

**REVIEW OF THE CITY OF EKURHULENI BIOREGIONAL  
PLAN 2020**

**DRAFT FOR PUBLIC  
COMMENT**

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## LIST OF ACCRONYMS

CoE	City of Ekurhuleni Metropolitan Municipality
CBA(s)	Critical Biodiversity Area(s)
ESA(s)	Ecological Support Area(s)
NEMA	National Environmental Management Act
NEMBA	National Environmental Management Biodiversity Act
SANBI	South African National Biodiversity Institute
GIS	Geographical Information System
GDARD	Gauteng Department of Agriculture and Rural Development
CBD	The Convention for Biological Diversity
UNFCCC	United National Framework Convention on Climate Change
MED	Ministerial Executive Committee
NEMPAA	National Environmental Management Protected Areas Act
SDF	Spatial Development Framework
IDP	Integrated Development Plan
SPLUMA	Spatial Planning and Land Use Management Act
WULA	Water Use Licence Application
RSA	Republic of South Africa
ha	Hectares
PA	Protected Area
CELUS	City of Ekurhuleni Land Use Scheme
GPAES	Gauteng Protected Area Expansion Strategy

# 1 INTRODUCTION TO THE CITY OF EKURHULENI BIOREGIONAL PLAN 2020

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## 1.1 DESCRIPTION OF THE BIOREGION: THE CITY OF EKURHULENI METROPOLITAN MUNICIPALITY

The City of Ekurhuleni Metropolitan Municipality (CoE) is located on the East Rand of the Gauteng Province, covering an area of approximately 1975km<sup>2</sup> (Figure 1.1). The neighbouring municipalities include Gauteng Metropolitan Municipalities of Tshwane and Johannesburg in north and west, respectively, and Sedibeng District Municipality in the south and east. Victor Khanye Local Municipality of the Nkangala District Municipality of the Mpumalanga Province share a short boundary in the east.

While largely modified by urban, mining and agricultural development, the CoE still supports threatened biodiversity and important ecological infrastructure within the Grassland biome, which offer a range of ecosystem services. Due to the significant extent of modification of the natural landscape, most of the remaining ecosystems in the CoE are threatened.

Development in the CoE has, and will, continue to expand. It is against this backdrop that planning for biodiversity pattern and process in the CoE has been undertaken. The revised CoE Bioregional Plan (2020) will replace the existing 2015 CoE Bioregional Plan.

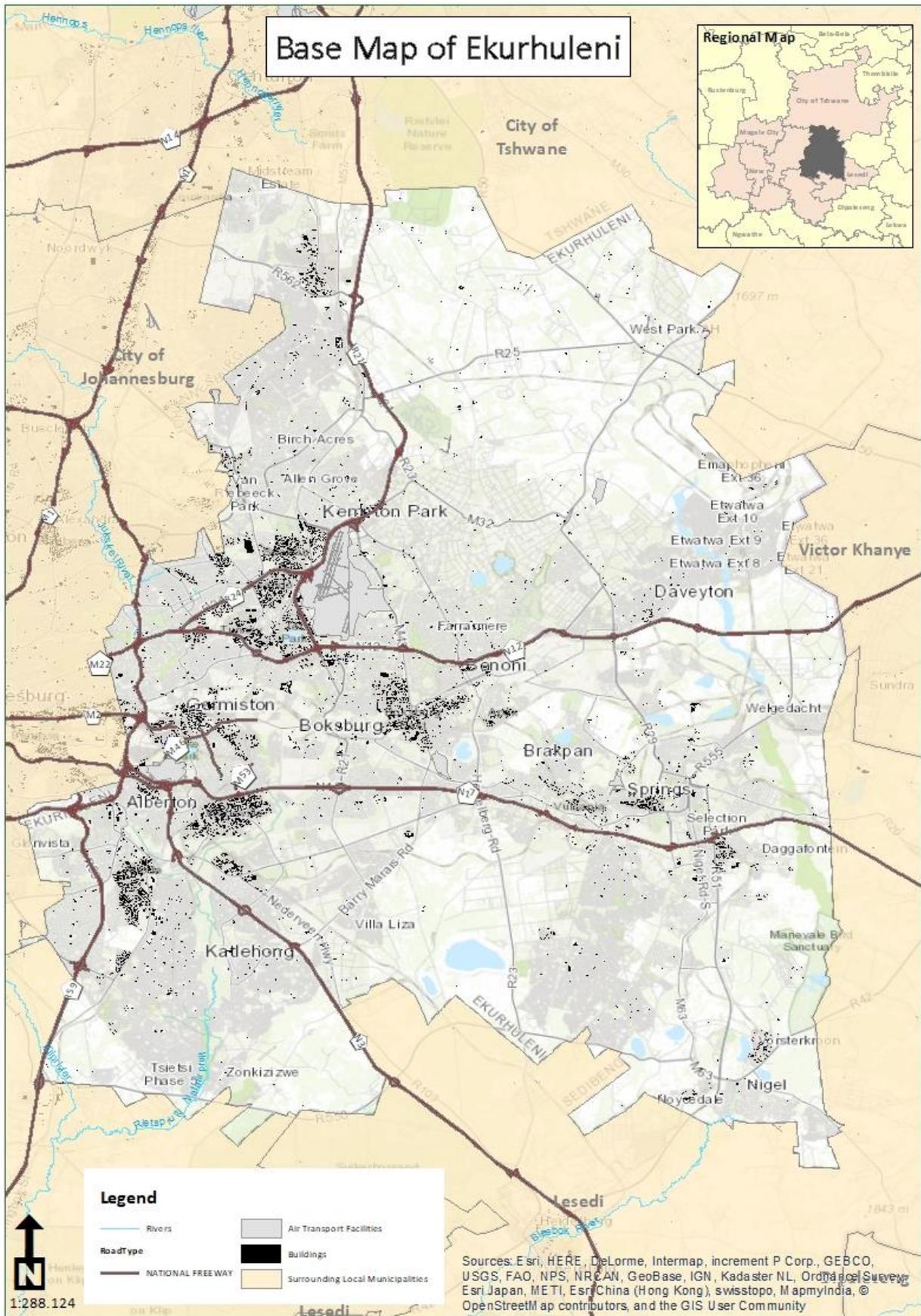


Figure 1.1 Locality of the City of Ekurhuleni Metropolitan Municipality,

## 1.2 BACKGROUND AND APPROACH TO BIOREGIONAL PLANNING IN SOUTH AFRICA

### 1.2.1 What is a Bioregional Plan?

A Bioregional Plan is a tool that guides and informs **land use and resource-use planning and decision-making** by a full range of sectors whose policies, programmes and decisions impact on biodiversity, in order to preserve long-term functioning and health of National or regional priority areas known as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs). It is therefore the official reference for biodiversity priorities that need to be taken into account in all land-use planning and decision-making processes.

A Bioregional Plan is developed by applying systematic biodiversity planning methods. The process is clearly outlined in the national guidelines for bioregional planning (NEMBA Guideline regarding the determination of bioregions and the preparation of and publication of Bioregional Plans No 291 of 2009) and the Technical Guidelines for CBA maps (SANBI, 2017).

In summary, a Bioregional Plan produces a map of important biodiversity areas, outside of the Protected Area network, that requires management intervention through land use guidelines, in order to retain biodiversity pattern and process. The types of information used to inform this map may include distribution mapping of biodiversity features, mapping land cover and land use and considering the Protected Area network. The process that was followed to “build” the revised CBA map is explained in more detail in Chapter 5. The components of a Bioregional Plan include:

1. A map of CBAs and ESAs, also known as a CBA map, for both terrestrial and freshwater ecosystems;
2. A Bioregional Plan handbook which includes a biodiversity profile and land use guidelines;
3. GIS files and metadata; and
4. A technical report describing the analyses and processes undertaken to develop the CBA map.

## 1.3 PURPOSE, AIMS AND OBJECTIVES OF A BIOREGIONAL PLAN

It is important to understand the Purpose and Objective of a Bioregional Plan to correctly interpret, apply and implement the Plan.

### 1.3.1 Purpose of Bioregional Plans

A Bioregional Plan is not in itself a multi-sectoral tool, but is **the biodiversity sectors input that should be integrated into other planning processes.**

The primary intention of NEMBA Chapter 3 is to facilitate conservation and management of biodiversity in “**biodiversity priority areas**” or **priority areas for conservation**, outside of the Protected Area network, at a landscape level. Therefore, the **purpose of the Bioregional Plan is to provide a map of the priority biodiversity areas** and develop associated land use management guidelines to inform:

1. Cross-sectoral spatial planning at all levels of government, relevant to sectors whose policies, actions and decisions impact on biodiversity;
2. Environmental assessment and authorisations; and
3. Natural resource management and protected area expansion programmes.

Note: A Bioregional Plan is produced to meet a specific objective, and is designed for a particular set of uses and users. Other management tools designed to achieve biodiversity conservation objectives include:

- Gauteng C Plan 3.3;
- Gauteng Protected Area Expansion Strategy;
- Biodiversity Management Plans (for ecosystems or species);
- Strategic Environmental Assessments; and
- Environmental Management Frameworks.

### 1.3.2 Aim and objectives of a Bioregional Plan

The aim of a Bioregional Plan is, simply put, to reduce further loss or degradation of biodiversity priority areas and ecological support areas.

The objectives of a Bioregional Plan are to:

1. Identify the minimum spatial requirements needed to maintain a living landscape that continues to support all aspects of biodiversity and retain/maintain essential ecological infrastructure. This is achieved through the selection of areas, based on achieving targets which represent important biodiversity pattern AND ecological processes;
2. Serve as the primary source of biodiversity information for land use planning and decision-making; and
3. Inform conservation and restoration action in key biodiversity areas.

## 1.4 REVISION OF THE COE REGIONAL PLAN

The first CoE Bioregional Plan was gazetted in 2015. The gazetted NEMBA Bioregional Plan guideline makes provision of a revision every 5 years. There reason why this is specifically needed in the CoE, and other urbanised metros, is that development is occurring at such a rapid rate that updated information, particularly associated with changes in land cover and land use, need to be captured, in order to review interventions that ensure the persistence of biodiversity pattern and process in the CoE.

It must also be noted that since the CoE Bioregional Plan (2015) was gazetted, a technical guideline was published, which provides a more detailed framework for the development of CBA maps and land use guidelines. The 2015 Bioregional plan will be revised to meet these technical requirements.

Once gazetted, the revised CoE Bioregional Plan (2020) will replace the previous published 2015 version.

### 1.4.1 CoE Bioregional Plan and the Gauteng C-Plan

The current CoE Bioregional Plan (2015) was based on a systematic biodiversity assessment conducted for the Gauteng Province in 2011 (C-Plan 3.3). This ensured that biodiversity targets for the Province were spatially efficient and proportionate, i.e. without burdening any one municipality with disproportionate targets. The revision of the Coe Bioregional Plan will continue to use the systematic planning outputs of this assessment to underpin the process of revising the CoE Bioregional Plan CBA map. The revised CoE Bioregional Plan needs to ensure that the CoE accounts for its share of the Provincial target and that it is aligned to the Provincial Biodiversity Spatial Framework, which has been further developed through engagement with GDARD and neighbouring Provinces.

### 1.4.2 Approach to revision

In South Africa, biodiversity planning typically includes a target-based approach, using either C-Plan or MARXAN, to select sites that will ensure that important biodiversity features are represented in the map of Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs). Conservation targets for all ecosystems in the CoE have been set at 24% (Mucina and Rutherford, 2006, 2012, Mucina *et al.*, 2018). The area remaining in a natural state in the CoE is less than 30% (Chapter 3). This includes secondary grasslands which have been historically cultivated. Therefore, the available land for achieving this target for some ecosystems is close to or at the set target. Biodiversity Planning models will therefore identify most of the remaining natural sites in the CoE as highly irreplaceable.

While theoretically the target-based approach is still applicable, a number of considerations need to be factored in:

1. Urban development is expanding (and will continue to do so) and encroaching on the surrounding natural landscapes;
2. Some sites are small, isolated and degraded. These sites will not contribute meaningfully in terms of achieving an ecosystem target;
3. Not all natural areas are pristine. Historical and recent fallow cultivated grasslands are likely to support lower levels of biodiversity. While some of these areas will need to be rehabilitated and conserved to ensure that targets are reached and that connectivity in the landscape is retained, pristine uncultivated grasslands are a much higher priority.

In light of the above, significant emphasis has been placed on the accuracy of the land cover/land use map and establishing ecological condition. In addition, for this revision, the C-Plan irreplaceability was not recalculated. Instead a simple set of criteria have been developed, which consider ecological condition, size, degree of connectivity, buffer areas, position in corridor networks, the C-Plan 3.3 irreplaceability values, special habitats and biodiversity features.

Ecological network corridors have been designed by reviewing Bioregional and Biodiversity Sector Plans of neighbouring municipalities. These plans have also been used for edge-matching. A detailed account of how the CBA map was developed is available in a CoE Bioregional Plan (2020) Technical Report published as part of this project. The Technical Report provides the method and techniques employed to generate the map.

The land use guidelines have been developed using the CoE Land Use Scheme (CELUS, 2020) land use categories (Chapter 6), which have been grouped or disaggregated, depending on their anticipated impact on the surrounding natural environment. This will facilitate the integration of the CBA map into the CoE Spatial Development Framework.

Management actions and interventions emanating from the plan should be incorporated into future Integrated Development Plans for CoE. This may include projects for securing biodiversity offset areas, ecosystem restoration projects, environmental education and data gathering, all of which need to be resourced.

Stakeholder engagement is an important component of a Bioregional Plan. Stakeholders from a wide range of sectors and backgrounds have been notified, including relevant CoE departments and Council. A workshop was conducted in March 2020 to gather information and comment that would inform the development of the CBA map and associated land use guidelines. All stakeholders **will** have an opportunity to review and provide comment on the Draft CoE Bioregional Plan 2020.

