uMgungundlovu District Municipality Environmental Management Framework: Terrestrial Biodiversity

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Table of Contents

List of Figures

List of Tables

1. INTRODUCTION

The National Environmental Management: Biodiversity Act (Act no 10 of 2004) defines biodiversity as "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." Thus the term biodiversity covers everything from the smallest organisms to biophysical landscapes, encompassing all species of plants and animals, ecosystems, landscapes, water and soil and the networks, links and ecological and evolutionary processes that makes life possible and sustainable. Maintaining intact and functioning biodiversity features is thus essential for the provision of ecosystem services upon which all life (including humans) depends, providing for the continued maintenance of clean water, clean air, food sources and a safe environment in which to live. Biodiversity provides the building blocks for the ecological and physical processes that regulate and control the environment, such as climate, streamflow, erosion and carbon storage (limiting global warming).

Biodiversity also provides an important basis for social and economic growth and development by providing the biophysical landscape and ecological processes essential for human socio-economic wellbeing, such as commercial and subsistence agriculture (food security), industrial materials, fishing, tourism, recreation and both commercial and indigenous medicinal use and development. Loss of biodiversity therefore places the economy and our quality of life at risk, particularly for those who are already living under adverse socio-economic conditions, and relying heavily on the environment for daily subsistence. The loss of biodiversity reduces the scope of possibilities for future generations to overcome socio-economic challenges.

GroundTruth was appointed by the Institute of Natural Resources to provide terrestrial biodiversity input into the development of the Environmental Management Framework (EMF) for the uMgungundlovu District Municipality (UMDM). GroundTruth collaborated with Ezemvelo KZN Wildlife in producing the Biodiversity Sector Plan (BSP) in 2010. This process was thus adopted into the UMDM EMF process, with updates made in terms of information that has become available in the last few years. The BSP was also incorporated directly into the SEA and SEMP that has since been developed for the District. Thus there was no need to incorporate information from this process.

2. BACKGROUND CONTEXT

2.1 Physical characterisation of the District

The uMgungundlovu District is characterised by a broad range of environmental conditions that is explained by the following primary drivers:

- ***Precipitation*** **–** The uMgungundlovu District falls predominantly within the summer rainfall area of South Africa – the typical rainfall season extends from October to April, with the highest rainfall occurring during December and January (Schulze *et. al.*, 2008). The Mean Annual Precipitation (MAP) averaged across the local municipalities varies from 785mm in Mkhambathini to 986mm in Impendle. The drier areas extend from Mooi River to Muden within the Mpofana Local Municipality, and from the Eston to Camperdown/Ashburton area predominantly within the Mkhambathini Local Municipality. .
- ***Topography*** **–** Elevations across the District range from 53m above sea level in the south east, to 3 320m at the Drakensberg escarpment along the western border. The highly variable topography creates a unique range of biophysical habitats and micro climatic conditions which support a diverse range of biodiversity. North facing slopes are generally warmer and drier, supporting habitat types such as grasslands. South facing slopes, escarpments and sheltered kloofs tend to be cooler and wetter, commonly providing conditions favourable for supporting indigenous forest.
- ***Geology*** **–** The District also contains a diverse range of geological and soil forms that are largely associated with the Drakensberg Group basalts, Stormberg Group sandstones, Beaufort Group mud and sandstones and the Ecca Group shale and sand stones (Irwin, 1992). The underlying geology gives rise to landforms (i.e. the surface of the landscape accounting for the topographical variations) which in turn define the geomorphology and various soil types.

The arrangement of various climatic and landscape factors provides the basis for a specific combination of biophysical characteristics that support various vegetation and habitats types. This mosaic of vegetation and habitat types in turn provides a broad range of opportunities for biota (i.e. fauna and flora or animals and plants), each with specific habitat requirements.

2.2 Biological characterisation of the District

2.2.1 Vegetation types

The uMgungundlovu District contains a number of different vegetation types as illustrated in Figure 2-1 below. These vegetation types are grouped into five biomes, namely, forest, grassland, coastal belt, savanna and azonal vegetation. The latter comprises vegetation that is specific to aquatic ecosystems. The biomes and vegetation types provide the basic template at a broad landscape level for defining the distribution and extent of species-specific habitats that potentially support rich and abundant biodiversity. Vegetation types that dominate the District include: Mooi River Highland Grassland (22%), Midlands Mistbelt Grassland (19%), Moist Coast Hinterland Grassland (9%), KwaZulu-Natal Sandstone Sourveld (9%) and Dry Coast Hinterland Grassland (8%).

