ecological process type classification

## 8 Conclusions and Recommendations

The final Bioregional Plan has identified priorities areas for biodiversity conservation in the Nelson Mandela Bay municipal area. Measures for effective management, review, monitoring and updating have also been recommended. Implementation of the various recommended measures for effective management and monitoring should commence immediately upon gazetting of the final Bioregional Plan.

The final Bioregional Plan serves as the official reference for biodiversity priorities within the bioregion, superseding all the previous non-published spatial biodiversity plans for the area. Upon gazetting of the final Bioregional Plan, all organs of state will be required to take the Bioregional Plan into account in their decision-making. The gazetting process will also trigger certain legal requirements in terms of the NEMA EIA Regulations.

This final Bioregional Plan is consistent with the NEM: Biodiversity Act and meets all the requirements of the *Guideline regarding the Determination of Bioregions and the Preparation and Publication of Bioregional Plans* (DEAT, 2008).

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All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

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# Appendices

**Appendix A: Systematic Conservation Assessment and  
Plan for the Nelson Mandela Bay Municipality (SRK  
Consulting, 2010)**

## **Appendix B: Extended Biodiversity Profile**

## **Appendix C: A4 map of Critical Biodiversity Areas**

## SRK Report Distribution Record

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