

# ENVIRONMENTAL MANAGEMENT FRAMEWORK FOR THE WATERBERG DISTRICT

## DRAFT ENVIRONMENTAL MANAGEMENT FRAMEWORK REPORT

October 2010



**environmental affairs**

Department:  
Environmental Affairs  
REPUBLIC OF SOUTH AFRICA



**LIMPOPO**  
PROVINCIAL GOVERNMENT  
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF  
ECONOMIC DEVELOPMENT, ENVIRONMENT & TOURISM



**Waterberg**  
District Municipality

# ENVIRONMENTAL MANAGEMENT FRAMEWORK FOR THE WATERBERG DISTRICT

Draft Environmental Management Framework Report

October 2010

**ENVIRONOMICS**  
Environmental Consultants

Contact Person: Paul Claassen  
P O Box 400, Midstream Estate, 1692  
Bondev Office Park, Block B, 1<sup>st</sup> Floor, Midstream Estate, Midrand  
Tel: (012) 661 5649  
Fax: (012) 661 0375



## Executive Summary

### PART A: INTRODUCTION AND SUMMARY OF THE STATUS QUO REPORT

#### Introduction

The Environmental Management Framework (EMF) is an initiative of the national Department of Environmental Affairs (DEA) in partnership with the Limpopo Department of Economic Development, Environment and Tourism (LEDET), and the Waterberg District Municipality (WDM). The EMF will support decision making in the Waterberg District Municipality area in order to facilitate appropriate and sustainable development. The EMF integrates policies and frameworks and aligns government mandates to streamline decision-making and to improve cooperative governance. The EMF has a number of specific objectives, which include identifying the status quo, development pressures and trends in the area and development of a decision support system for development in the area to ensure that environmental attributes, issues and priorities are taken into account.

#### Geology, Landscape and Soils

The simplified geology of the Waterberg District can be classified into five distinct geology types, namely the Transvaal Super Group, Karoo Super Group, Waterberg Group, Bushveld Igneous Complex, and the Archaean Granite/Gneiss and Swazian Complex. The Karoo Super Group contains coal deposits while Bushveld Igneous Complex harbours important sources of platinum and chromium. The Waterberg Group contains no minerals of economic value. The Transvaal Super Group has iron ore deposits. The lithology of the area shows that there are 26 dominant rock types occurring in the Waterberg District. All of which are described.

The landscape of the Waterberg District is a unique feature that distinguishes it from any other place in South Africa. There are four

main landscape features in the Waterberg District, namely the Waterberg Plateau, the Transvaal Plateau Basin, the Pietersburg Plain and the Limpopo Depression.

The character of the Waterberg Escarpment is an important feature of the area. It is an asset that should be protected.

Similarly the wide open bushveld plains of the Limpopo Peneplain represent a special South African bushveld character. This character is one of the key selling points that the tourism sector employs in their marketing strategy.

Steep slopes have been identified in the EMF as they are inherently sensitive to change. The soil of the area is diverse.

Major soil associations have been identified. These include weakly developed soils on mountainous catchments, uplands and rocky areas; dystrophic, red and yellow, freely draining sandy soils; and plinthic upland duplex and paraduplex soils on undulating middleveld, rugged terrain.

The agricultural potential of the area is intimately associated with topographical, pedological (soil) and climate determinants. Rainfall distribution is also an important factor in determining the agricultural potential.

#### Climate

The northern and western regions of the area experience a hot and semi-arid climate. The southern and eastern regions are more humid and slightly cooler. The mean circulation of the atmosphere over southern Africa is anticyclonic throughout the year. Air circulations have implications for the dispersion of air pollution, and are influenced by a variety of factors. The main source of information for the atmospheric conditions and wind was taken from the Waterberg District Municipality's Air Quality Management Plan. No measurable evidence of global warming or climate change can be deduced from the information, due to significant natural fluctuations.

#### Hydrology

The Waterberg District is covered by the Limpopo Water Management Area as well as the Crocodile (West) and Marico Water Management Area. The Waterberg District has five catchments that fall within its boundaries namely

- Lower Crocodile River Sub-catchment;
- Mokolo (or Mogol) River Catchment;
- Lephalala River Catchment;
- Mogalakwena River Catchment; and
- A small portion of the Olifants River Catchment.

Most of the rivers drain in a north-westerly direction to the Limpopo River.