Vegetation types that are associated with the grassland biome dominate the District, and originally made up approximately 74% of the area, followed by savanna vegetation types, with about 22%. The remaining 5% of the District is reserved for other biomes, namely forest, coastal belt, and azonal vegetation. The present situation is markedly different as a significant proportion (approximately 45%) of the UMDM has since become transformed. The transformation has been largely as a result of agriculture and forestry, which today cover around 21% and 16% of the UMDM respectively. Taking into consideration the degree of transformation that has taken place within the District, the extent of grassland and savanna is reduced to around 39% and 12% respectively. Land transformation has also caused habitats to become more fragmented resulting in reduced abilities for biota to move and disperse freely, and to connect with of populations. The remaining untransformed land (approximately 55%) is exposed to other pressures through land use management that cause a loss of ecosystem condition and resilience, for example over grazing and poor fire burning practices. Fortunately, a reasonable proportion of vegetation/habitats within the District are protected by a network of protected areas (*c.f.* Section 2.3.1).

Approximately 75% of the District is characterised by vegetation/ecosystems that are Threatened (i.e. they are either Critically Endangered, Endangered or Vulnerable). Of particular importance are KwaZulu-Natal Sandstone Sourveld (Critically Endangered), Midlands Mistbelt Grassland (Endangered), Moist Coast Hinterland Grassland (Endangered) and Mooi River Highland Grassland (Vulnerable). Each of these support important biodiversity, and continue to be threatened by land transformation and land use management. Mooi River Highland Grassland is most common to the UMDM with around 77% of the vegetation occurring within the district, and has relatively low levels of transformation (approximately 37%) with around 9% occurring within protected areas. KwaZulu-Natal Sandstone Sourveld is most at risk, and has experienced the greatest degree