The following steps of approval will be undertaken as part of the adoption process:

1. Through review and comment, gain approval from GDARD and SANBI;

2. Submit to Council for approval; and
3. Submission to MEC/Minister for adoption and gazetting: the necessary support from GDARD and SANBI will be required for this phase of approval.

## 1.5 LEGAL AND POLICY FRAMEWORK

### 1.5.1 International Conventions

South Africa is party to a number of international conventions that deal with biodiversity. The CoE Bioregional Plan recognises, and is consistent with, the commitments of these agreements which include:

- The Convention on Biological Diversity (1993)
- Convention of Trade and in Endangered Species of Wild Fauna and Flora (CITES 1973)
- Convention on Wetlands (known as the 'Ramsar Convention', 1971)
- United National Framework Convention on Climate Change (UNFCCC, 1994)
- Convention on the Conservation of Migratory Species of Wild Animals (1983)

South Africa is a ratified signatory of, and therefore party to, The Convention for Biological Diversity (CBD) and as such has contracting and reporting obligations. These include developing and implementing the National Biodiversity Strategy and Action Plan (2015) and reporting on the Aichi Biodiversity Targets (CBD, Strategic Plan 2011-2020). The National Biodiversity Strategy and Action Plan outlines a number of Strategic Objectives and Outcomes. The CoE Bioregional Plan fulfils Strategic Objective Outcome 6.3: *“Geographic priority areas for the management, conservation and restoration of biodiversity assets and ecological infrastructure are identified base on best available science”*.

The Ramsar Convention is also particularly relevant to the CoE. The man-made Blesbokspruit wetland system was designated as a Ramsar site in 1986 and was added to the Montreux Record In 1996.

### 1.5.2 National legislation

The **Constitution of the Republic of South Africa** (The Constitution), in the broadest terms, speaks to environmental health and a requirement for sustainable development in terms of the Bill of Rights (Section 24): *“Everyone has the right (a) to an environment that is not harmful to their health or well-being and (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that (i) prevent pollution and ecological degradation, (ii) promote conservation; and (iii) secure ecological sustainable development and use of natural resources while promoting justifiable economic and social development”*. This provides the necessary directive to develop appropriate environmental and biodiversity planning tools and implement appropriate legislation, management plans and programmes.

The **National Environmental Management Act** (No. 107 of 1998, as amended) sets the stage for environmental law in South Africa. In addition to the NEMA principals, which form the foundation for environmental management in South Africa, NEMA Chapter 5 Section 24 makes provisions that are relevant to the CoE Bioregional Plan:

- Firstly, in terms of Section 24(2)(a) & (b) of NEMA, the Minister, or an MEC with the concurrence of the Minister, may identify activities which may not commence without environmental authorisation from the competent authority. These activities have been published and are enforced through the **National Environmental Management: Environmental Impact Assessment Regulations (2014, as amended)**. The CBA map of the CoE Bioregional Plan is a geographical trigger for activities in Listing Notice 3; and
- Secondly, in terms of Section 24(3) “the Minister, or an MEC with the concurrence of the Minister, may: *“compile information and maps that specify the attributes of the environment in particular geographical areas, including sensitivity, extent, interrelationship and significance of such attributes which must be taken into account by every competent authority”*”.

The **National Environmental Management Biodiversity Act** (No. 10 of 2004, as amended) (NEMBA) provides the legal framework for integrated and co-ordinated management, conservation and sustainable use of biodiversity. Through NEMBA a number of planning and management tools have been introduced, including: Threatened or Protected Species Regulations, Listing of Threatened Ecosystems (Section 52), Alien and Invasive Species Regulations, and Bioregional Planning Guidelines. Chapter 3, Section 40-42 of NEMBA outlines the procedure for the development and publishing of Bioregions and Bioregional Plans. Bioregions are areas that contain whole or several nested ecosystems and is characterised by its landforms, vegetation cover, human culture and settlement pattern. Bioregional plans contain measures for the effective management of biodiversity and the components of biodiversity in the region and must be incorporated into municipal Integrated Development Plans and Spatial Development Plans. To date, the CoE Bioregional Plan (2015) has been considered in these plans.

The **National Environmental Management Protected Areas Act** (No. 57 of 2003, as amended) (NEMPAA) governs the network of proclaimed protected areas which formally contribute towards the conservation of biodiversity and natural landscape features. NEMPAA provides the framework for the management of all formal protected areas proclaimed under the Act by: setting roles and responsibilities (e.g. management authorities) and determining reporting requirements (management plans).

### 1.5.3 Biodiversity offset guidelines

The Draft National Biodiversity Offset Policy (2017) provides a framework for the consideration, development and implementation of biodiversity offsets. In addition, a best practice guideline for wetland offsets was published by the Water Research Commission (Macfarlane *et al.*, 2016). These guidelines must be used to inform the consideration, development and implementation of biodiversity offsets where they are appropriate and the need has been identified.

### 1.5.4 Additional regulating legislation

Additional legislation, which regulates land uses in the same landscape as the CoE Bioregional Plan, and which will need to be read in conjunction with NEM laws (above), is provide below. This is not an exhaustive list, but is considered to be the most relevant.

Year	Document/Act
	Legislation
1970	Subdivision of Agricultural Land Act (No. 70 of 1970)
1983	Gauteng Nature Conservation Ordinance (No. 12 of 1983)
1983	Conservation of Agricultural Resources Act (No. 43 of 1983)
1998	National Forest Act (No. 84 of 1998)
1998	National Water Act (No.36 of 1998)
1999	National Heritage Resources Act (No 25 of 1999)

Year	Document/Act
2002	Mineral and Petroleum Resources Development Act (No. 28 of 2002)
2004	National Environmental Management: Air Quality Act (No. 39 of 2004)
2008	National Environmental Management: Waste Act (No. 59 of 2008, as amended)
2013	Spatial Planning and Land Use Management Act (No 16 of 2013)

## 1.6 INTENDED USES AND USERS

### 1.6.1 By whom, and how, should the CoE Bioregional Plan 2020 be used?

The CoE Bioregional Plan should be used by all sectors involved with land use planning and decision-making in the CoE. This extends to entities that need to use the CoE Bioregional Plan to meet legislative requirements, as well as planners, programmes and developers who would find it useful to inform planning processes. The main users of the CoE Bioregional Plan should include (Also see Table 1.1 below):

- All CoE departments who undertake planning functions;
- Other National and Provincial development planning departments;
- National and Provincial Extended Public Works Programmes;
- Government departments and authorities whose decisions and programs impact on biodiversity and the natural environment, including DEFF, GDARD and DMR;
- Environmental Assessment Practitioners;
- Developers or land owners considering development applications or changes in land use; and
- Conservation NGOs.

#### How is the Bioregional Plan used?

##### **Planning ahead:**

- Provincial and Municipal planning departments must integrate CBAs, ESAs and the land use guidelines into:
  - Spatial Development Frameworks (SDFs), Integrated Development Plans (IDPs) and other relevant sector plans;
  - Strategic Environmental Assessments (SEA) or Environmental Management Frameworks (EMF); and
  - Land use zoning schemes or other planning under SPLUMA.
- Environmental Impact Assessment processes and the scope of work for biodiversity specialist inputs should be informed by the Bioregional Plan.
- The identification of appropriate sites for the Gauteng Protected Areas Expansion Strategy should be informed by the Bioregional Plan.
- Restoration and rehabilitation programmes should use the Bioregional Plan to identify sites of high biodiversity value or that are considered as critical for ecosystem function as priority areas for programme implementation.

##### **Making decisions**

- Decision-making on applications for Environmental Authorisations
- Relevant agricultural applications
- Water-use licence applications (WULAs)
- Authorisation for prospecting and mining

**Table 1.1 Summary of who should use the CoE Bioregional Plan 2020 and how**

User	Application	Specific uses
City of Ekurhuleni Metropolitan Municipality	Proactive planning	Informing spatial and development planning through integration as a sectoral plan in SDFs, IDPs and other relevant municipal sector plans.
Other National and Provincial development sectors (e.g. DEFF, GDARD, COGTA, etc.)	Proactive planning	Informing development planning and decision-making.
National and Provincial Extended Public Works Programmes	Proactive planning	Assisting planning and prioritisation of areas for restoration and conservation.
Developers or land owners contemplating changes in land use	Proactive planning	Informing appropriate development, layout and design of proposed land use changes by considering sensitive biodiversity and habitat.
Environmental Practitioners Assessment	Reactive assessment and decision-making	Informing the scope of work for EIAs and biodiversity specialist impact assessments.
Competent Authorities (DEA, GDARD, DMR, DWS)	Reactive assessment and decision-making	Informing decision-making/permitting/authorisation.

Although the revised CoE Bioregional Plan (2020) is based on the most accurate, recent and available science, due to gaps in biodiversity knowledge, the following must be taken into account:

- The CoE Bioregional Plan cannot be used to the exclusion of other environmental or biodiversity planning initiatives.
- The CoE Bioregional Plan cannot replace onsite surveys and assessments for land use or development applications in terms of NEMA EIA Regulations.

## 2 BIOPHYSICAL OVERVIEW OF THE CoE

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### 2.1 PHYSICAL CHARACTERISTICS

#### 2.1.1 Rainfall and Temperature

The rainfall of the CoE is highly seasonal, with most of its annual 650mm to 950mm occurring between November and April. Temperatures experienced in the CoE fluctuate between mild warm summers and cold winters where frost and sub-zero temperatures are common.

#### 2.1.2 Topography

The CoE varies in elevation from approximately from 1480 – 1800 metres above sea level (Figure 2.1). A number of higher lying ridges and koppies traverse the CoE roughly east-to-west. These form part of the continental divide. The watershed created by this divide is the source of some of South Africa's major river system which either flow west towards the Atlantic Ocean or east towards the Indian Ocean. The topography in the remainder of the CoE is low-lying and relatively flat.

#### 2.1.3 Hydrology and Wetlands

The CoE is characterised by significant hydrological features in the form of permanent rivers, valley bottom wetlands and depression/pan wetlands (Figure 2.2).

The northern portion of the CoE is drained via the Rietvlei and Hennops tributaries which flow north and converge to form the Rietvlei River. The central and eastern areas are drained by the Blesbokspruit River system and the south-west is drained by the Rietspruit, Elsburgspruit and Natalspruit rivers which merge to form the Klip River.

The Rietvlei and Klip Rivers systems, which have their origins in this mining, urban and agricultural setting, are the source of some of South Africa's larger rivers such as the Olifants (east flowing towards the Indian Ocean) and the Vaal (west flowing towards the Atlantic Ocean) Rivers, respectively.

Most of the river systems are associated with wetlands, which provide flood relief in periods of high rainfall. Many of the wetlands receive waste water effluent from various land use activities, which will affect the water quality. It is important to note that not all the pans and wetlands are natural. Artificial wetlands (dams) are also mapped in the National Freshwater Priority Areas (NFEPA, 2018).

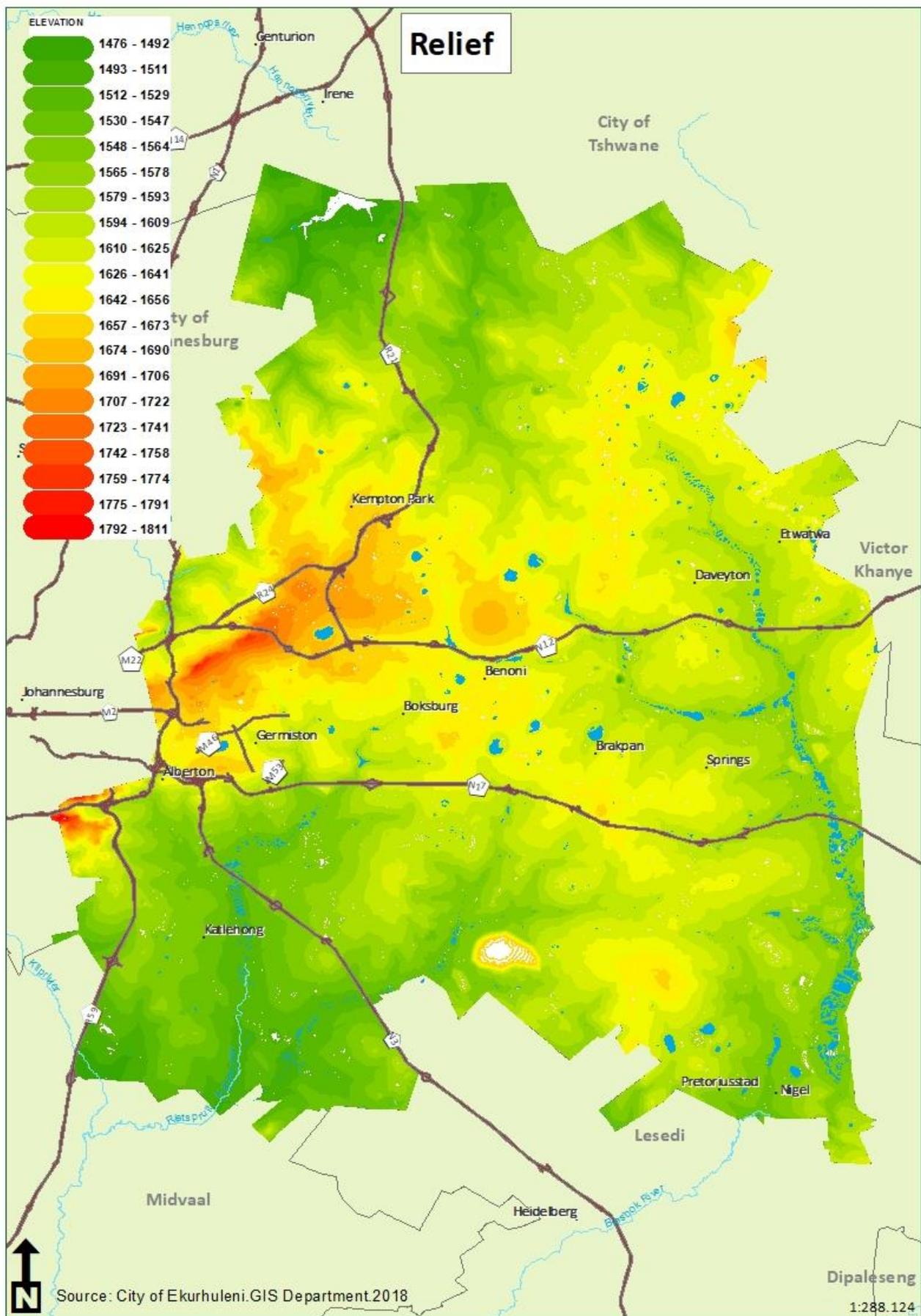


Figure 2.1. Relief of City of Ekurhuleni.