Major dams in the Waterberg District Municipality area include the Mokolo Dam, the Doorndraai Dam, and the Glen Alpine Dam.

Information regarding the health was obtained from the River Health Programme documents. Not all the catchments in the area have had studies completed. Most of the rivers appear to be in a fair condition. Groundwater is a limited but important resource in the area.

#### Biology

Most of the study area falls within the Central Bushveld Bioregion, which falls within the Savanna Biome. There are also small patches of vegetation that fall within the Mesic Highveld Grassland Bioregion, which falls within the Grassland Biome. Patches of Azonal vegetation is also found within the area. Lowveld Riverine Forest, Springbokvlakte Thornveld, Central Sandy Bushveld, Makhado Sweet Bushveld and Subtropical Salt Pans are the vegetation types of most concern for conservation. There are 43 mammal species of conservation concern that occur in the study area. Thirteen of these species are threatened with extinction and are on the Red List.

Three centres of endemism occur near the eastern boundary of the Waterberg District. A small part of the Wolkberg Centre of

# Waterberg District Environmental Management Framework – Draft EMF Report

Endemism occurs within the EMF study area. Conservation of this unique vegetation is important.

There are a number of protected areas within the Waterberg District, including Marakele National Park, Entabeni Nature Reserve, D'nyala Nature Reserve and Doorndraai Dam Nature Reserve to name a few. Some of these reserves have been incorporated into the Waterberg Biosphere Reserve. The Waterberg Biosphere Reserve is recognised by UNESCO. The presence of the Biosphere Reserve in the study area provides an opportunity to promote biodiversity conservation at the same time as advancing eco-tourism in the study area.

The Waterberg District's natural vegetation has experienced degradation in some areas. This includes from urbanisation cultivation or mining. Severe over-grazing is problematic.

Biodiversity hotspots and conservation priorities in the study area should be preserved before transformation leads to the loss of the entire area.

The ecological sensitivity of the area was determined using a number of factors, including vegetation types, the presence of rivers, streams, drainage lines and wetlands, presence of steep slopes or mountains and the potential presence of various plant and animal species of conservation concern.

## **Cultural and Historical Features**

This history of the Waterberg District extends as far back as the Stone Age and is diverse. The history was greatly influenced by natural phenomena and features of the area. Some important cultural and historical features of the area include rock paintings and stone tools of San hunters and Khoe Khoe herders, Bambata clay pottery, and also ruins of Langa Ndebele settlements. The Waterberg District has a rich cultural history also, with various tribes that inhabited the area, as well as the colonial settlements. The interaction between the colonial voortrekkers and local tribes in the area are of importance especially at sites such as the Makapan's Caves.

## **Air Pollution Potential**

The Waterberg District Municipality Air Quality Management Plan, completed in June 2009 was used as the main source of information. The Air Quality Management Plan compiled an emissions inventory for the Waterberg District. This was compiled for air pollution sources where information was available or where emission factors could be applied to quantify emissions. Pollution sources include power generation, mining, industrial emissions, domestic fuel burning, vehicle emissions, agricultural activities, biomass burning, waste treatment & disposal, and dust from various sources.

Currently, the air quality of the Waterberg District is fair, but with future development set to happen in the area, it is expected that air pollution will increase.

## **Economic Characteristics and Drivers**

The sector that contributes most to the GDP of the Waterberg District is mining. However, the sector that employs the largest number of people is agriculture. With future developments set to take place in the Waterberg District, it is likely that current GDP and employment trends will change. In terms of the population, three local municipalities registered positive growth with Modimolle registering the biggest growth followed by Mogalakwena. Changes of municipal demarcations may have impacted on the growth trends observed.

## **Population Characteristics**

The Waterberg District Municipality area has an estimated total population of 572 625. Most of the people in the District are distributed around Mogalakwena, Lephalale, as well as the Thabazimbi local municipality areas respectively. The education levels are relatively low within the Waterberg District. The working population tend to fall into two main brackets that earn between R1 to R400 and R6401 to R12 800 per month.

## **Development Pattern**

The primary activities of the Waterberg District include mining. The mining of minerals such as iron, platinum and coal has led to the development of nodes which have grown into the largest of the towns in the district. Lephalale is one of the areas with significant mining potential. Plans to expanding mining in this area are already underway.