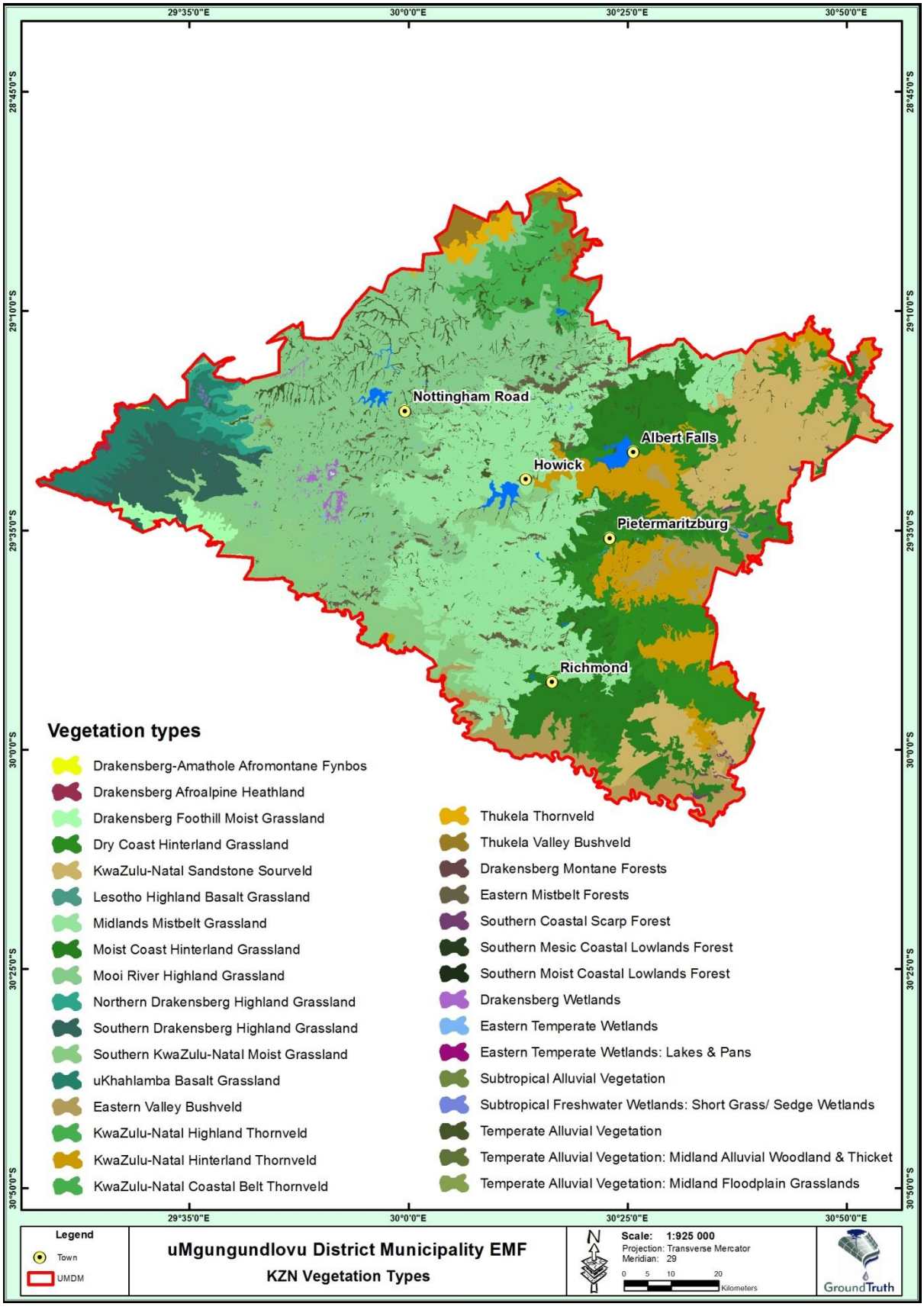

Figure 2-1 Vegetation types of the uMgungundlovu District as defined by Ezemvelo KZN Wildlife for KwaZulu-Natal (after Scott-Shaw and Escott, 2011)

of transformation (approximately 82%), with no areas conserved within the protected area network.

2.2.2 Occurrence of conservation important biota

The conservation status of fauna and flora is determined using categories[2] determined by conservation assessments as defined by the International Union for Conservation of Nature (IUCN, 2012). These assessments are designed to determine the relative risk of a particular species becoming extinct. Red Lists are produced as an outcome of the conservation assessments. The purpose of these lists are to catalogue and highlight species that are facing a higher risk of extinction. Species that are listed as Critically Endangered (CR), Endangered (EN) and Vulnerable (VU) collectively considered as "Threatened". The Red Lists also include species that cannot be evaluated because of insufficient information (i.e. Data Deficient) as well as taxa that are close to meeting the "Threatened" thresholds (i.e. Near Threatened). A significant number of Red Listed fauna and flora occur within the uMgungundlovu District as summarised as follows:

- ***Flora –*** The District is known to support a number of Red Listed plant species, including eight Critically Endangered, 12 Endangered, 36 Vulnerable, 20 Near Threatened and 12 Data Deficient species (Table 1-1). Majority of the Red Data plant species are small herbaceous pants that occur within grasslands, e.g. *Brachystelma* species.
- ***Fauna –*** There are about 80 conservation important species of fauna that occur, or that are expected to occur within the District based on their known distributions and habitat requirements (Table 1-1). An additional 14 species are considered rare and/or endemic to the region. In terms of "threatened" species, three Critically Endangered, nine Endangered and 30 Vulnerable.

[2] **IUCN Categories:**
Critically Endangered (CR) – the species is considered to be facing an extremely high risk of extinction in the wild, based on IUCN criteria.
Endangered (EN) – the species is considered to be facing a very high risk of extinction in the wild, based on IUCN criteria.
Vulnerable (VU) – the species is considered to be facing a high risk of extinction in the wild, based on IUCN criteria.
Near Threatened (NT) – when evaluated against IUCN criteria, does not qualify for a Threatened category but is close to qualifying for or is likely to qualify in one of those categories in the near future.
Data Deficient (DD) – there is inadequate information regarding the species' population size, distribution or threats for an assessment to be made.

A detailed list of Red Data plant species is provided in Appendix 1 of the Biodiversity Sector Plan produced for the District.

Table 1-1 Summarised conservation status of fauna and flora for the uMgungundlovu District

Group	Conservation status					Total
	CR	EN	VU	NT	DD	
Flora						
Trees	1	1	4	5		**11**
Shrubs	3	2	1	2	1	**9**
Climbers		1	3			**4**
Herbs	4	8	26	13	11	**62**
Graminoids			2			**2**
Sub total	**8**	**12**	**36**	**20**	**12**	**88**
Fauna						
Amphibians		2	2	1		**5**
Reptiles			4	4	1	**9**
Birds	3	2	17	18		**40**
Mammals		4	7	9	3	**23**
Invertebrates		1				**1**
Sub total	**3**	**9**	**30**	**32**	**4**	**78**

A select few of the Red Listed species can be classified as flagship species for the District, i.e. species that are iconic within the environment, and chosen because of their vulnerability, attractiveness and/or distinctiveness in order to attract support and acknowledgment from societies. These include the following biota:

- ***Plant –*** Hilton Daisy (*Gerbera aurantiaca*)
- ***Mammal –*** Oribi (*Ourebia ourebi*) and Spotted-necked Otter (*Lutra macullicollis*)
- ***Bird –*** Wattled Crane (*Bugeranus carunculatus*), Cape Parrot (*Poicephalus robustus*) and Blue Swallow (*Hirundo atrocaerulea*)
- ***Reptile –*** Bourquin's Dwarf Burrowing Skink (*Scelotes bourquini*)
- ***Amphibian –*** long-toed Tree Frog (*Leptopelis xenodactylus*)
- ***Invertebrate –*** Karkloof Blue butterfly (*Orachrysops ariadne*)

2.3 Areas of conservation importance

2.3.1 Formally protected areas

Protected areas are areas of land that protected by law under the National Environmental Management: Protected Areas Act (Act 57 of 2003), and as a result these areas are managed for the conservation of biodiversity. The protected areas include several categories, namely:

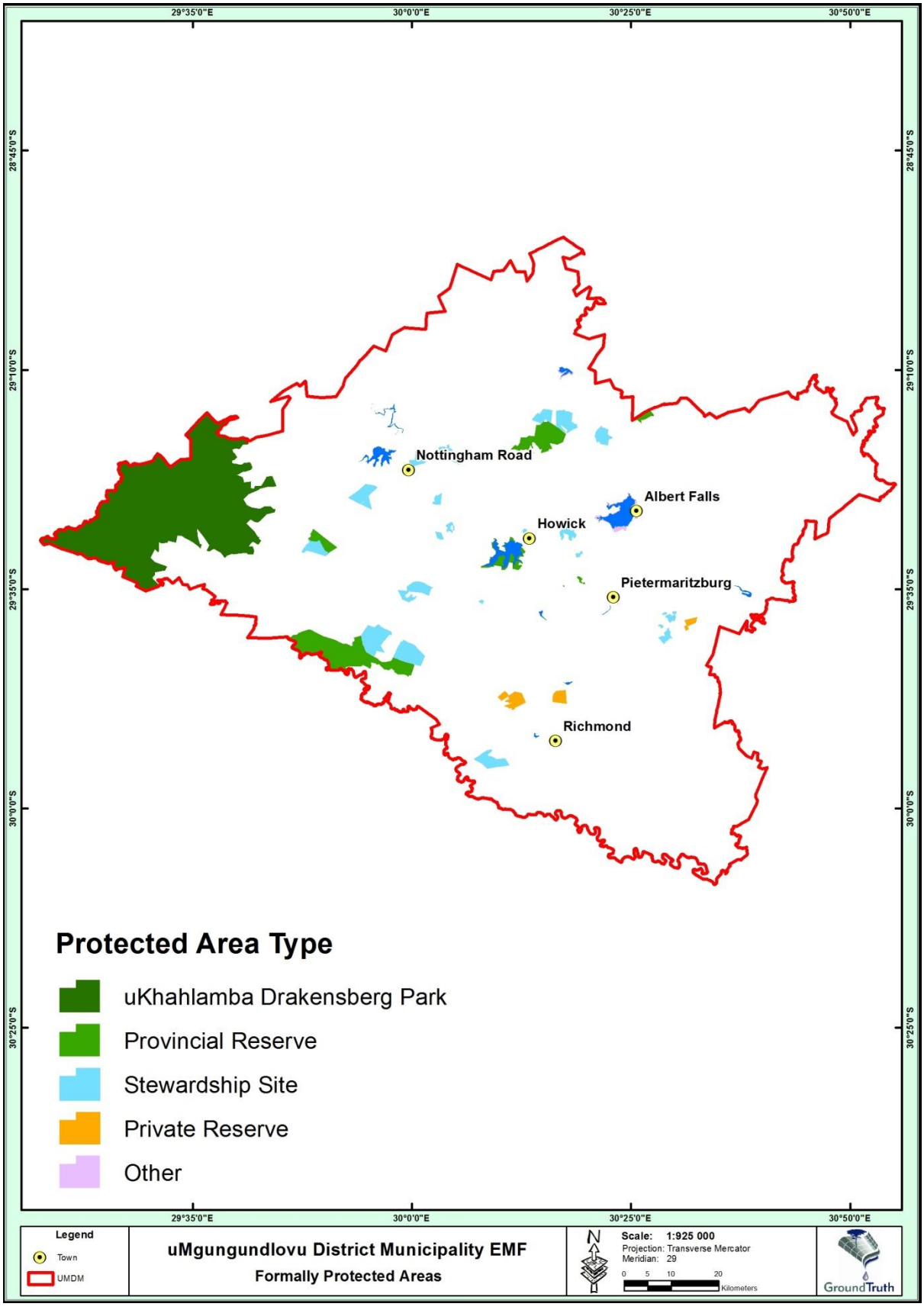

Figure 2-2 Protected areas and other conservation areas within the uMgungundlovu District (after EKZNW, 2010)