## 2.2 IMPORTANT BIODIVERSITY AND HABITATS

### 2.2.1 Description of Terrestrial Ecosystems and Threat Status

According to the Vegetation Map of South Africa (Mucina *et al.*, 2018) there are 8 vegetation types in the CoE, five (5) of which are threatened (Table 2.1, Figure 2.3).

Egoli Granite Grassland in the CoE constitutes only 5.5% of its entire extent in South Africa. It is **Critically Endangered**, and only 25% of its original extent in the CoE still in a natural or near-natural state (Figure 2.4).

Almost 37% of the entire extent of Tsakane Clay Grassland falls within the CoE. It is **Endangered**, and only 41% of its original extent in the CoE remains in a natural or near-natural state (Figure 2.4).

**Table 2.1 Description of Vegetation Types of the CoE**

Vegetation type	Threat Status (2018)	Original extent in CoE (ha)	Remaining natural in CoE (ha)	% remaining in CoE	RSA conservati on target (%)	RSA (ha)	% extent in CoE
Andesite Mountain Bushveld	Least Concern	5,340	3,760	70%	24	201,784	2.7%
Carletonville Dolomite Grassland	Least Concern	53,229	16,985	32%	24	920,045	5.8%
Eastern Highveld Grassland	Vulnerable	24,192	8,168	34%	24	1,277,243	2%
Egoli Granite Grassland	Critically Endangered	6,048	1,498	25%	24	109,319	5.5%
Gold Reef Mountain Bushveld	Least Concern	463	140	30%	24	203,098	0.2%
Rand Highveld Grassland	Vulnerable	5,755	2,982	52%	24	1,030,645	0.5%
Soweto Highveld Grassland	Vulnerable	54,192	20,303	37%	24	1,457,366	3.7%
Tsakane Clay Grassland	Endangered	48,316	19,625	41%	24	131,322	36.8%
<b>Total</b>		<b>197,536 ha</b>	<b>73,459 ha</b>	<b>37%</b>		<b>5,330,821 ha</b>	

Within the matrix of these ecosystems ridges/koppies and a complex of wetlands (described in Section 2.1.3) increase the landscape heterogeneity and supports a range habitat specialists. The threat status of the freshwater ecosystems, including rivers and wetlands, is concerning, with all wetlands systems and main river reaches assessed as Critically Endangered in the National Biodiversity Assessment (2018) (Figure 2.5).

#### **Blesbokspruit RAMSAR wetland**

Blesbokspruit: The Montreux Record is a register of wetland sites on the List of Ramsar wetlands of international importance where changes in ecological character have occurred, are occurring, or are likely to occur as a result of technological developments, pollution or other human interference. It is a voluntary mechanism to highlight specific wetlands of international importance that are facing immediate challenges. It is maintained as part of the List of Ramsar wetlands of international importance (Figure 4.1).

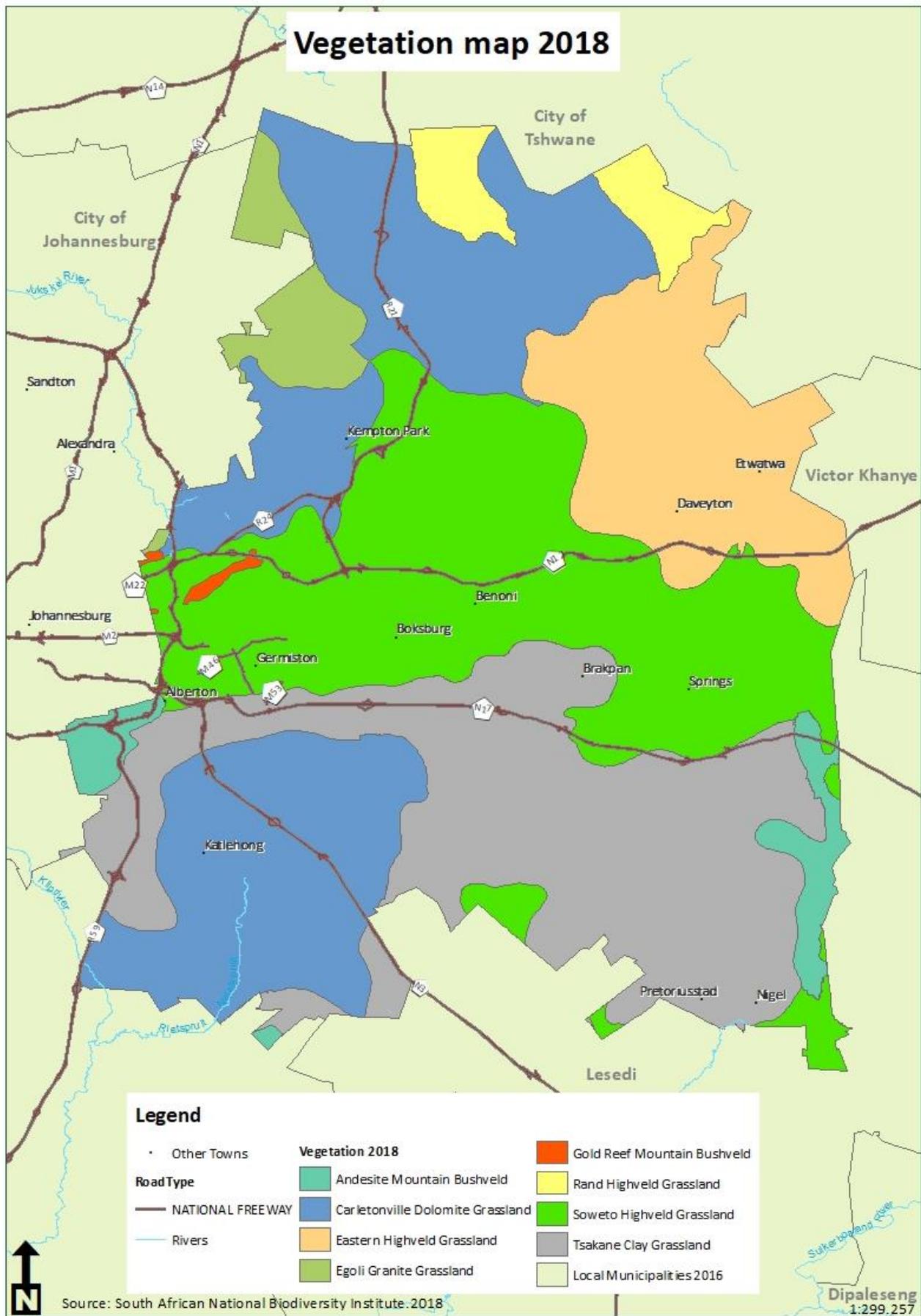


Figure 2.3 Vegetation types of the City of Ekurhuleni.

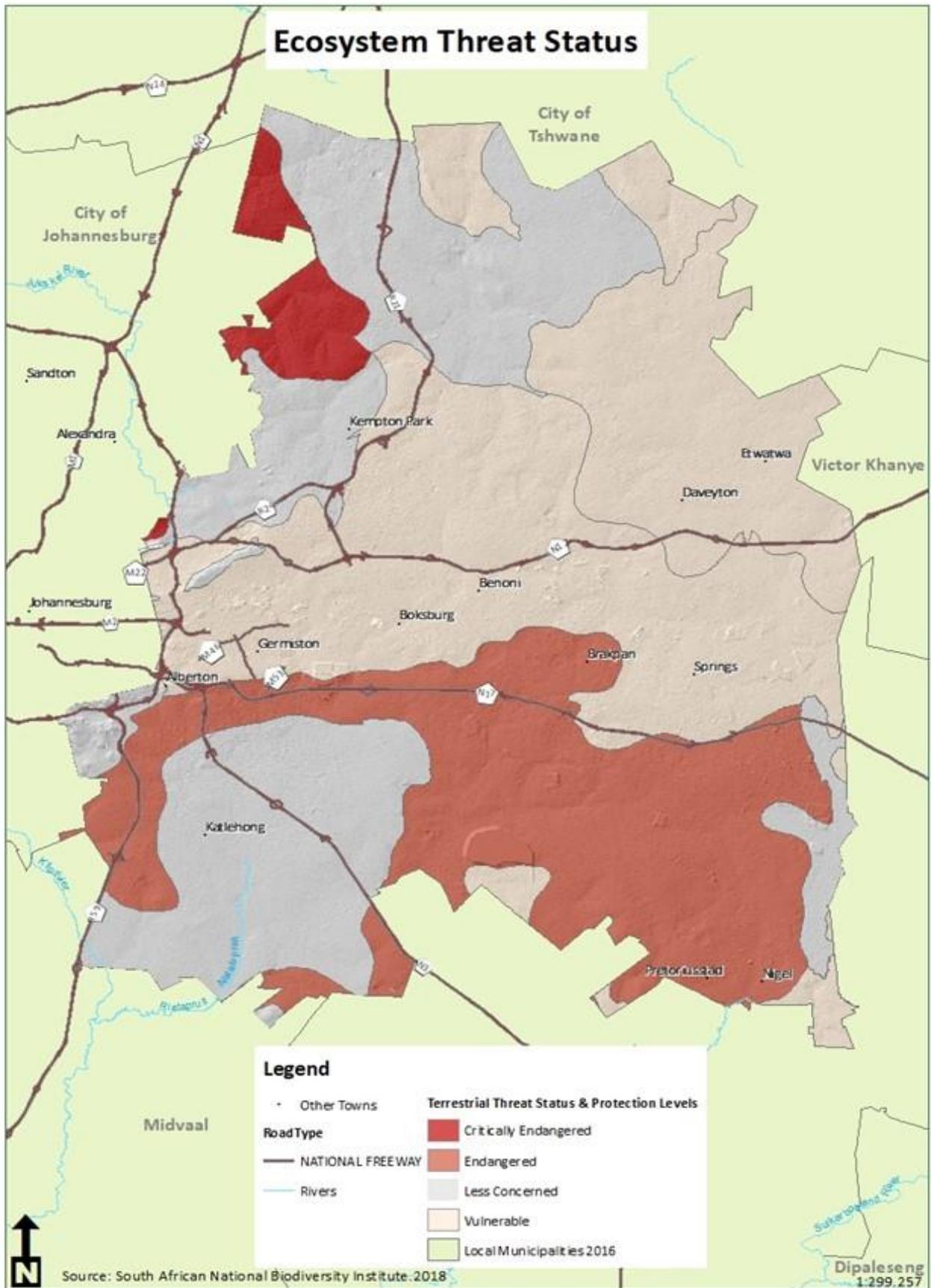


Figure 2.4 Threat status of terrestrial ecosystems of the City of Ekurhuleni.

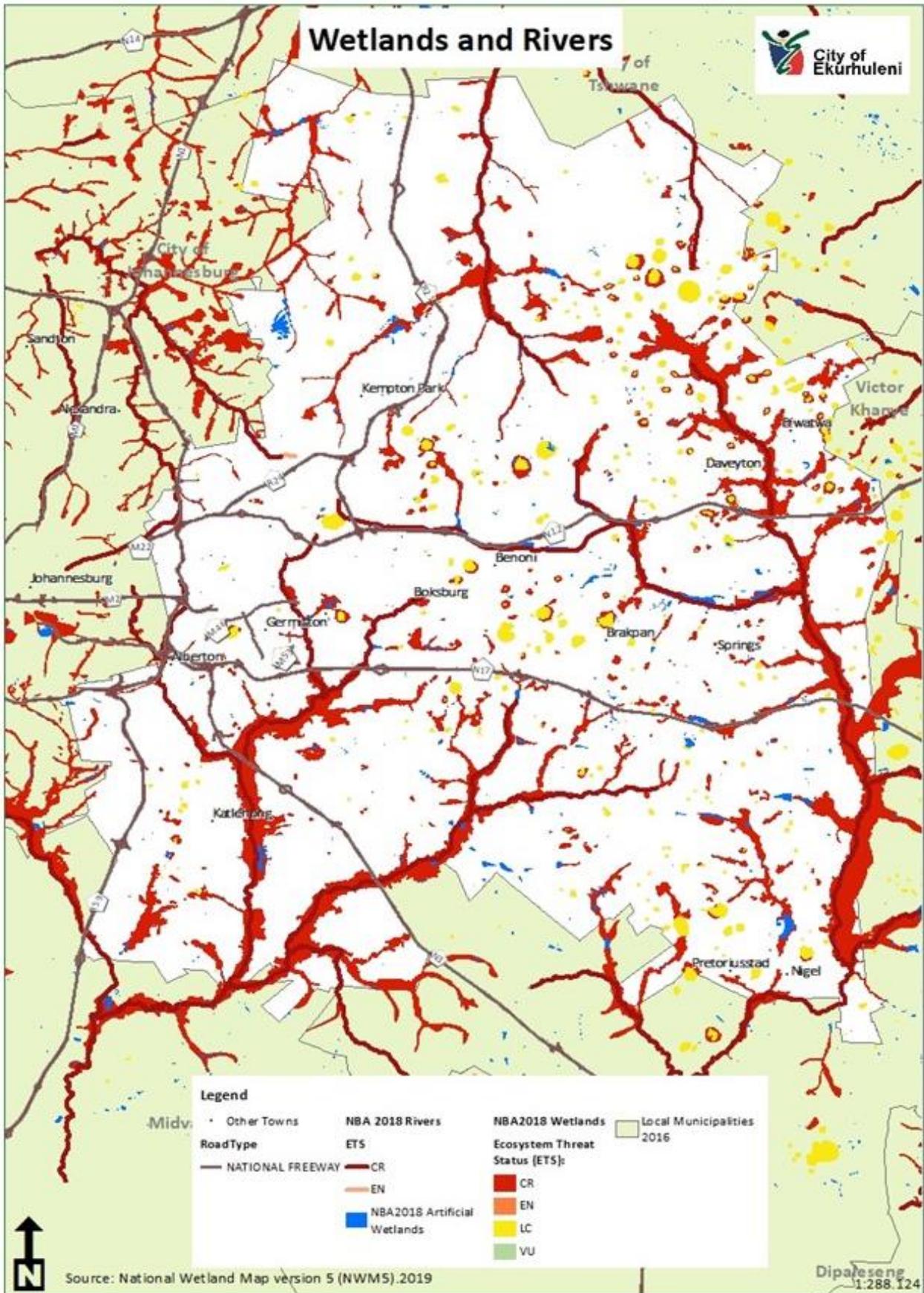


Figure 2.5 Threat status of aquatic ecosystems of the City of Ekurhuleni (CR – Critically Endangered, E – Endangered, VU – Vulnerable, LC- Least concern).