Agriculture is another primary activity. Commercial farming mainly occurs on the "Springbok flats" in the south-east of the district. Irrigated agriculture occurs along several of the rivers, most notably the Crocodile River. The Modimolle Local Municipality area and the Mookgophong Local Municipality area have strong agriculture sectors. Game and cattle farming also form an important component of the Waterberg District.

Secondary activity is mainly industrial development, especially around the Lephalale area. Small scale manufacturing and service industries are located in Bela-Bela, Thabazimbi and Mokopane.

The settlement pattern in the district is fairly dispersed, with a high concentration of towns and villages in the east and the south. Mining, topographical features, tribal land and major transport corridors contribute to the settlement pattern. Densification is taking place in some centres, including Lephalale, Mokopane, Thabazimbi and Bela-Bela.

Road links are fairly well established in the Waterberg District, these links include the N1, N1 – R33, R510, and R516. With the exception of the N1, which is a toll road, the R-routes are not well-maintained. Many of the roads have deteriorated, to the point of being a danger to travel on.

Although a rail link does exist between Lephalale and Thabazimbi, it will need to be upgraded to increase its capacity. This will allow coal to be transported by rail instead of by road as is currently the case.

Major towns such as Thabazimbi, Lephalale, Bela-Bela, Modimolle and Mokopane have airfields which accommodate light aircraft. At present no commercial flights exist.

# Waterberg District Environmental Management Framework – Draft EMF Report

The development in Lephalale will place a higher demand on the water resources of the area. The Mokolo and lower Crocodile Water Augmentation Project were commissioned to help combat the lack of water. The project will be implemented in three phases. The first phase involves the construction of pipelines that will run parallel to an existing pipeline. The second phase will involve the transfer scheme from the Crocodile River at Vlieeport near Thabazimbi to the Lephalale area. The last phase will involve De-bottlenecking. This entails the construction of the first 9 km of the proposed gravity pipeline (for Phase 1) with interconnections to the existing pipeline (Exxaro pipeline).

There are several challenges involved in the waste management in the Waterberg District. There are also several problems and challenges surrounding service delivery. Sanitation and sewage treatment are of particular concern. The Green Drop Report highlights the poor state of wastewater treatment plants in the Waterberg.

The Waterberg's Spatial Development Framework proposals for development are around existing structure. The Framework also recognises the importance of external linkages especially in terms of agriculture and conservation.

## PART B: STRATEGIC ENVIRONMENTAL MANAGEMENT PLAN

### Key Issues

The key issues for this project were identified in three stages. In the first stage, key issues were identified by the project team, before the public participation process began. In the second stage, issues that arose during the first round of public participation were identified. During the third stage, additional and persistent issues that arose during the second round of public participation were identified.

Issues were categorised under the following headings:

- Water availability and utilisation

- Water quality and pollution
- Air Quality
- Noise
- Character of the Waterberg District
- Waterberg Biosphere Reserve
- Firewood
- Change to the population structure and socio-economic conditions
- Service Infrastructure Needs
  - Roads
  - Telecommunications.
  - Electricity
  - Water and Sewage.
  - Education and Skills Training.
  - Waste Disposal
- Government
- Planning and Development

### Desired State

This section illustrates what is important to the different sectors as conveyed by participants in the stakeholder and the public participation process.

All the sectors expressed a need for improvement in service infrastructure. It is also generally expected that these improvements should be government's contribution to the economic development of the area over the short term.

The game framing community is being represented by various sub-groups whose activities are dictated by the specific "markets" they operate in each with its own needs.

Due to the strict regulations that are applied many (not all) game farmers are of the opinion that they are unfairly discriminated on by

government, which makes their industry unnecessarily difficult and expensive to the extent where it is becoming difficult to operate.

The tourism industry in the Waterberg District has a rich offering of landscape, biological and cultural features with a potential to develop a high quality tourism product for a variety of markets. It is also very favourably located in relation to Gauteng which makes it an ideal area for weekend and short holiday breakaways.

There is a need for a strong "Waterberg brand", supported by government that promotes the area as a whole, as a destination.

Conservation expansion is focussed on the Waterberg Biosphere Reserve and the expansion thereof onto private property. There is very little public investment into the expansion of conservation areas, and the focus of the conservation authorities is therefore on the strict management of development and change on private land which could impact negatively on the natural environment,

Agriculture in the area is important for the production of food for the expanding markets in parts of the district and also for markets in nearby Gauteng. In addition, agriculture remains the most important employment sector in the district and as such has an important function in the stability of the social structure of the area. For these reasons it is important that current agricultural practices, especially intensive agriculture be maintained and be expanded onto additional high potential agricultural land in future.