special nature reserves, nature reserves and protected environments; world heritage sites; specially protected forest areas, forest nature reserves and forest wilderness areas declared in terms of the National Forests Act (Act 84 of 1998); and mountain catchment areas declared in terms of the Mountain Catchment Areas Act (Act 63 of 1970). South Africa's protected area network currently falls far short of sustaining biodiversity and ecological processes (Government of South Africa, 2010). This is largely due to the non-uniform distribution of protected areas across the country resulting in large gaps in the protected areas network.

The uMgungundlovu District contains a number of "formally" protected areas (Figure 1-2). Most notable is the Ukhahlamba Drakensberg Park World Heritage Site (UDPWHS), an area with international recognition supporting important biodiversity and ecosystems assets. Through this recognition, the UDPWHS has become listed as a Ramsar Site, thereby supporting wetlands of international importance.

2.3.2 Conservation planning and target setting areas

The two primary categories are used in the biodiversity mapping, and which are the most critical for biodiversity management. These are:

- ***Critical Biodiversity Areas (CBAs) –*** CBAs include all areas that are critical for meeting biodiversity targets and thresholds in the Province, and which are required to ensure the persistence of viable populations of species, as well as the functionality of ecosystems. CBAs are split into two levels, namely Irreplaceable CBAs and Optimal CBAs. CBAs are derived using provincial–scale conservation planning processes (i.e. the irreplaceable and optimal categories from the 2010 Minset). Other datasets included in the conservation planning process included Critically Endangered and Endangered ecosystems, and critical linkages from the landscape corridor dataset. Together with protected areas CBAs form core areas for biodiversity conservation.
- ***Ecological Support Areas (ESAs) –*** ESAs include areas that support and sustain the ecological functioning of the core biodiversity areas (i.e. protected areas and CBAs) to ensure the persistence and maintenance of biodiversity patterns and ecological processes within the core areas, as well as allowing for the maintenance of Ecological Infrastructure (EI). ESAs include ecological corridors, species-specific areas, and protected area buffers such as the Trail Zone that has been specifically defined for the uKhahlamba Drakensberg Park World Heritage Site.

Together CBAs and ESAs form a network of biodiversity features as illustrated in Figure 2-3, which are essential for maintaining the wellbeing of biodiversity within the District. Land use activities within these areas therefore need to be carefully regulated and managed.

2.3.3 Other biodiversity zones

The two primary categories are used in the biodiversity mapping, and which are the most critical for biodiversity management. These are:

- ***Agro-Biodiversity Zones –*** Areas that are important for both sustainable agriculture and biodiversity conservation due to presence of land of 'moderate' to 'high' agricultural potential and high biodiversity value are referred to as Agro-Biodiversity Zones. Agro-Biodiversity Zones have recently been mapped by Ezemvelo KZN Wildlife. The mapping process purposefully avoided transformed modified land (e.g. cultivation, plantations, etc.) with a selection of land that is good condition but which is not suitable for cultivation (i.e. steep slopes, shallow/rocky soils, limited water availability, etc.). The mapped areas are therefore largely suited for extensive grazing with a limited amount of resource utilisation. Agro-Biodiversity Zones have potential to maintain biodiversity features and patterns in the landscape, and should preferably discourage large-scale and intensive land use activities.
- ***Environmental Management Zones –*** Areas that have a 'low' agricultural potential that are also support important biodiversity patterns and processes are referred to as Environmental Management Zones. These areas form environmental corridors and ecological links while promoting sustainable land management for biodiversity and ecosystem goods and services.