## 2.2.2 Levels of Protection of Terrestrial Ecosystems as calculated for the CoE

A number of ecosystems in the CoE are not represented in the CoE Protected Area network (Figure 2.6 and Table 2.2). These ecosystems may be protected in surrounding municipalities and Provinces and therefore the Level of Protection calculated at a Provincial level may differ. The only ecosystem to enjoy a moderate level of protection is “Gold Reef Mountain Bushveld”.

**Table 2.2 Levels of Protection of Ecosystems in the CoE**

<b>Vegetation type</b>	<b>Level of Protection</b>
Andesite Mountain Bushveld	Poorly protected
Carletonville Dolomite Grassland	Not protected
Eastern Highveld Grassland	Poorly protected
Egoli Granite Grassland	Not protected
Gold Reef Mountain Bushveld	Moderately protected
Rand Highveld Grassland	Poorly protected
Soweto Highveld Grassland	Not protected
Tsakane Clay Grassland	Not protected

DRAFT

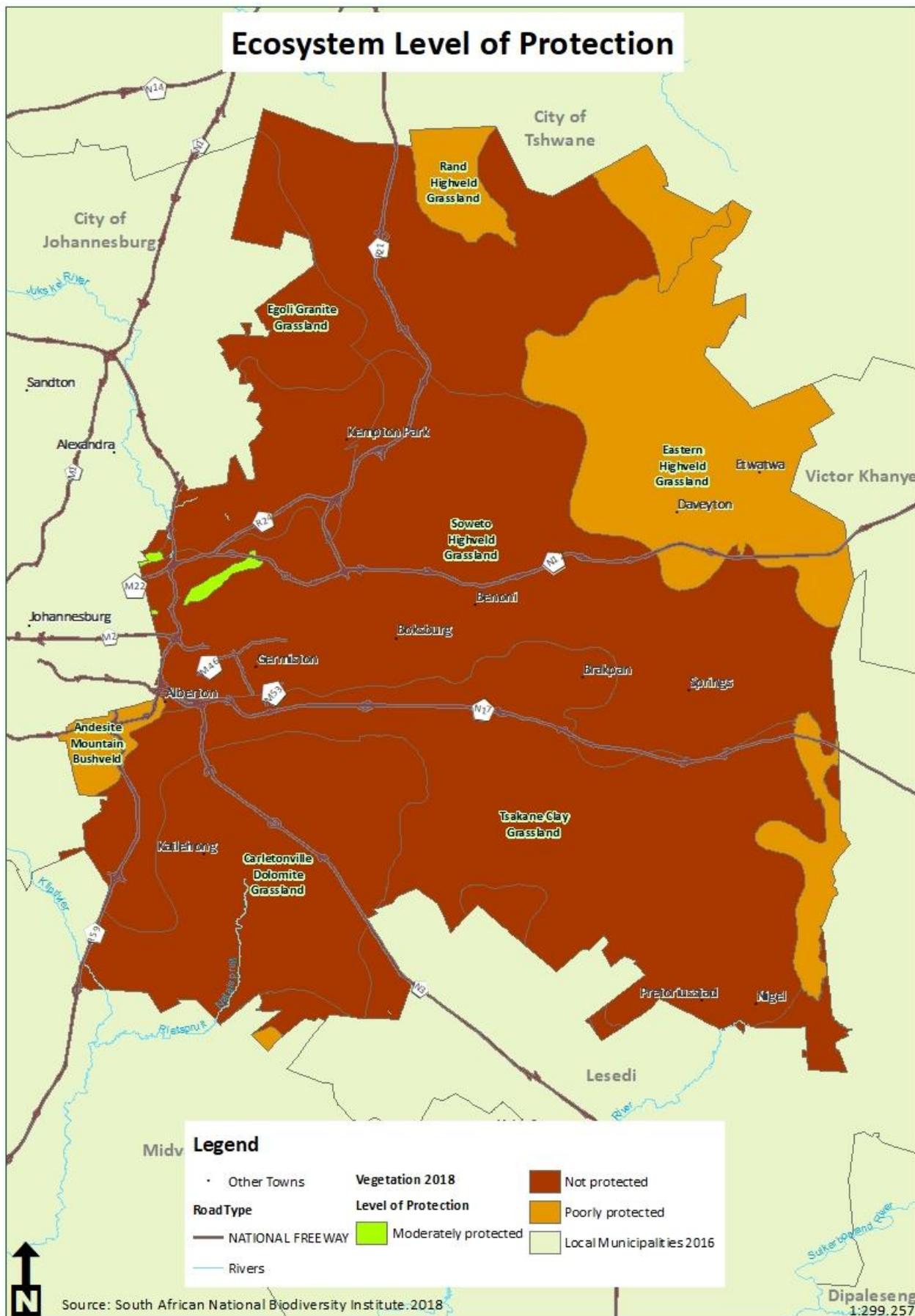


Figure 2.6 Levels of Protection of Ecosystems in the City of Ekurhuleni.

### 2.2.3 Threatened and endemic biodiversity

The following comments on Species of Conservation Concern is not a comprehensive list of species, but summarises some of the key species that have been used to inform the CoE Bioregional Plan 2020:

**Plants:** The revision of the bioregional plan consider the spatial information for 32 orange and red listed species. One species, *Holothrix micrantha*, is suspected of being extinct, and one species is Critically Endangered (*Brachycorythis conica* subsp *transvaalensis*) while 3 species (including *Delosperma purpureum* and *Habaneria mossii*) are Endangered. Fourteen species are Vulnerable and thirteen (13) are Near Threatened.

**Invertebrates:** The species of conservation concern, present in the CoE, includes three (3) Endangered butterflies (*Lepidochrysops praeterita*, *Chrysoritis aureus* and *Aloeides dentatis dentatis*), In addition, a number of Vulnerable and protected species from the TOPS, including beetles (e.g. *Ichneustoma stobbiai* and *Manticora* spp.) and scorpions (*Opisthophthalmus* spp) were used to inform the plan.

**Mammals:** Two of Gauteng's threatened and species of conservation concern mammal species are found in the CoE. They include the Endangered White tailed mouse (*Mystromys albicaudatus*) and the Near Threatened Spotted-necked otter (*Lutra maculicollis*).

**Birds:** The CoE sports over 450 bird species. Some of these species are transient, while others are migratory or permanent residents. Approximately 18 species of conservation concern, relevant and reliant on habitat in the CoE have been used to inform the revision of the Bioregional Plan. Two of these species are Endangered (African Marsh-Harrier - *Circus ranivorus* and Yellow-billed Stork - *Ephippiorhynchus senegalensis*). Nine species are Vulnerable (including the African Grass-Owl (*Tyto capensis*), which is highly reliant on wetland habitats). In addition, 7 Near Threatened species such as the Greater and Lesser Flamingos were also considered.

**Reptiles and amphibians:** While the CoE supports a numerous reptile species, only one threatened species, the Near Threatened Striped Harlequin Snake (*Homoroselaps dorsalis*), has been recorded in the metro. In addition, the presence of the Near Threatened Giant Bull Frog (*Pyxicephalus adspersus*) was confirmed by specialists.

## 3 LAND COVER/LAND USE: PRESSURES ON BIODIVERSITY IN CoE

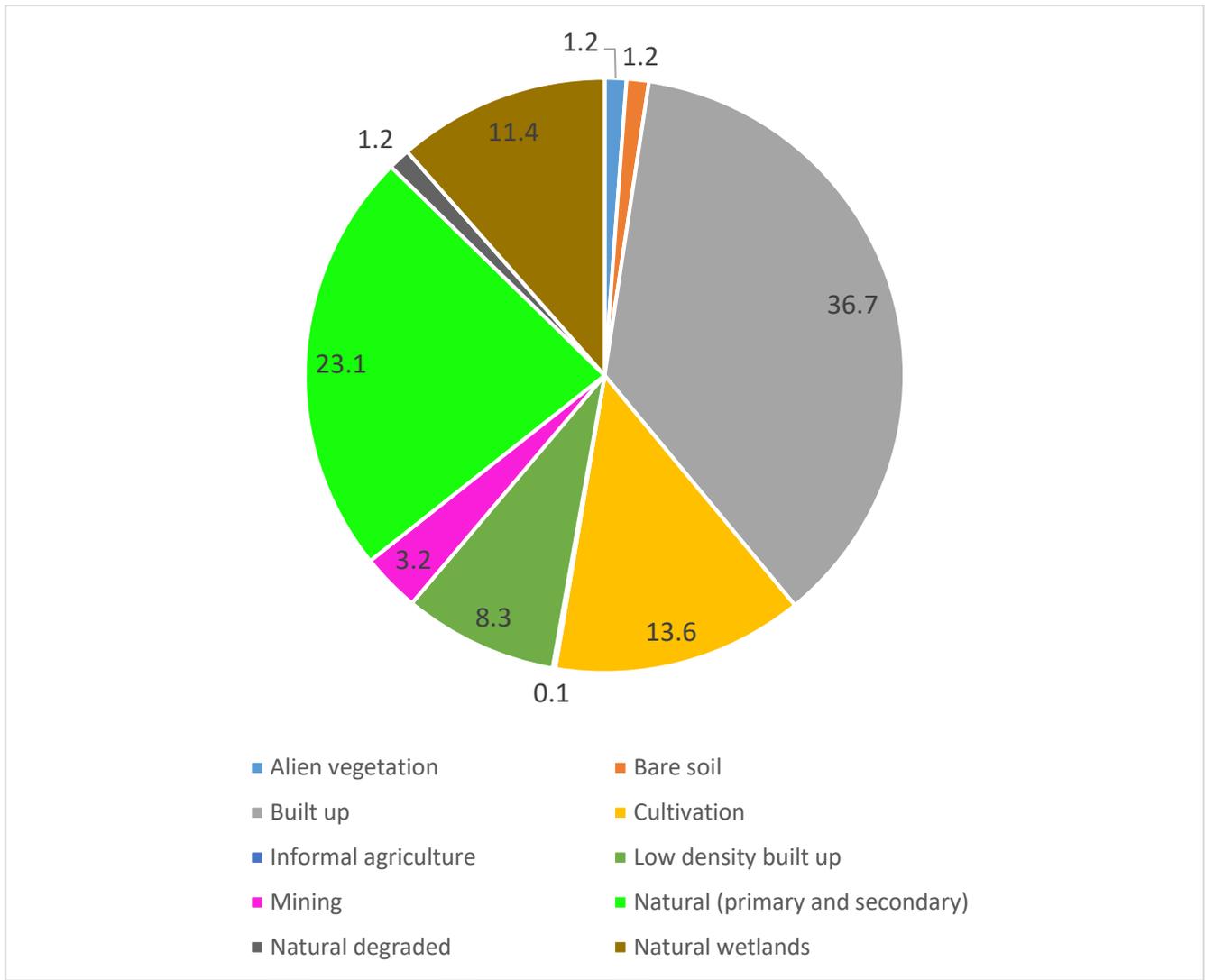
### 3.1 LAND COVER AND LAND USE

For the CoE, a 2020 land cover was generated from detailed mapping. Three “Natural” categories in the land cover were quantified (Table 3.1), which includes undisturbed grasslands (primary), previously cultivated grasslands (secondary), degraded sites which have not yet been permanently modified and wetlands. When combined, these make up approximately 35% of the CoE. The largest land cover category is, as expected, the “Built-up urban” category with almost 37% coverage (Figure 3.1), followed by “Cultivation” agriculture covering almost 14% of the CoE.

The different land cover categories are not distributed evenly throughout the CoE. Cultivation and agriculture is concentrated in the north-eastern portion, with large patches associated with the wetland systems in the east and south. A large proportion of the remaining natural vegetation is located in the south, while urban development is present along the whole western boundary and extends throughout the CoE in varying densities. An urban built-up corridor bisecting the CoE follows the N12 and N17 (Figure 3.2). These settlement patterns were shaped by the historic mining belt in this corridor, around which towns were developed.