Mining is the cornerstone of the economy of the district and currently accounts for more than 50% of the GDP of the area. It is highly unlikely that this contribution will decrease over the next 60 to 100 years. The mining industry is therefore important for the development of the district over the medium to long term.

There is a desperate need for clarity on what government's long term plans are in respect to the further development of the Waterberg Coal Field, especially in relation to electricity generation and potential liquid from coal processes. Commitments from government to supply adequate water, transport infrastructure and other necessary infrastructure is also required to reduce the risks of private enterprise and to make proper planning possible.

# Waterberg District Environmental Management Framework – Draft EMF Report

## Sensitivity Analysis

The sensitivity analysis together with the structural spatial elements (towns, villages, mineral resources, economic activities, etc.) identified in the status quo stages and the desired state provides the basis for the development of Environmental Management Zones (next section).

Based on the findings contained in the draft Desired State Report it was decided to do further analysis on the following aspects in order to refine a spatial base that would be relevant and accurate for the identification of Environmental Management Zones:

- General environmental sensitivity (ecological and landscape);
- Conservation planning (current protected areas and potential expansion areas);
- Water production priority areas; and
- Agricultural intensity (footprint).

## Environmental Management Zones

Initially the Environmental Management Zones (EMZ) for the Waterberg District EMF were determined through the careful evaluation of the status quo inputs and especially the environmental sensitivity and other priority needs in the area as described in the previous section of the report.

These Environmental Management Zones for the Waterberg have been revised and refined based on the following:

- Feedback from stakeholders and interested and affected parties on the Draft Desired State Report;
- feedback and input received during a workshop with municipal authorities;
- feedback and input received during a workshop with national and provincial authorities;

- feedback and input received from stakeholders and interested and affected parties on the draft Environmental management Zon); and
- an in depth assessment of the wider regional context, including likely activities within Botswana.

The section provides a short description of each EMZ, a description of the desired state of each EMZ as well as an indication of activities that are preferred, compatible and undesirable in in each EMZ. The following Environmental Management Zones have been identified:

- Zone 1: Protection of natural vegetation, scenic landscape and rock painting areas, with limited appropriate tourism;
- Zone 2: Nature and cultural tourism focus areas within a high quality natural setting;
- Zone 3: Game and cattle farming (including hunting) areas with commercial focus;
- Zone 4: Game and cattle farming (including hunting) areas with commercial focus;
- Zone 5: Potential large industrial and related activities focus area;
- Zone 6: Restricted mining focus areas in aesthetic and/or ecological resource areas;
- Zone 7: Urbanisation focus areas and nodes;
- Zone 8: Rural settlement areas;
- Zone 9: Agriculture focus areas with a tourism component;
- Zone 10: Agriculture areas with commercial focus; and
- Zone 11: Major infrastructure corridors.

The application of the National Environmental Management Act and the Environmental impact Assessment Regulations is in respect to the sensitive Zones 1 and 2 is also set out.

## Environmental Management Guidelines

In order to give guidance on certain important environmental issues, guidelines on the following issues have been included:

- Solid waste management and recycling;
- Sewage disposal;
- Transformation of land;
- Duty of care and remediation of environmental damage;
- Compensative investment; and
- Stream flow management.