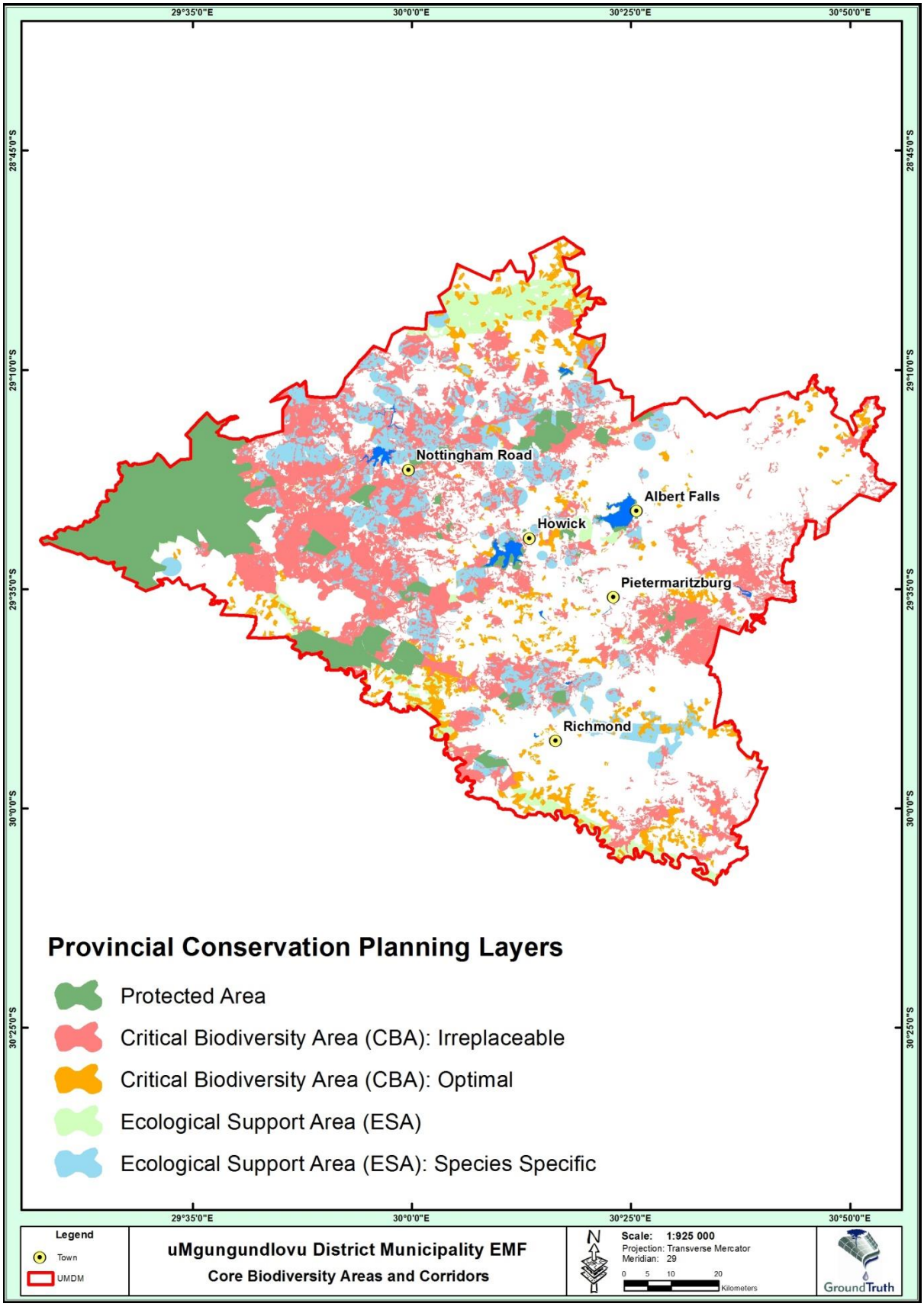

Figure 2-3 Important biodiversity areas based on provincial conservation planning conducted by Ezemvelo KZN Wildlife

3. INPUT INTO THE uMGUNGUNDLOVU DISTRICT EMF

3.1 Approach for mapping and spatial integration

Mapping the biodiversity within the uMgungundlovu District Municipality was achieved through a process of integrating spatial datasets in order to define areas of varying importance from a biodiversity perspective. This process adopted a hierarchical approach of characterising and mapping areas based on importance and/or sensitivity to land use development. A key component in the mapping procedure was the use of specific criteria for biodiversity mapping, defined in an objective manner where provincial biodiversity conservation targets are supportive, but which include additional scope for enhancing biodiversity targets at a district municipal scale. The following spatial datasets were incorporated into the biodiversity layer for the EMF:

- ***Formally protected areas*** **–** the contribution to meeting biodiversity conservation targets is automatically included within the network of areas, and national and provincial legislation enforces that these areas are managed sustainably. Protected areas form the highest level of constraint (i.e. very high sensitivity) for development by the virtue that any development needs to designed for, and complementary to, the conservation of biodiversity (e.g. ecotourism facilities). The spatial layer defining protected areas was built using several datasets as presented in Table 3-2, including private nature reserves, stewardship sites, provincial reserves and national parks.
- ***Critical Biodiversity Areas (CBAs)*** **–** as a direct outcome of provincial systematic conservation planning where the conservation targets for one or more biodiversity feature (e.g. species, ecosystems, etc.) occurring within an area can be met. These areas are highly sensitive in that they are not formally protected, and any losses of land containing CBAs will have detrimental impacts on the biodiversity features therein.
- ***Agro-Biodiversity Zones*** **–** areas that are important for both biodiversity conservation and sustainable agriculture due to the presence of 'moderate' to 'high' agricultural potential land. These areas are generally not suitable for cultivation and are reserved principally for extensive grazing while maintaining habitats and corridors supporting biodiversity. Agro-biodiversity zones were lumped with CBAs in terms of sensitivity to land use development.
- ***Ecological Support Areas (CBAs) and Environmental Management Zones*** **–** include areas that are required to support and sustain the ecological functioning of CBAs. They are not necessarily pristine natural areas, but retain a certain level of ecological functionality. Essentially ESAs are corridors providing linkages