**Table 3.1 Description of the CoE land cover 2020 and comparison with land cover 2011 used for CoE (2015)**

Land cover class	2020		2011	
	Area (ha)	% of Total	Area	% of Total
Alien vegetation	2,317	1.2	-	-
Bare soil	2,367	1.2	3,424	2
Built-up urban	72,420	36.7	67,632	34
Cultivation	26,816	13.6	36,843	19
Informal agriculture	289	0.1	-	-
Low density built up	16,451	8.3	4,264	2
Mining	6,261	3.2	7,346	4
Natural (primary and secondary)	45,591	23.1	57,647	29
Natural degraded	2,333	1.2	2,952	1
Natural wetlands	22,587	11.4	17,427	9
Grand Total	197,435		197,535	



**Figure 3.1 Distribution of land cover classes of the City of Ekurhuleni.**



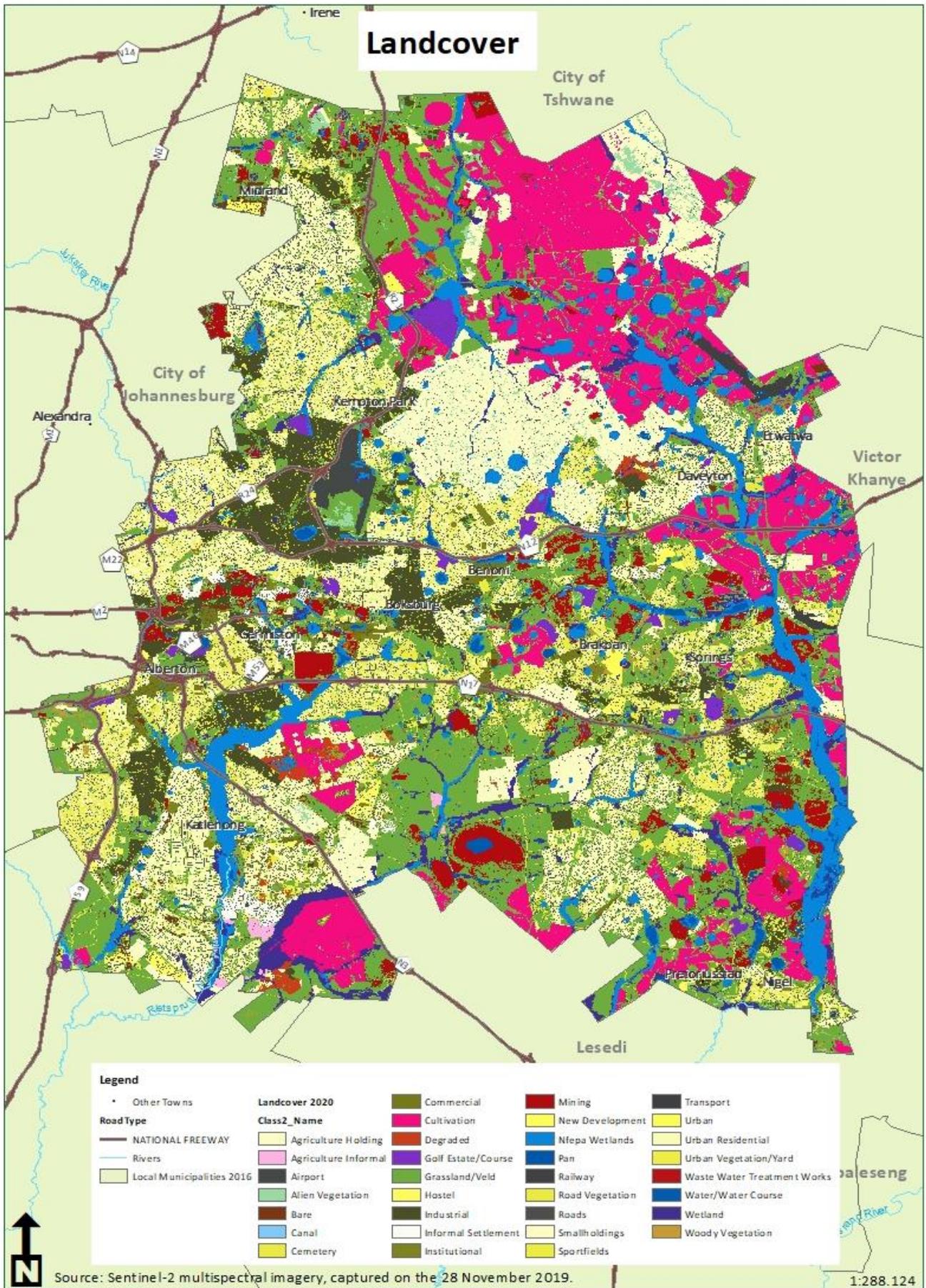


Figure 3.2 Land cover map of the City of Ekurhuleni.

## 4 PROTECTED AREAS AND OTHER CONSERVATION MECHANISMS

### 4.1 PROTECTED AREAS OF COE

According to the GDARD database, the CoE has 14 proclaimed and *de facto* Protected Areas (PAs) (Figure 4.1, Table 4.1). Two Provincial nature reserves, Marievale in the east and only small portions of Suikerbosrand in the south, provide refuge for biodiversity of a range of taxonomic groups. Numerous bird sanctuaries associated with water bodies and a wetland reserve are managed by the CoE. These CoE sites are not proclaimed, but are important “islands” for bird species and are therefore considered *de facto* Protected Areas. Three proclaimed Private Nature Reserves (Table PA, yellow shading) are modified and it is highly unlikely that they will function as areas for the conservation of biodiversity.

Protected Areas should be supported by development buffers as per GDARD policy to prevent edge-effects within the PA itself. The land directly adjacent to most of the PAs in the CoE is largely modified and no longer in a natural state. This poses a threat to the PAs which will require ongoing monitoring and management.

**Table 4.1 Protected Areas of the City of Ekurhuleni Metropolitan Municipality**

Name of Protected Area	Management/Ownership	State of PA
Ian P Coetzer	Private Nature Reserve	Two small holding plots.
Andros	Private Nature Reserve	Transformed (old mine)
Avalon	Private Nature Reserve	Transformed (old mine)
Rietvlei	Municipal Reserve	Secondary, but sustaining biodiversity
Bill Stewart	Municipal Reserve	Natural, but fragmented by road infrastructure
Rolfe's pan	Municipal Reserve	Natural, completely surrounding by built-up, but stepping stone for mobile biodiversity.
Pamula	Private Nature Reserve	Terrestrial component all secondary, most of PA = natural pan
Kosman (Westdene Pan)	Bird Sanctuary: Municipal, de facto	Natural pan
Victor Penning	Bird Sanctuary: Municipal, de facto	Natural wetland/pan. Old WWTW adjacent to site.
D Meyer	Bird Sanctuary: Municipal, de facto	Wetland and park. Walking paths through PAs
Grootvaly (Blesbokspruit)	Wetland reserve: Municipal, de facto	Natural wetland reserve making up Blesbokspruit RAMSAR
Marievale	Provincial Nature Reserve	Mostly natural, 3 little portions in the north don't look right. Check SAPAD database...
Rondebult	Bird Sanctuary: Municipal, de facto	Natural adjacent to WWTW
Suikerbosrand	Provincial Nature Reserve	Natural

### 4.2 RAMSAR WETLAND AND IMPORTANT BIRD AREA

Both the Blesbokspruit Ramsar Wetland and the Blesbokspruit Important Bird Area is located along the eastern border of the CoE and incorporates Grootvaly Wetland Reserve and Marievale Nature Reserve (Figure 4.1).



# 5 SPATIAL MAPPING OF IMPORTANT BIODIVERSITY PATTERNS AND PROCESSES IN THE CoE

## 5.1 SPATIAL ASSESSMENT METHODOLOGY

Important and unique biodiversity is not distributed uniformly throughout the landscape. A spatial biodiversity planning exercise **prioritises** and maps information about biodiversity pattern and ecological processes, current and future land use, and the protected area network in the context of achieving biodiversity targets set for species and ecosystems.

It is important to note that based on the current land cover calculations, the conservation targets for most of ecosystems in the CoE CANNOT be met in the remaining natural and secondary natural areas. A conservation target-based approach which just considers the CoE landscape will result in all natural and near-natural sites having 100% irreplaceability or 100% likelihood that the site will be required to achieve conservation targets. In other words all sites are equally important in terms of their contribution to achieving conservation goals. Treating all sites as equal does not assist planners in making decisions where trade-offs between biodiversity, social and economic demands need to be made. Therefore, a number of biodiversity representation, ecological persistence and landscape connectivity criteria were developed to help differentiate sites to be earmarked as CBA.

The following set of questions (Table 5.1) provide the basis for the steps taken and criteria used in the systematic biodiversity planning process.

**Table 5.1 Questions that drive the Systematic Biodiversity Planning Process**

Question	Systematic Biodiversity Planning Process: Steps taken
Where in the landscape does biodiversity occur?	Biodiversity information was collected from a number of sources. In addition, a number of specialists were engaged to conduct focussed surveys. The biodiversity information used is considered the best available science.
How much conservation/protection is required in order to ensure the persistence of that biodiversity?	South Africa, through a number of projects and initiatives, has an established set biodiversity conservation targets for ecosystems (e.g. vegetation types, rivers) that the protection of which will ensure the persistence of biodiversity and ecological processes. The targets set for the terrestrial ecosystems in the CoE is 24% of its extent.  Portions of these targets have been secured in the South African Protected Area (PA) network. However much of the target is still located outside of PAs and it is in this space that systematic biodiversity planning takes place.
Where are the best places to achieve the conservation/protection?	Firstly, the condition of the CoE was mapped in order to determine what areas were in a natural state and what condition they are in. In this step, as much mapping about the land cover that was available was integrated into a single consolidated land cover map.

Question	Systematic Biodiversity Planning Process: Steps taken
	<p>Secondly, a set of criteria were developed to prioritise important biodiversity and ecological process areas. Examples of criteria considered include:</p> <ul style="list-style-type: none"> <li>• Previous CoE CBAs;</li> <li>• Condition of site;</li> <li>• Collated biodiversity features;</li> <li>• Special habitats such as ridges;</li> <li>• Wetland and species buffers;</li> <li>• Critical corridors for landscape connectivity;</li> <li>• Degree of connectivity; and</li> <li>• Size of area.</li> </ul> <p>(See Table 5.2 for full description).</p> <p>Thirdly, an assessment of current and future land use pressure will be undertaken to determine where conflict may occur, and where possible, to avoid this conflict while still achieving biodiversity targets.</p>
How should the areas be managed?	A set of land use guidelines are developed based on the prevalent land uses in the CoE and the management objective of each CBA category.
How should this information be communicated and used?	Uptake and implementation of the CoE Bioregional Plan 2020 is crucial for the necessary conservation of the remaining biodiversity. The CBA maps and the associated land use guidelines have been developed to guide users.

In the section below, a brief description of the criteria that were used to develop the CBA map is provided. More detailed technical information regarding data inputs and analyses is available in the CoE Bioregional Plan (2020) Technical Report.

## 5.2 DESCRIPTION OF MAPPING CATEGORIES

The Terrestrial and Aquatic CBA layers have been merged into a single layer. The CBA maps categories include:

- Protected Areas;
- Conservation Areas;
- Critical Biodiversity Areas;
- Ecological Support Areas;
- Other Natural Areas; and
- No Natural Habitat remaining.

Further descriptions of each category are provided below:

### **Protected Areas**

Protected Areas are areas that have been formally declared or recognised in terms of NEMPAA. This refers to “State owned” reserves, which includes National PAs managed by SANParks, Provincial PAs managed by GDARD, municipal reserves, Private Nature Reserves, and Protected Environments. A number of municipal have not been formally proclaimed under any legislation, but are zoned accordingly in relevant Spatial Development Frameworks and are recognised as *de facto* Protected Areas.

Conservation Areas are defined as the proclaimed private nature reserves, which are modified by mining activities (See Chapter 4, Table 4.1). These areas will be shown as an outline in the CBA map, but will display the underlying CBA categories.

### **Critical Biodiversity Areas 1 (CBAs)**

CBA areas are selected to meet biodiversity targets for species, ecosystems and ecological processes. These include:

- Critically Endangered and Endangered Ecosystems;
- Critical linkage points in the corridor network; and
- All areas required to meet biodiversity targets and to ensure future persistence of species, ecosystems and special habitats.

CBAs are areas of high biodiversity value and should therefore be maintained in a natural state, with no further loss of habitat.

### **Critical Biodiversity Areas 2 (CBAs)**

As above, but sites have been historically cultivated.

### **Ecological Support Areas (ESAs)**

ESAs are areas NOT essential for meeting biodiversity targets, but are **essential** for ensuring landscape connectivity between CBAs, strengthening climate change resilience, and proper function of ecosystem infrastructure for delivery of ecosystem services. ESAs may include riparian areas, powerline corridors, ridges, etc. In the urban fabric of the CoE, creative ways of mapping and maintaining these corridors need to be explored.

ESAs need to be maintained in a semi-natural, if not natural, state.

### **Other Natural Areas (ONAs)**

ONAs are areas in a natural or near natural state that have not been identified as priority areas in the current plan. ONAs still support biodiversity and deliver ecosystem services.

### **No Natural habitat Remaining (NNR)**

NNR areas that are heavily or permanently modified and are no longer considered natural. Although some biodiversity and ecological function may be retained, irreversible impacts on biodiversity mean that they cannot contribute towards targets.

**Table 5.2 Criteria that were used to develop the CBA map**

Map Category	Criteria headings
<b>PROTECTED AREAS</b>	Protected Areas: As per GDARD PA database
<b>CONSERVATION AREAS</b>	Conservation Areas: Proclaimed Private Nature Reserves, which are modified. These areas are incorporated into the CBA-ESA map.
<b>CBA 1</b>	All sites that are still in a pristine natural state. I.e. no historical cultivation or disturbance.
	CBA sites from CoE Bioregional Plan 2015
	Wetlands with: high biodiversity value, high EIS, WET-Health PES A/B ecological category as well as systems linked to these, priority ecological corridors, in WET-health PES A/B/C ecological category
	Important Biodiversity areas as determined by collated biodiversity data
<b>CBA 2</b>	All sites that have been selected as CBA areas, but which have been historically cultivated.
	All wetland sites identified as priority intervention areas for maintaining and/or enhancing water quality and flood attenuation functions.
<b>ESA 1</b>	Biodiversity Framework for CoE and surrounding municipalities
	Ecological corridors for connectivity in the CoE All remaining wetland not classified as CBAs
<b>ESA 2</b>	All CBA 1, CBA 2 and ESA 1 sites which are no longer in a natural state.
<b>ONA</b>	Other Natural Area
<b>NNR</b>	No Natural Habitat Remaining.