# Waterberg District Environmental Management Framework – Draft EMF Report

## TABLE OF CONTENTS

ABBREVIATIONS.....	8	4.2.1. The Mokolo Dam .....	28	10.3.1. Roads.....	50
GLOSSARY OF TERMS .....	8	4.2.2. The Doorndraai Dam .....	28	10.3.2. Proposed road development .....	50
Part A: Introduction and summary of the status quo report... 9		4.2.3. The Glen Alpine Dam .....	28	10.3.3. Rail links.....	50
1. Introduction.....	10	4.2.4. Other dams .....	28	10.3.4. Airfields .....	50
1.1. Background .....	10	4.3. River Health .....	28	10.3.5. Water Augmentation Project .....	52
1.2. The Environmental Management Framework Area .....	10	4.3.1. General Introduction .....	28	10.3.6. Integrated waste management plan .....	52
1.3. The purpose of the EMF .....	10	4.4. Groundwater .....	29	10.3.7. Integrated transport plan .....	52
2. Geology .....	12	5. Biology .....	30	10.3.8. Engineering Services .....	54
2.1. Geological Systems.....	12	5.1. Vegetation.....	30	10.4. Spatial Planning and Future Development.....	54
2.1.1. The Transvaal Super Group.....	12	5.2. Conservation Features.....	30	10.4.1. Development initiative proposals.....	54
2.1.2. Karoo Super Group .....	12	5.2.1. Flora .....	30	11. Botswana.....	56
2.1.3. Waterberg Group.....	12	5.2.2. Fauna .....	32	11.1. Botswana Coalfields.....	56
2.1.4. Bushveld Igneous Complex.....	12	5.3. Other Features of Conservation Importance.....	34	11.2. Current Botswana Initiatives.....	56
2.1.5. Archaean Granite/Gneiss and Swazian Complex.....	12	5.3.1. Centres of endemism.....	34	Section B: Strategic Environmental management Plan, including: .....	57
2.2. Dominant Rock Types .....	14	5.3.2. Conservation areas.....	34	1. Introduction.....	58
2.3. Mineral Potential.....	16	5.3.3. Waterberg Biosphere Reserve.....	35	1.1. Purpose.....	58
2.4. Landscape .....	18	5.3.4. Wetlands, riparian areas.....	35	1.2. Spatial Context.....	58
2.4.1. The Waterberg Plateau .....	18	5.3.5. Habitat transformation in the study area .....	35	1.3. Time Perspective.....	58
2.4.2. The Transvaal Plateau Basin .....	18	5.4. Discussion and Conclusions .....	36	1.4. Sectors .....	58
2.4.3. The Pietersburg Plain.....	18	6. Cultural and Historical Features.....	38	1.5. Sustainable Development Context .....	58
2.4.4. The Limpopo Depression .....	18	6.1. Introduction .....	38	2. key issues.....	59
2.5. Terrain Morphology and Areas with Special Character .....	18	6.2. The Heritage Character of the Waterberg District.....	38	2.1. Water Availability and Utilisation .....	59
2.6. Steep Slopes .....	20	6.3. Pressures and Impacts on Cultural Resources in the Waterberg District.....	38	2.2. Water Quality and Pollution.....	59
2.7. Soil Types.....	20	7. Air pollution potential.....	40	2.3. Air Quality.....	59
2.7.1. Interpreted soils data.....	20	7.1. Air Pollution Sources.....	40	2.4. Noise .....	59
2.8. Agricultural Potential.....	22	7.2. Estimated Total Emissions for Local Municipalities .....	42	2.5. Character of the Waterberg District.....	59
2.9. Land Capability Data for Dryland Agriculture.....	22	7.3. Air quality Priority Area .....	42	2.6. Waterberg Biosphere Reserve .....	60
2.10. Wetlands .....	22	7.4. Current and Future Poluting Developments.....	42	2.7. Firewood .....	60
2.11. Soils and Wetlands.....	22	7.5. Necessary Infrastructure.....	42	2.8. Change to the Population Structure and Socio-economic Conditions.....	60
2.12. Resource Related Conflict.....	22	8. Economic characteristics and drivers.....	44	2.9. Service Infrastructure Needs.....	60
3. Climate .....	24	8.1. Economic Profile of Waterberg District Municipality .....	44	2.9.1. Roads.....	60
3.1. General Description.....	24	8.1.1. GDP and formal employment outlook.....	44	2.9.2. Telecommunications .....	60
3.2. Atmospheric conditions .....	25	8.1.2. Growth, development and economic character .....	44	2.9.3. Electricity.....	60
3.2.1. Macroscale air circulation.....	25	8.1.3. Population.....	44	2.9.4. Water and sewage .....	60
3.2.2. Mesoscale air circulation .....	25	8.2. Economic Tables and GDP Contributions.....	44	2.9.5. Education and skills training.....	60
3.2.3. Wind.....	25	8.2.1. Contribution % to gross value added (GVA) 2004 .....	44	2.9.6. Waste disposal.....	61
3.3. Conclusion.....	25	8.2.2. Growth per sector of the Waterberg District (2002-2004) .....	44	2.10. Government .....	61
4. Hydrology .....	26	9. Population Characteristics .....	46	2.11. Planning and Development .....	61
4.1. Catchments .....	26	10. Development pattern .....	48	3. the Desired State.....	62
4.1.1. Lower Crocodile River Sub-catchment.....	26	10.1. Economic Development Pattern .....	48	3.1. Introduction .....	62
4.1.2. Mokolo (or Mogol) River Catchment.....	26	10.1.1. Primary activities.....	48	3.2. Across all Sectors.....	62
4.1.3. Lephalala River Catchment.....	26	10.1.2. Secondary activities.....	48	3.3. Game Farming .....	62
4.1.4. Mogalakwena River Catchment.....	26	10.2. Settlement Pattern .....	50	3.4. Tourism .....	62
4.2. Major Dams .....	28	10.3. Infrastructure.....	50	3.5. Conservation .....	63