between protected areas and CBAs, as well as creating buffers around these core biodiversity areas.

- ***Other Natural Areas (ONAs) –*** Untransformed land that was not identified as a priority for biodiversity conservation based on the aforementioned categorise are referred to as other natural areas (ONAs). Although they have a lower level of importance/sensitivity, they continue to perform a range of biodiversity processes and ecological functions. They should be managed as far as possible especially when in a natural/near-natural condition. Furthermore ONAs should also be considered in accordance with other components of the UMDM EMF (e.g. water yield and water quality) in terms of maintained and/or enhanced ecological infrastructure in the District. Two sub-categories for ONAs was used to distinguish areas that are of higher biodiversity value due to the potential occurrence of Threatened vegetation as listed and categorised by SANBI and DAEA (2009).

Table 3-1 summarises the sensitivity categories defined for terrestrial biodiversity based on the aforementioned rationale. Figure 3-1 Combined map illustrating areas of sensitivity for biodiversity within the uMgungundlovu District Municipality

Table 3-2 provides a list of spatial layers used to build the biodiversity layer and to define the sensitivity categories. Figure 3-1 illustrates the spatial distribution and extent of the terrestrial biodiversity sensitivity zones as they are located within the district.

Table 3-1 Summarised conservation status of fauna and flora for the uMgungundlovu District

Sensitivity level	Terrestrial biodiversity features
Very High Sensitivity	Protected areas
Very High Sensitivity	Critical Biodiversity Areas (CBAs) and Agro-Biodiversity Zones
High Sensitivity	Ecological Support Areas (ESAs) and Environmental Management Zones.
Medium Sensitivity	Other Natural Areas (ONAs) that are Threatened (i.e. Critically Endangered, Endangered, Vulnerable)
Low Sensitivity	Other Natural Areas (ONAs)