### 5.3 CRITICAL BIODIVERSITY AREAS AND ECOLOGICAL SUPPORT AREAS

The development of the terrestrial and aquatic CBA map for the CoE Bioregional Plan 2020 is consistent with the Guidelines for Bioregional Plans (NEMBA, 2009) and the Technical Guidelines (SANBI, 2017).

The Terrestrial and Aquatic CBA map developed in the current assessment replaces, in their entirety, the maps developed in the CoE Bioregional Plan 2015. The extent of each CBA category is provided in Table 5.3.

**Table 5.3 The extent of Critical Biodiversity Area categories in the 2015 and 2020 CoE Bioregional Plan**

CBA Map category	Extent (ha) in CoE 2015	%	Extent (ha) in CoE 2020	%
Protected Areas	2,641	1%	2,641	1
Critical Biodiversity Area 1	33,303	17%	49,512	25%
Critical Biodiversity Area 2	2,566	1%	20,120	10%
Ecological Support Area 1	11,372	6%	1,897	1%
Ecological Support Area 2	23,427	12%	26,789	13.6%
Other Natural Areas	23,780	12%	10,584	5.4%
No Natural Habitat Remaining	100,442	51%	88,652	44%

Figure 5.1 and 5.2 below presents the Terrestrial and Aquatic CBA map for the CoE Bioregional Plan 2020.

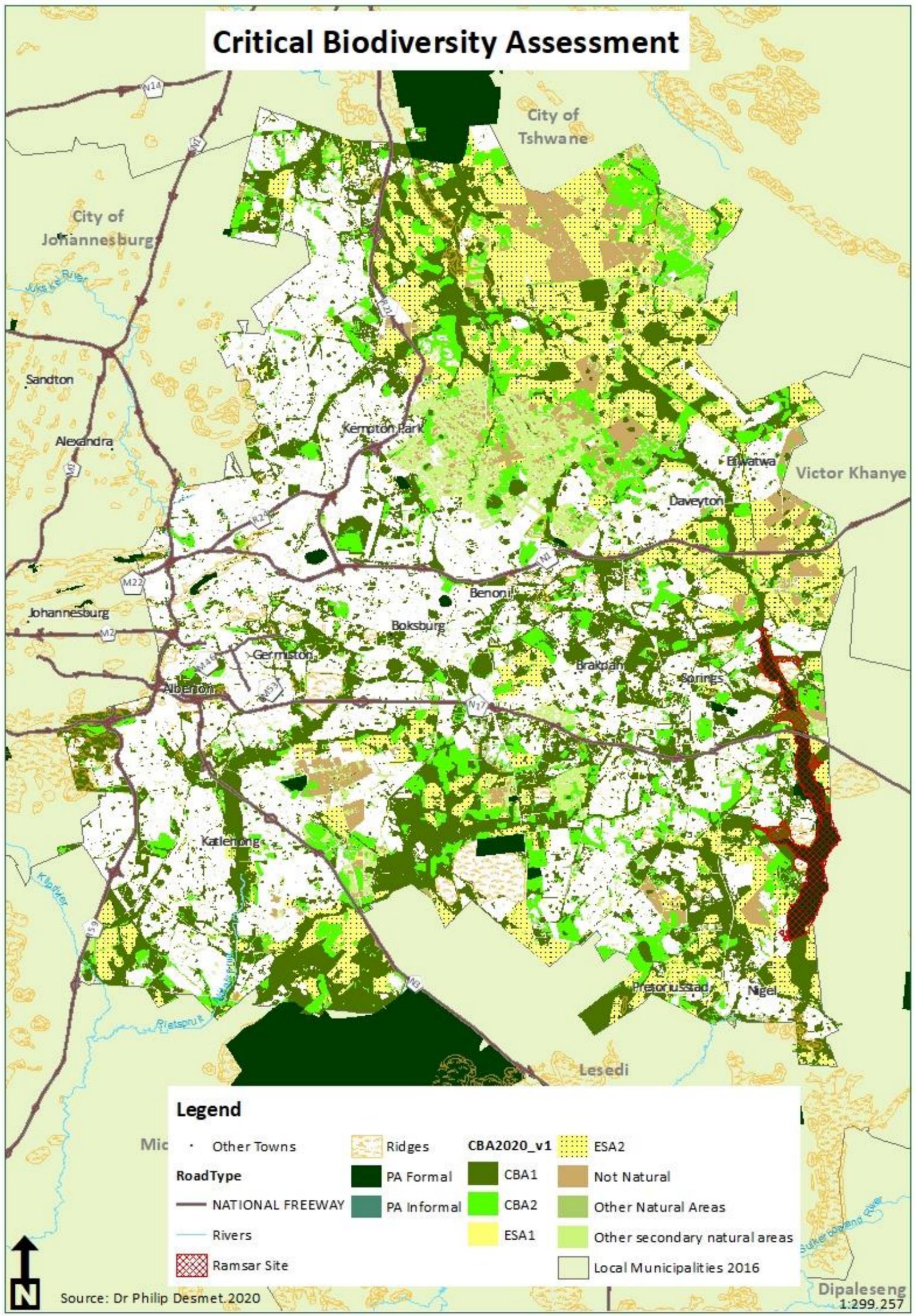


Figure 5.1 Terrestrial CBA map for the City of Ekurhuleni.

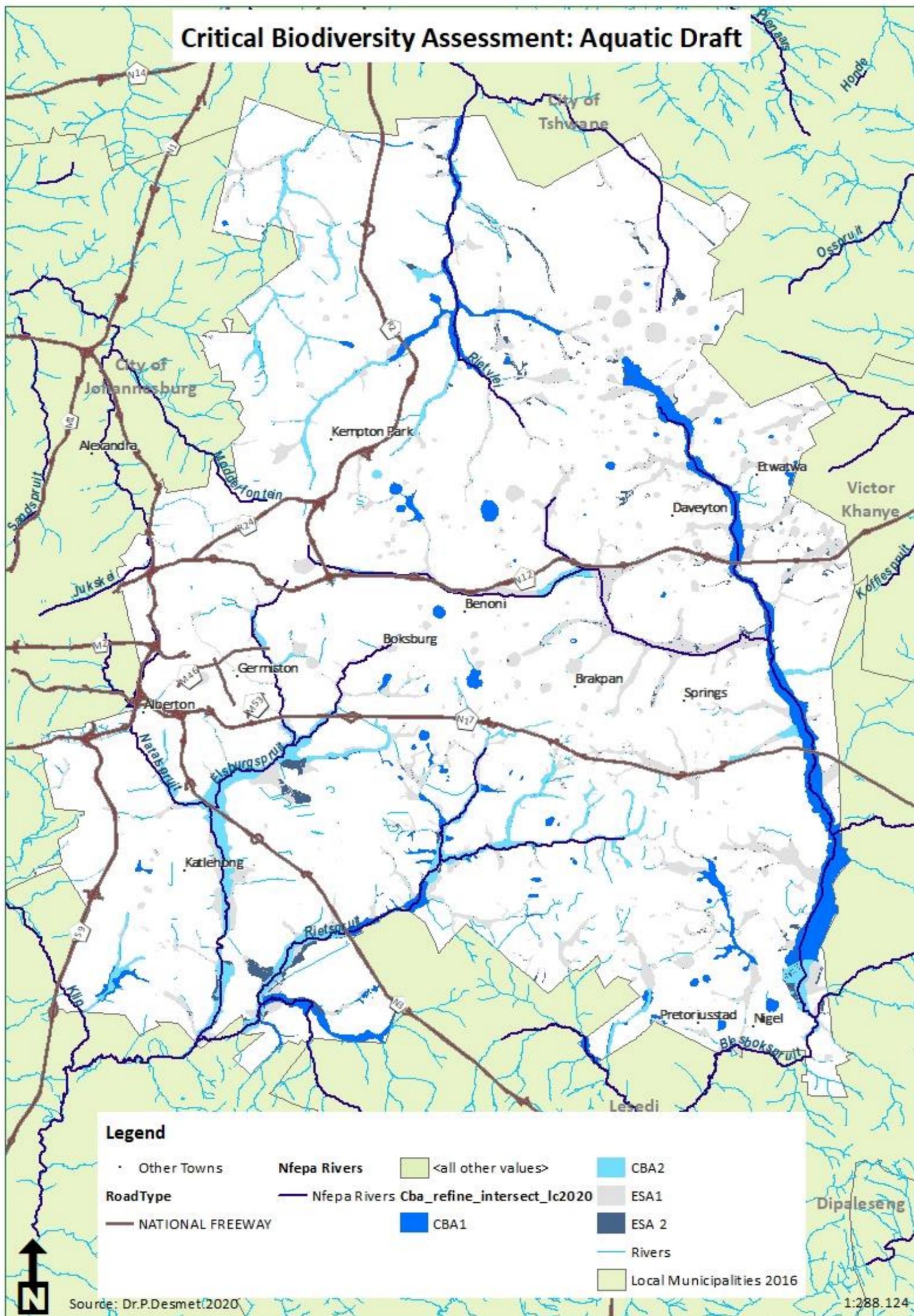


Figure 5.2 Aquatic CBA map for the City of Ekurhuleni.

## 6 LAND USE GUIDELINES FOR PLANNING AND DECISION-MAKING

The land use guidelines are developed to inform planning and development. Specifically, land use guidelines should inform the spatial planning of land use categories and subsequent zoning schemes of Municipal SDFs. In addition, authorities, decision-makers and Environmental Assessment Practitioners (EAPs) must consider these guidelines when assessing development applications.

The land use guidelines for the CBA map categories have there been informed by:

1. Land management objectives of CBA and ESA categories; and
2. Anticipated impacts associated with land use activities which can be linked directly to land use categories in the CoE Land Use Scheme.

### 6.1 DESIRED STATE AND MANAGEMENT OBJECTIVES

Once a CBA map is produced, the next question may be: so what does this mean and how it is implemented? The first step is to define and describe in detail what the desired state of each map category should be. The second step is to develop a set of management objectives required to achieve the desired state (Table 6.1).

**Table 6.1 Linking CBA categories to management objectives.**

CBA Map Category	Desired State	Land management objective
Protected Areas	Natural	Protected Areas are managed through Protected Area Management Plans.
Conservation areas	Natural/Rehabilitated	Conservation Areas are rehabilitated and integrated into the formal Protected Area network.
Critical Biodiversity Area 1	Natural	<p>Maintain in natural or near-natural state that secures the retention of biodiversity pattern and ecological processes:</p> <p>For terrestrial and aquatic areas classified as CBA1, the following applies:</p> <ul style="list-style-type: none"> <li>• Ecosystem and species are to remain intact and undisturbed.</li> <li>• Since these areas demonstrate high irreplaceability, if disturbed, biodiversity targets will not be met.</li> <li>• Critically Endangered and Endangered species and ecosystems: these biodiversity features are at, or beyond, their limits of acceptable change.</li> </ul> <p>If land use activities are unavoidable in these areas, the feasibility of a Biodiversity Offset must be assessed, and if deemed appropriate, it should be designed and implemented as a legally binding condition of development (See Section 7.3 for further recommendations on offsets).</p>

CBA Map Category	Desired State	Land management objective
Critical Biodiversity Area 2	Natural/Rehabilitated	<p>Maintain in natural or near-natural state that secures the retention of biodiversity pattern and ecological processes:</p> <p>For terrestrial areas classified as CBA2, the following applies:</p> <ul style="list-style-type: none"> <li>• Ecosystem and species are to remain intact and undisturbed.</li> <li>• These biodiversity features are at risk of reaching their limits of acceptable change.</li> </ul> <p>For aquatic areas classified as CBA2, the following applies:</p> <ul style="list-style-type: none"> <li>• Management must focus on maintaining and enhancing ecological function and limit impacts on ecological connectivity.</li> <li>• Sites should be prioritised for rehabilitation and protection to enhance ecological function.</li> </ul> <p>If land use activities are unavoidable in these areas the following guidelines shall apply:</p> <ul style="list-style-type: none"> <li>• For terrestrial areas: If site specific data confirms that biodiversity is significant, unique, or threatened, a Biodiversity Offset as per CBA 1 above, must be considered (See Section 7.3 for further recommendations on offsets).</li> <li>• For aquatic areas: A wetland offset is required to address any impacts on affected areas. Targets must be assessed based on a realistic rehabilitated state as opposed to present ecological state to ensure a net positive contribution from offset activities (See Section 7.3 for further recommendations on offsets).</li> </ul>
Ecological Support Area 1	Functional	<p>Maintain ecological function within the localised and broader landscape. A functional state in this context means that the area must be maintained in a semi-natural state such that ecological function and ecosystem services are maintained.</p> <p>For areas classified as ESA1, the following applies:</p> <ul style="list-style-type: none"> <li>• These areas are not required to meet biodiversity targets, but they perform essential roles in terms of landscape connectivity, ecosystem service delivery and climate change resilience.</li> <li>• These systems may vary in condition and maintaining function is the main objective, therefore: <ul style="list-style-type: none"> <li>○ Ecosystems still in natural, near natural state should be maintained as such;</li> </ul> </li> </ul>

CBA Map Category	Desired State	Land management objective
		<ul style="list-style-type: none"> <li>○ Ecosystems that are moderately disturbed/degraded should be restored/rehabilitated.</li> <li>● Where wetlands are impacted, a wetland offset will be required to address significant residual impacts. Targets should be assessed based on present ecological state to ensure a no-net-loss from development activities.</li> </ul>
Ecological Support Area 2	Functional	<p>Maintain current land use with no intensification.</p> <p>For areas classified as ESA2, the following considerations apply:</p> <ul style="list-style-type: none"> <li>● These areas have already been subjected to varying degrees of modification and are no longer considered natural.</li> <li>● These areas are not required to meet biodiversity targets, but they may still perform an <i>important</i> function with respect to connectivity, ecosystem service delivery and climate change resilience</li> <li>● Objective is to maintain remaining function, therefore: <ul style="list-style-type: none"> <li>○ Areas should not undergo any further deterioration in ecological function;</li> <li>○ Opportunities to change land use practices to improve ecological function (i.e. cultivation agriculture to livestock grazing agriculture) are desirable in ESA2 areas.</li> </ul> </li> </ul>
Other Natural Areas and No Natural Habitat Remaining	Production	No desired state or management objective is provided for ONA or NNR.