# Waterberg District Environmental Management Framework – Draft EMF Report

4. Sensitivity Analysis .....	64	5.9. Zone 8: Rural settlement areas.....	75	Legislation.....	87
4.1. Introduction.....	64	5.9.1. Description.....	75	World Bank Standards .....	87
4.2. General Environmental Sensitivity (ecological and landscape).....	64	5.9.2. Desired state.....	75	Government Documents .....	88
4.3. Conservation Planning Priorities .....	64	5.9.3. Preferred, compatible and undesired developments.....	75	Other Documents.....	88
4.4. Water Production Priority Areas .....	64	5.10. Zone 9: Agriculture focus areas with a tourism component.....	76	Internet articles and Web Pages .....	89
4.5. Land Capability for Agriculture .....	64	5.10.1. Description.....	76	Presentations .....	89
5. Environmental Management Zones.....	66	5.10.2. Desired state.....	76	Specialist Reports .....	90
5.1. Introduction.....	66	5.10.3. Preferred, compatible and undesired developments.....	76		
5.2. Zone 1: Protection of natural vegetation, scenic landscape and rock paintings areas, with limited appropriate tourism .....	66	5.11. Zone 10: Agriculture areas with commercial focus	76		
5.2.1. Description .....	66	5.11.1. Description.....	76		
5.2.2. Desired state .....	66	5.11.2. Desired state.....	77		
5.2.3. Preferred, compatible and undesired developments .....	68	5.11.3. Preferred, compatible and undesired developments.....	77		
5.3. Zone 2: Nature and cultural tourism focus areas within a high quality natural setting .....	68	5.12. Zone 11: Major infrastructure corridors.....	77		
5.3.1. Description .....	68	5.12.1. Description.....	77		
5.3.2. Desired state .....	69	5.12.2. Desired state.....	78		
5.3.3. Preferred, compatible and undesired developments .....	69	5.12.3. Preferred, compatible and undesired developments.....	78		
5.4. Zone 3: Game and cattle farming (including hunting) areas with commercial focus .....	70	5.13. NEMA 24(2)(b) and (c) implementation .....	78		
5.4.1. Description .....	70	6. Environmental Management Guidelines .....	79		
5.4.2. Desired state .....	70	6.1. Introduction .....	79		
5.4.3. Preferred, compatible and undesired developments .....	70	6.2. Solid waste Management and Recycling .....	79		
5.5. Zone 4: Mining focus area .....	71	6.2.1. The need for the guideline .....	79		
5.5.1. Description .....	71	6.2.2. Guidelines.....	79		
5.5.2. Desired state .....	71	6.3. Sewage Disposal .....	79		
5.5.3. Preferred, compatible and undesired developments .....	72	6.3.1. The need for the guidelines .....	79		
5.6. Zone 5: Potential large industrial and related activities focus areas.....	72	6.3.2. Guidelines.....	79		
5.6.1. Description .....	72	6.4. Transformation of Land.....	80		
5.6.2. Desired state .....	72	6.4.1. The need for the guidelines .....	80		
5.6.3. Preferred, compatible and undesired developments .....	73	6.4.2. Guidelines.....	80		
5.7. Zone 6: Restricted mining focus areas in aesthetic and/or ecological resource areas .....	73	6.5. Duty of Care and Remediation of Environmental Damage.....	80		
5.7.1. Description .....	73	6.5.1. The need for the guidelines .....	80		
5.7.2. Desired State .....	73	6.5.2. Guideline .....	81		
5.7.3. Preferred, compatible and undesired developments .....	74	6.6. Compensative Investment .....	81		
5.8. Zone 7: Urbanisation focus areas and nodes.....	74	6.6.1. The need for the guidelines .....	81		
5.8.1. Description .....	74	6.6.2. Guidelines.....	81		
5.8.2. Desired State .....	74	6.7. Stream Flow Management.....	81		
5.8.3. Preferred, compatible and undesired developments .....	75	6.7.1. The need for the guideline .....	81		
		6.7.2. Guidelines.....	81		
		6.8. Eradication of Alien Vegetation.....	82		
		6.8.1. The need for the guideline .....	82		
		6.8.2. Guideline .....	82		
		Bibliography .....	83		
		Resource Documents.....	87		
		Spatial Development Frameworks and Integrated Development Plans .....	87		