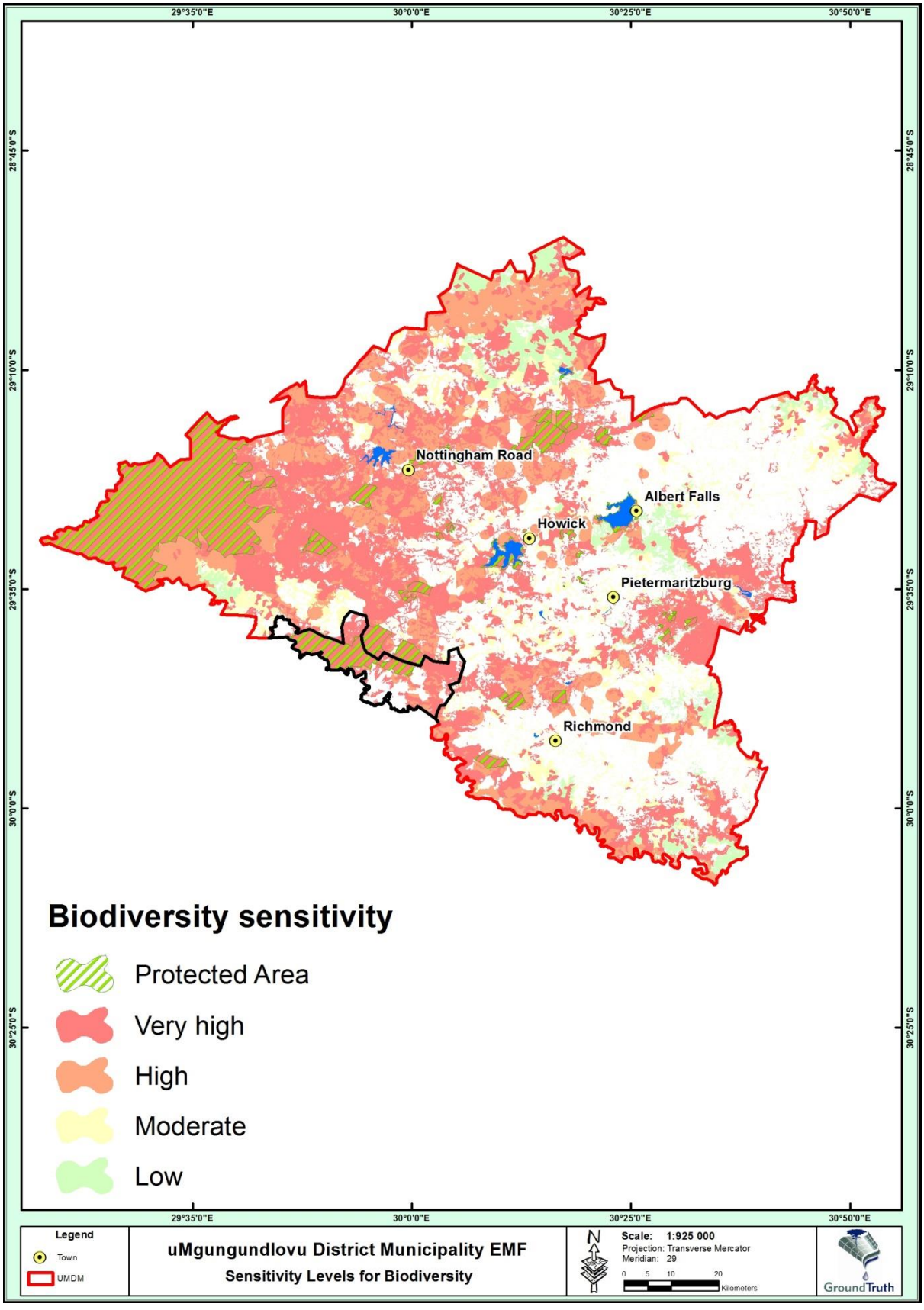

Figure 3-1 Combined map illustrating areas of sensitivity for biodiversity within the uMgungundlovu District Municipality

Table 3-2 List of spatial information provided by Ezemvelo KZN Wildlife (EKZNW) that was used in the mapping procedures for development of the uMgungundlovu District Municipality EMF

EMF layer	EKZNW dataset	Source file name
Protected area	Ezemvelo Protected Area Boundary (2015)	ekznw_pabnd_2015_wdd
Protected area	Ezemvelo Managed Protected Area Boundary – Areas recently acquired but not currently proclaimed (2016)	ekznw_pabnd_owned_not_yet_proclaimed_ 2016_wll
Protected area	KZN Proclaimed State Protected Areas not Managed by Ezemvelo KZN Wildlife (2016)	KZN_Other_ProclaimedPA_notEKZNW_wll_2016
Protected area	KZN Private Nature Reserve (2016)	KZN_Private_NR_wll_2016
Protected area	KZN Stewardship Sites (2016)	stewardship_wll_jan2016_draft
Critical Biodiversity Area	KZN CBA Irreplaceable version 26012016	KZN_CBA_Irreplaceable_wll_26012016
Critical Biodiversity Area	KZN CBA Optimal version 03032016	KZN_CBA_Optimal_wll_03032016
Ecological Support Area	KZN ESA version 01022016	KZN_ESA_wll_01022016
Ecological Support Area	KZN ESA Species Specific version 01022016	KZN_ESA_Species_wll_01022016

3.2 Constraints and limitations

The following constraints and limitations apply to the terrestrial biodiversity component of the UMDM EMF:

- ***Ground-truthing*** **–** Originally it was envisaged that areas would be ground-truthed to verify and validate the biodiversity mapping outputs, particularly within the key focus areas. This was not possible due to time and budgetary reasons. However, the mapping procedures undertaken by EKZNW to delineate Agro-biodiversity Zones and Environmental Management Zones provides a reasonable degree of verification whereby biodiversity features were mapped at a desktop level using high-resolution imagery taken from 2014.
- ***Timing of development of spatial layers*** **–** Spatial layers used to develop the biodiversity layer for the UMDM EMF cover a range of temporal scales, and it is assumed that the layers provided (as per Table 3-2) provide the most up-to-date and accurate representation of biodiversity features within the District.

- ***District boundary –*** The decision was made towards the end of the study to include the latest boundary for the District. The biggest change from the previous District boundary is located along the south-western boundary in the Impendle area as shown by the black polygon in Figure 3-1. The mapping of biodiversity sensitivity covers the latest District boundary, however with omission of Agro-biodiversity Zones and Environmental Management Zones. Nevertheless, this area is largely covered by land comprising a protected area and CBAs.

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