## 6.2 RECOMMENDED LAND USE GUIDELINES

Human development and land use activities exert impacts on the surrounding environment. Land use categories in terms of the CoE Land Use Scheme (CELUS, 2020) have been grouped according to typical impacts associated with them for the purposes of managing land use activities to achieve the management objectives for the CBA map. The assessment of land use recommendations with respect to the terrestrial and aquatic CBA/ESA categories (Table 12 and 13) is structured around the following recommendations for each land use group of acceptance for each land use type/purpose:

1. Yes (Y): This is an appropriate land use activity, it is unlikely to compromise biodiversity, the activity is in line with, and may contribute to, the management objective, the land use activity is compliant with the CoE Bioregional Plan.

2. Restricted (R): the activity may compromise the integrity of biodiversity or ecological infrastructure, it may not be in line with management objectives, it will require detailed specialist assessment, it will require restrictive conditions (e.g. reduced footprint, clustering, located only on previously cleared land, etc.), may require biodiversity offsets or set-asides
3. Not appropriate (N): this activity will result in the destruction/degradation of important biodiversity and/or ecological support areas, it is not in line with management objectives. Development activities proposed will require detailed specialist assessment\* in the appropriate field of study in order to establish compelling reasons why this activity should be authorised for development. Severe restrictive conditions will be applied and a biodiversity offset plan must be investigated, developed and implemented as a legal binding condition of authorisation (Draft National Biodiversity Offset Policy (2017) with site specific input from experts).
4. Management required (M): it is possible that selected land use activities may not result in further degradation or disruption of biodiversity or ecological infrastructure or processes, provided that these activities are formally managed and monitored throughout the life of the activity. This will require management oversight and will require the development and implementation of a management plan for monitoring and reporting purposes.

\* The specialist selected will depend on the biodiversity features present within the area in question. This will be determined by querying the spatial layers of the CBA map, where attribute information will embed information pertaining to CBA-ESA criteria that were met for the site. For example, an area may be classified as a CBA due to:

- The presence of a threatened vegetation type. In this case, a suitably qualified vegetation specialist should be appointed to undertake a detailed survey of the vegetation.
- The presence of a threatened species (e.g. bird/plant/reptile/amphibian). A taxonomic specialist should be appointed to assess the presence of threatened species and the surrounding habitat to support these species.
- The need of an area to meet South African biodiversity targets. In this case, a biodiversity planner should be appointed to consider the biodiversity present in the project area and provide an opinion on the alignment of the development proposal with the objectives of the CoE Bioregional Plan 2020.
- The presence of priority koppies, river and/or wetland features. Similarly, suitably qualified specialists should be appointed to assist with assessments of these ecosystems.

Table 6.2 summarises the land use groups present in the CoE. Each land use group is described in terms of the CoE land use scheme and typical activities associated with it.

**Table 6.2 Matrix of recommended land use and water use guidelines for the CoE**

CoE land use definition or zoning scheme	Corresponding activities permissible in the City of Ekurhuleni Land use scheme	Bioregional Plan LU category	CBA 1	CBA 2	ESA 1	ESA 2
<b>Conservation</b>	Land and buildings used for the protection of biological diversity such as but not limited to conservancies, protected environments, nature reserves, national parks and for the purposes of the CoE Bioregional Plan this includes public open spaces zoned as bird sanctuaries and wetland reserves.	Conservation areas	Y	Y	Y	N
Residential 1-4	All residential zoning categories	Urban development: built up	N	N	N	R
Business 1-3	All business zoning categories					
Industrial 1&2	All industrial zoning categories					
Public garage	Petrol and motor dealers/workshops					
Community Facility	Education, social halls, libraries, sports and recreation, places of worship					
Social Services	Hospitals, clinics, police stations, fire stations, municipal-government offices, old age homes, museums, post offices					
Public Services	Markets, abattoirs, water works, mortuaries, substations, sewage treatment, waste landfill sites					
Parking	Parking bays, garages					
Recreation	Resorts, conference centres, guesthouses, hotels, play parks, social halls, sports and recreational clubs. For purposes of the CoE Bioregional Plan 2020, this activity excludes conservation areas and open parks.					
Transportation	Railway, airports, transport centres, taxi ranks, parking bays/garages					
Infrastructure: powerlines	None	Infrastructure: powerlines	R	R	Y	Y
Public Services	Linear infrastructure: Water, storm water and sewage pipelines	Urban development: semi-natural/open space	N	R	R	Y
	Cemeteries, storm water retention/attenuation		N	N	R	Y
Roads	Streets, roads	Roads and Transportation	N	N	R	R



CoE land use definition or zoning scheme	Corresponding activities permissible in the City of Ekurhuleni Land use scheme	Bioregional Plan LU category	CBA 1	CBA 2	ESA 1	ESA 2
Mining	Land area which is used for operations and activities for the purposes of searching for and extracting any mineral on, in the earth, water or any residual deposit, as defined and regulated in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002). The CoE scheme includes brick-making into this zone.	Mining	N	N	N	N
Agriculture 1 and 2	Arable, meadow and/or pasture land and buildings used for bona fide farming activities, such as crop or grain farming, grazing, land used for bee-keeping, bird and animal breeding and keeping, livestock farming, dairy farming, game farming, aquaculture, mushroom production, plant nursery gardens, plantations, orchards, market gardens and such other ancillary uses and buildings, such as cultivation sheds and store rooms/sheds, farm worker accommodation, equestrian centres	Agriculture: intensive cultivation	N	N	N	Y
		Subsistence or small-scale agriculture	N	R	M	M
		Agriculture: grazing	M	M	Y	Y
Public and private open space	Land set aside or to be set aside for the use by a community as a recreation area. For the purposes of the CoE Bioregional Plan 2020, this only includes parks, natural gardens, storm water retention/attenuation, development exclusion areas (i.e. around landfill sites). See "Recreation" for developed open space.	Public and private open space	R	M	Y	Y
	Botanical and zoological gardens includes: land and buildings used for the housing, care and exhibition of animals, birds, reptiles and insects for educational and research purposes or for the cultivation with exotic and indigenous plants, which allows restricted access to the public and may include a Restaurant.	Botanical and zoological gardens	R	R	Y	Y

# 7 SPECIFIC RECOMMENDATIONS FOR PARTICULAR SITES OR ECOSYSTEMS INDICATED ON THE MAP

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## 7.1 WETLAND MANAGEMENT AND REHABILITATION

Wetlands are the most threatened and least protected ecosystems in South Africa (SANBI, 2019). Whilst this highlights the need for conservation action, they are also recognised as “high-value” ecosystem types which, whilst only making up a small part of our landscape, provide disproportionate positive benefits to people (SANBI, 2019). In urban settings, in particular, the value of healthy and functioning ecosystems in reducing the impacts of climate change is increasingly being recognized. Additionally, the amenity and cultural benefits provided by natural environments are also starting to be recognized as important in enhancing the liveability of urban environments; especially since the world is becoming more urban and will continue to do so. A preliminary economic valuation of the ecosystems provided by intact and functional ecosystems in South Africa (Turpie *et al.*, 2017) concluded that:

“...maintaining untransformed natural systems generates substantial value equivalent to at least 7% of the country’s GDP (R4 014 billion in 2015), either in the form of inputs to productive activities and welfare or the losses avoided by retaining these systems. This is more than three times the value of the agricultural, forestry and fishing sector (2.2%). This is a conservative and incomplete estimate.”

Wetland ecosystems, in particular, are increasingly being recognized as highly valuable natural assets that provide a wide range of ecosystem services to society in support of a number of important agendas such as: (i) biodiversity maintenance, (ii) water resource management, (iii) disaster management and climate resilience/adaptation, and (iv) direct use goods and cultural/amenity services to people. In urban contexts, in particular, their ability to filter and improve the quality of water and reduce the intensity of floods are considered valuable services in supporting biodiversity, water resources, public health and disaster risk management municipal objectives. In response, a broad suite of guidelines have been developed to guide and inform wetland management, with the latest guideline focussing specifically on providing guidance to municipal planning and decision making (ICLEI, 2018).

Whilst all wetlands should be regarded as important features, they differ in terms of their level of importance as reflected in the CBA map. The wetlands of the CoE have therefore been assessed in terms of a modelled Present Ecological State and CBA1 wetlands have been prioritised based on specialist criteria. CBA 2 wetlands, whilst degraded to some degree, have been earmarked as priorities for rehabilitation due to their potential to support of disaster risk management and climate adaptation/mitigation. These wetlands are also deemed critical in supporting effective water resource management by trapping sediments, improving water quality and regulating flows from highly urbanised catchment areas. Although this diverges from the typical focus on conservation and protection of biodiversity, these wetlands play such a pivotal role in terms of supporting downstream biodiversity and water quality as well as contributing towards climate change resilience that restoration of these systems as mapped and described in this plan, must feature as a priority for further action.

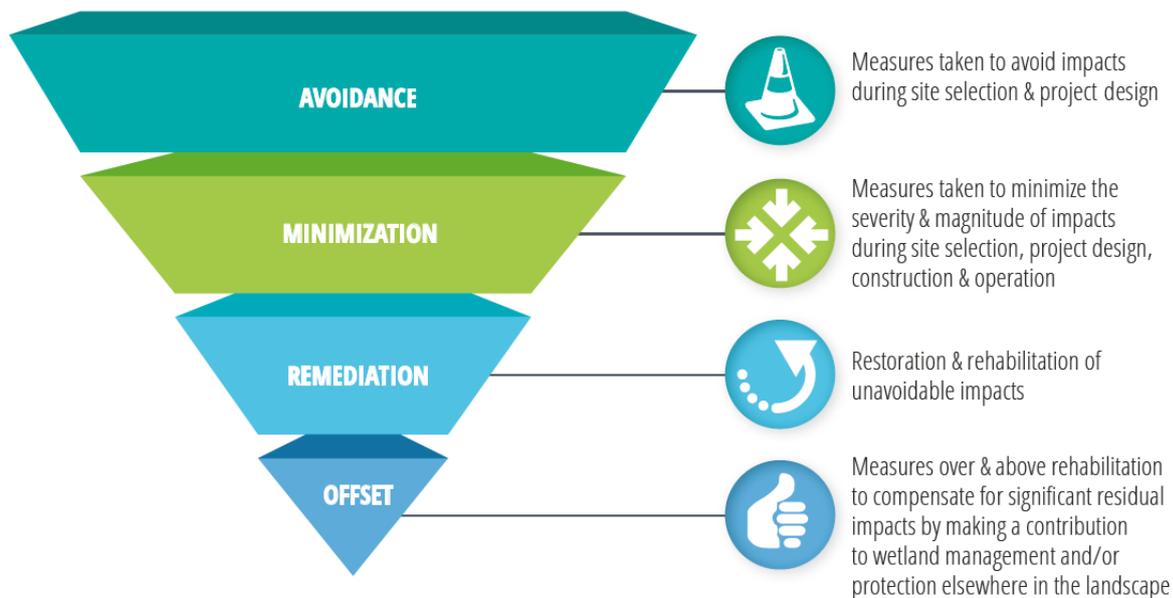
## 7.2 SITES CRITICAL FOR LANDSCAPE CONNECTIVITY

Given the demand for open land within this rapidly developing urban context, unique multiple-use approaches to land utilisation need to be developed and implemented that achieve both ecological and social-economic objectives. This is particularly relevant in modified landscapes earmarked as ecological linkages where maintaining current land use is vital for maintaining landscape connectivity that would otherwise be lost if the site was further developed. For this reason, ESA 2 areas that lend themselves to restricted future development may be elevated in importance in terms of their landscape connectivity value. Similarly, specific services, such as cemeteries and powerlines may be appropriate in ESA areas. Subsistence or small-scale agriculture (grazing and cultivation) represents opportunities to maintain ecological corridors, whilst maintaining livelihoods and food security in these communities. The “connectivity” data field in the CBA map indicates how important sites are for maintaining ecological connectivity. Whilst some sites may have apparent low biodiversity value in terms of species or habitats present, the fact that they may function as critical ecological network linkages elevates the importance of maintaining the current land use and “ecological permeability” of the site.

## 7.3 BIODIVERSITY OFFSETS

South Africa’s National development Plan (NDP 2030) recognises that market and policy failures have resulted in the global economy entering a period of ‘ecological deficit’ as natural capital is being degraded, destroyed, or depleted faster than it can be replenished. This is particularly evident in urban areas such as Ekurhuleni which is characterised by rapid urban expansion. It is important to note however that the NDP 2030 goes beyond the potentially limiting utilitarian concept of natural capital by requiring that we protect the natural environment in all respects, leaving subsequent generations with at least an endowment of at least equal value. In light of this situation, there is a growing recognition that biodiversity offsets provides one means of slowing and even reversing ecological deficit by counterbalancing degradation, destruction, and depletion through protection, rehabilitation, restoration and replenishment (DEA, 2018).

The environmental impact mitigation hierarchy is the principal tool used to inform effective environmental management for sustainable development (Figure 7.1). In instances where development still results in significant impacts to biodiversity, the concept of Biodiversity Offsets must be considered as a means to offset the losses, particularly where impacts affect CBA 1&2 areas. A provisional framework for considering terrestrial offsets is provided in the Draft National Biodiversity Offset Policy (2018) whilst guidelines for wetland offsets has been published by the Water Research Commission (SANBI & DWS, 2016). Best available science should therefore be applied to inform offset planning in CoE until such time as firm regional guidance has been provided.