# Waterberg District Environmental Management Framework – Draft EMF Report

<b>List of Maps</b>	<b>Page</b>	<b>List of Figures</b>	<b>Page</b>	<b>List of Tables</b>	<b>Page</b>
1		1		1	
2		2		2	
3		3		3	
4		4		4	
5		5		5	
6		6		6	
7		7		7	
8		8		8	
9		9		9	
10		10		10	
11				11	
12				12	
13				13	
14				14	
15				15	
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					

Page numbers will be added in the final report

# Waterberg District Environmental Management Framework – Draft EMF Report

## ABBREVIATIONS

APPA	Atmospheric Pollution Prevention Act
ARC – ISCW	Agricultural Institute for Soil, Climate and Water
BOD	Biochemical Oxygen Demand
CDM	Capricorn District Municipality
CR	Critically endangered ecosystem
CTL	Coal-to-liquids
DEA	Department of Environmental Affairs
DWA	Department of Water Affairs
DWAF	Department of Water Affairs and Forestry (now Department of Water Affairs)
EIA	Environmental Impact Assessment
EMF	Environmental Management Framework
EMZ	Environmental Management Zones
EN	Endangered ecosystem
GDP	Gross Domestic Product
GGP	Gross Geographic Production
GVA	Gross Value Added
HIA	Heritage Impact Assessment
IDP	Integrated Development Plan
ITP	Integrated Transport Plan
IUCN	International Union for Conservation of Nature
IWMP	Integrated Waste Management Plan
LCF	Lephalale Coal Field
LED	Local Economic Development Plan
LEDET	Limpopo Department of Economic Development, Environment and Tourism

Ma	Million years ago
MAR	Mean Annual Runoff
MEC	Member of the Executive Council
NEMA	National Environmental Management Act
RAL	Roads Agency Limpopo
	Ramsar International Convention on Wetlands
RSA	Republic of South Africa
S	South
SANRAL	South African National Roads Agency
SDF	Spatial Development Framework
SE	South East
SW	South West
UNESCO	United Nations Educational, Scientific and Cultural Organisation
VU	Vulnerable ecosystem
WD	Waterberg District
WDM	Waterberg District Municipality
WMA	Water Management Areas
WSPs	Water Service Providers
WWTW	Waste Water Treatment Works

## GLOSSARY OF TERMS

**Arable land** means land that is fit to be cultivated.

Azonal vegetation means vegetation that occurs in between terrestrial and aquatic habitats.

**Biodiversity** means the totality of genes, species, and ecosystems of a region.

**Endemism** means a species that is prevalent in or peculiar to a particular locality. Endemism is the ecological state of being

unique to a particular geographic location, such as a specific island, habitat type, nation or other defined zone. To be endemic to a place or area means that it is found only in that part of the world and nowhere else.

**Escarpment** means a steep slope or long cliff that results from erosion or faulting and separates two relatively level areas of differing elevations.

**Long term** means at least a hundred years from now.

**Mean Annual Runoff (MAR)** means the total amount of surface water within a catchment area and can consist of runoff from precipitation falling within that area, and water flowing into that area from adjacent areas. The total amount of water in that area is referred to as the mean annual runoff (MAR). MAR can also be defined as the average annual stream flow passing a specific point or the maximum average annual flow observed in a river basin.

**Non-perennial** means something that does not last through the year.

**Overgrazing** means to permit animals to graze (vegetation cover) excessively, to the detriment of the vegetation and so that it no longer provides nourishment.

**Plateau** means an area of highland, usually consisting of relatively flat terrain.

**Sediment** means solid fragments of inorganic or organic material.

**Topography** means a representation, usually graphic of the surface features of a place or region on a map indicating their relative positions and elevations.

**Undulating** means moving up and down like waves or forming a series of regular curves.