**Figure 7.1. Diagram illustrating the mitigation hierarchy (ICLEI, 2018).**

Whilst it is acknowledged that policy and guidelines to inform biodiversity offsets are still under development, the situation in the CoE is such that urban development is occurring at a rapid rate. The unchecked loss of ecosystems within the CoE increases the threat status of these ecosystems at a national level and thus transfers the burden of achieving national targets to neighbouring municipalities and Province. This in turn places limitations on development in these municipalities.

From a biodiversity perspective, ecosystem and biodiversity loss within the CoE is close to or at thresholds of acceptable loss. Further losses in the CoE could only be balanced (and possibly prevented) by implementing offsets which involve restoring degraded wetlands and securing remaining representative ecosystems for inclusion in the National and Provincial Protected Areas network. It is important to note however that there are real constraints to developments in the CoE and there are instances where developments should not be considered and the in-situ conservation of a biodiversity feature is necessary. Intact remnants of Critically Endangered Egoli granite Grassland and Endangered Tsakane Clay Grassland are particularly important in this respect and should not be developed even if an offset is proposed.

Biodiversity offsets are typically identified where threatened species and ecosystems will be affected, but in terms of this Bioregional Plan, important ecological corridors which represent critical pinch-points for achieving connectivity in the landscape may be considered as important sites, the loss of which would also need to be compensated for through offset activities. This includes the funding for the acquisition of the offset and the long-term ecological maintenance thereof. It must be noted that options for identifying and securing offsets within the CoE with respect to terrestrial ecosystems and habitat are limited. For this reason, sites beyond the CoE boundary will need to be considered. In the case of wetland ecosystems, there is a growing recognition that policy responses should be fit for purpose rather than simply adopting a one-size-fits-all approach. In instances where existing impacts have already degraded wetland functions to a point where they are not able to address water quality concerns and water quality poses a risk to downstream users, a more pro-active policy approach is required. Such an approach has been adopted by the eThekweni Metro and is used to enhance the functioning of wetlands in the landscape (Macfarlane, 2016). A similar

approach is advocated in the CoE where CBA2 wetlands are recognised as offset receiving areas that require special attention. Where developments impact on ESA wetlands, a “no-net-loss” approach is advocated however a “net-gain” approach is advocated for impacts to CBA2 wetlands. To facilitate offset exchanges, a pro-active approach to offset planning is advocated whereby offset sites are rehabilitated in advance and mechanisms instituted to formalise trading rules through a wetland offset banking scheme.

## 7.4 GAUTENG PROTECTED AREAS EXPANSION STRATEGY

An important message of the National Spatial Biodiversity Assessment (2005) was that the current network of Protected Areas in the South Africa is not adequate for the objective of securing the protection of representative biodiversity, ecosystems and ecological processes. In order to address this issue, the National Protected Areas Expansion Strategy was initiated, which identified important priority areas at a National scale.

At the Provincial level, the implementation of the strategy required finer-scale mapping. In 2013, the Gauteng Protected Areas Expansion Strategy (GPAES) was developed in order to provide a road-map for the expansion of Protected Areas in the Province over a 20-year planning period (the strategy was approved in 2018). Sites for Protected Area expansion, primarily through the implementation of the Stewardship Programme, have been identified in the CoE. The GPAES sites in the CoE expand from existing Protected Areas and identify areas which contain important wetlands and threatened ecosystems. PAES sites have been earmarked for future conservation, therefore the modification or development of these sites is undesirable. Although PAES sites are not publically available (due to data sensitivity), enquiries may be submitted to GDARD Scientific Services.

## 8 COMPETING LAND USES AND FUTURE THREATS TO BIODIVERSITY IN CoE

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### 8.1 URBAN EXPANSION

Urban expansion is occurring at a rapid rate. When comparing the land cover generated for this revision with the land cover derived in 2011 for the Gauteng C-Plan 3.3, approximately 35,000ha of natural land in the CoE has been developed. This which equates to roughly 4000h per year. At this rate, planning for biodiversity in the landscape needs to focus on maintaining functional ecological infrastructure for the continued delivery of much needed ecosystem services. Although the CBAs have been effective in terms of influencing development into non-CBA areas, the socio-economic-political objectives will continue to apply pressure on the remaining biodiversity and ecosystems.

It is hoped that the level of land cover accuracy achieved in this Bioregional Plan will provide a stronger case conserving CBA 1 area.

An assessment of the CoE SDF this Draft CBA map indicates that there are still significant conflicts with respect to land use objectives between the plans, especially in Ecological Support Areas. A detailed assessment of where the CBA map may accommodate changes, with respect to the CoE SDF, will be undertaken. Where the CBA map is non-negotiable, development applications within CBAs will have to be assessed on a case-by-case basis, and which may attract the need to design and implementation of a Biodiversity Offset.

### 8.2 CLIMATE CHANGE

The integration of climate change mitigation and adaptation has become central to all sectoral planning. Climate change manifestations will effect biodiversity and ecological processes at the level of individuals, populations, communities, ecosystems and biomes through extinction events, loss of vulnerable and fragile ecosystem and changes in distribution ranges. The loss or change of biodiversity, combined with the disruptive effect of changes in temperature and rainfall will affect the level of integrity of ecosystems which will in turn determine the ability of ecological infrastructure to deliver ecological and social services. Also, pressures currently being exerted on the biodiversity and ecological processes are likely to intensify with the progression of climate change manifestations. Maintaining healthy, functioning ecosystems is an important adaptation strategy that enhances the ability of natural systems to build resilience against climate change impacts. Wetlands are a good example of ecological infrastructure which provides effective flood attenuation, which need to be prioritised. To increase natural resilience it is imperative to develop an integrated approach to biodiversity conservation, poverty alleviation and development.

The Ecological Support Area is designed to maximise connectivity of natural areas and to avoid further fragmentation of the landscape. Connectivity supports landscape-level ecological functioning as well as the ability of ecosystems and species to adapt to climate change. Areas important for ecological processes often play an important role in climate change adaptation, either by acting as climate change refugia or by providing corridors for the movement of species.

### 8.3 AGRICULTURE

Almost 18% of the CoE is currently involved with cultivation agriculture. The high land capability of the soils and the availability of water make these areas within the CoE an important resource for future food security and should therefore not be developed. This objective overlaps with biodiversity objectives to some degree and, in some cases, synergies may be achieved. However, should an area of high land capability overlap with an area of high biodiversity, which has not previously been cultivated, there will be a conflict in land use.

### 8.4 MINING

Current and decommissioned mines have formed and transformed the landscape throughout the CoE along the mining belt. Prospecting applications for future mining have been communicated, but the locality of these applications has not been sourced to date.

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## 9 ADDITIONAL MEASURES FOR EFFECTIVE MANAGEMENT OF BIODIVERSITY IN THE CoE

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### 9.1 DECISION-MAKING FOR SUSTAINABILITY IN THE CoE

In the face of expanding urban development, authorising agencies may be required to make decisions that compromise natural resources in favour of socio-economic benefits such as housing, poverty alleviation and job creation. An important goal is to achieve social, economic and environmental **sustainability**, which is core to the success of any initiative, plan, project or programme.

Decision-makers and planners need to be clear about what is meant by the phrase “sustainable” and must be able to justify their decisions based on sustainability criteria. The word “sustain” has two meanings that bear relevance. “Sustain” is to: strengthen, support, and assist. It also means to: endure or withstand. In all aspects of social, economic and environmental assessment and decision-making, the following questions should be asked:

1. Will the project/development strengthen, support and assist social needs?
2. Will the project/development strengthen, support and assist economic development?
3. Will the project/development strengthen, support and assist conservation goals and initiatives?

As importantly:

1. Is there a social **desire** and elements of social **investment** associated with the development?
2. Is there a genuine economic **desire** and are there sufficient supporting **economic resources**?
3. Are there opportunities in layout and design to support and sustain ecological function and have these been integrated into the development proposal?
4. Has provision been made for the renewable use and management of natural resources and is the land use compatible with principles of **maintaining biodiversity and ecological integrity** for delivery of ecosystem services, now and in the future?

It is also important to emphasise the potential for biodiversity assets and ecological infrastructure to provide the basis for development in the CoE and to contribute to the achievement of socio-economic goals. There is potential to support both biodiversity conservation and development, and striking this balance should form the framework for sustainable decision-making.

# 10 MONITORING AND REVISION

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The loss or modification of natural environments, due to ongoing changes in land use, as well as changes in distribution or knowledge of biodiversity, may impact on the identified network of Critical Biodiversity Areas (CBA) and Ecological Support Areas (ESA). This highlights the importance of monitoring, evaluation and revision of the CoE Bioregional Plan.

The CoE Bioregional Plan revised in 2020 will be gazetted in terms of the National Environmental Management Biodiversity Act. Provisions in the Act stipulate that plans be monitored and reviewed on at least a five-yearly cycle. It is therefore recommended that formal monitoring, reviewing and updating of the CoE Bioregional Plan takes place to ensure that the CBA map and associated land use recommendations remain current and useful to planning and decision-making.

The City of Ekurhuleni Metropolitan Municipality is the primary responsible agent for the implementation, monitoring and review of the CoE Bioregional Plan revised in 2020, while the Gauteng Department of Agriculture and Rural Development (GDARD) is responsible for the systematic biodiversity plan underpinning the bioregional plan.

## 10.1 REPORTING ON MONITORING INDICATORS

Monitoring the indicators of this Bioregional Plan should be undertaken when the plan is updated/revised. Some of these indicators must be adopted by the CoE for annual reporting purposes. This would improve the availability of this information for integration into the next revision and also track targets that have are discussed below.

The purpose of ongoing monitoring is to:

1. Evaluate the implementation of the CoE Bioregional Plan i.e. is the plan being used a key informant in SDFs and other planning initiatives? This is achieved by checking that the SDF includes and integrates the CBA map and land use recommendations and whether the SDF refers to the Bioregional Plan. A spatial conflict analysis which calculates the area of land uses mapped in the SDF which align or conflict with Bioregional Plan CBA and land use recommendations, should also be undertaken.
2. Evaluate the outcomes or impact of the CoE Bioregional Plan, i.e. by implementing the plan, are the biodiversity objectives, such as reduced loss of important species/habitat, being achieved? This could be achieved by the calculating the % of CBA area lost versus the % ESA and % Other Natural Area (ONA). One would expect minimal loss in CBAs and a greater losses in ONAs.

Additional recommended monitoring indicators include:

- Reference to the CoE Bioregional Plan in the CoE SDF and IDP reviews;
- Number and type of development applications for environmental authorisations that occur within CBAs and ESAs; and
- Changes in threat status or ecological status of ecosystems, including terrestrial and aquatic.

The CoE Bioregional Plan 2015 provided six indicator that should be reported on. Data on these indicators have been sources, were possible. These include:

Indicator	2015		2020		Target for 2025
	ha	%	ha	%	
Percentage and area (hectares) of CBAs and ESAs that are under some form of conservation management (including both formal protection, conservation stewardship agreements or municipal zoning);	None of the PAs were included in CBA network	0	0 – no additional PAs have been proclaimed in the CoE since 2011	0	50% of CBAs
Percentage and area (hectares) of CBAs and ESAs that are zoned for conservation in terms of municipal zoning);	None of the PAs were included in CBA network	0	0 – no additional PAs have been proclaimed in the CoE since 2011	0	20% of CBAs 20% of ESAs
Percentage and area (hectares) of successful development applications in CBAs and ESAs;	NA	NA	Unverified.		0%
Percentage and area (hectares) of appropriate biodiversity management interventions (alien clearing, wetland rehabilitation) has been undertaken in CBAs and ESAs;	-	-	1,466 ha	0.74%	1.5%
Percentage and area (hectares) of CBAs and ESAs that have been modified/lost;					
CBA 1	-	-	4067	12%	0%
CBA 2	-	-	811	32%	0%
ESA 1	-	-	2664	23%	0%
Percentage and area (hectares) of CBAs and ESAs that are in a natural or near-natural state;					
CBA 1	-	-	29271	88%	100%
CBA 2	-	-	1757	68%	100%
ESA 1	-	-	8721	77%	100%

Indicators which are monitored over time provides valuable information with respect to trends and data against which to assess the influence of the Bioregional Plan with respect to development. However, without attaching a target to these indicators, the reporting exercise is passive and reactive, and does not provide the necessary proactive planning tool that would be elicited when establishing a target associated with the indicator. A target expresses the desired state or outcome of the indicator.

Annual monitoring of selected indicators, such as conservation and protection in CBAs and ESAs, as well as development/loss of CBAs and ESAs, against a target will provide the necessary basis for proactive action and intervention.

## 10.2 REVISION OF THE COE BIOREGIONAL PLAN

The CoE Bioregional Plan 2020 should be reviewed and updated (where necessary) at least every five years by CoE/GDARD in accordance with the published guidelines for Bioregional Planning (NEMBA 291 of 2009). The review process should examine:

- Progress of implementation and impact of the CoE Bioregional Plan revised in 2020 (as measured by the implementation of monitoring indicators from Section 10.1 and 10.2 above).
- The need (or lack thereof) for an update of the underlying systematic biodiversity plan. Although the update of a systematic biodiversity plan is a data intensive and time consuming process, due to the rapidly changing landscape, it may be necessary.
- The need (or lack thereof) for an update of the other components of the Bioregional Plan (e.g. land use guidelines; monitoring indicators and processes).
- Notwithstanding the above, a preliminary assessment indicates that the following data improvements will be required as part of the update:
  - I. Detailed updated land cover mapping;
  - II. Protected area and conservation area map; and
  - III. Inventories of all taxon groups with emphasis on threatened mammals, amphibians, invertebrates and plants.

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## 11 GIS DATA USED

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Please refer to the Draft Technical Report circulated. This chapter will be populated once the all the spatial datasets collected and used, have been integrated.

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