Environmental Management Framework for Ekurhuleni

June 2007

Produced by :

ENVIRONOMICS

In association with

MetroGIS

Mawatsan

ABEMS

Deon van Zyl

Kweyama Consulting

Index

Produced for:

Ekurhuleni Metropolitan Municipality,

and

Gauteng Department of Agriculture Conservation and Environment

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PREFACE

The Environmental Impact Regulations (Regulations in terms of Chapter 5 of the *National Environmental Management Act*, 1998 **(**Act 107 of 1998**)**, were published on 21 April 2006 in Government Gazettes R385, R386 and R387. These regulations came into effect on 3 July 2006 and make provision for environmental management frameworks as regulatory instruments.

EMFs assist MECs responsible for the environment and other government decision-makers to make informed decisions on environmental matters.

This document is the combination of two studies that were integrated in order to form a single EMF and represents the combination of two reports namely:

- The Environmental Management Framework of the Northern Service Delivery Region of the Ekurhuleni Metropolitan Municipality, December 2005[1]; and
- the Status Quo Report of the Environmental Management Framework of the Eastern and Southern Service Delivery Regions of the Ekurhuleni Metropolitan Municipality, January 2006[2].

In combining the two studies, much of the information contained in the first study has been updated or been replaced. This document does not attempt to duplicate the previous studies. Its purpose is to give a brief summary of the background information contained in the previous studies, reflect the updated sections and to provide a combined Strategic Environmental Plan section that covers the whole area. In addition the EMF also incorporated the following recent changes:

- The Gauteng policy on the Protection of High Potential Agricultural land, 2006;
- the Environmental Impact Assessment Regulations, 2006; and
- the implementation of sections 24(2)(b) and (c) on the National Environmental Management Act,1998(Act 107 of 1998) as amended.

The delays that were necessarily to accommodate the above were inevitable but have provided the opportunity to deliver a product that is current and relevant for the whole of Ekurhuleni.

Terms of reference

Government agencies in the Republic of South Africa are committed to sound and sustainable development. In terms of Chapter 2 (the Bill of Rights) of the *Constitution of the Republic of South Africa 1996,* (Act 108 of 1996), everyone has the right to a healthy and pollution-free environment. Furthermore, the Bill of Rights specifies that pollution and environmental degradation should be prevented through sustainable environmental conservation, ecologically sustainable development and wise use of natural resources. Protection of the environment must thus be in balance with the socio-economic well-being of the inhabitants of an area. The Ekurhuleni Metropolitan Municipality (EMM) and the Gauteng Department of Agriculture and Environment (GDACE) have therefore embarked on a programme to establish environmental management frameworks for the entire service delivery region of the EMM. These frameworks were compiled by the project team and will aid decision-making processes in respect of present land-use, as well as decisions on new development activities in the area.

The clients

The EMM and GDACE are the clients for this project.

The EMM was created in the year 2000, when eleven local authorities merged as part of the municipal rationalisation and transformation process.

Keeping the background of national and provincial legislation in mind, almost all use of land in South Africa is under the control of local government. This includes planning and allocation of land. In Gauteng, it is mainly controlled in terms of the *Town Planning and Townships Ordinance*, 1986 (Ordinance 15 of 1986), various town planning schemes, surface rights in terms of mining legislation and Annexure F of the *Township Establishment and Land Use Regulations, 1986* issued under the *Black Communities Development Act, 1984* (Act 4 of 1984).The conditions of town establishment and title conditions of properties may also influence land use.

The GDACE draws its mandate mainly from national and provincial legislation. A long list of agricultural and environmental legislation exists in terms of which the Gauteng Provincial Government has accepted a five-year programme for 2004-2009. The programme focuses, *inter alia*, on the alleviation of poverty and job creation, reduction of inequalities, healthy communities and caring, responsive and responsible governance.

The project team

The following member organisations were part of the team:

- Environomics;
- MetroGIS;
- Abongi Bemvelo Environmental Management Consultants;
- Mawatsan;
- Deon van Zyl Property Development Consultants;
- Kweyama Consulting; and
- Index.

The project was managed by a steering committee with members from the EMM, the GDACE and the project team. The steering committee was chaired by the EMM.

The Environmental Management Framework and Spatial Development Frameworks

The EMF provides a framework that sets out the environmental attributes of Ekurhuleni in a way that determines environmental opportunities and constraints for development of the area while Spatial Development Frameworks (SDFs) provides frameworks for interpreting the development vision, planning principles and structuring elements of Ekurhuleni.

The EMF, in terms of the Environmental Impact Assessment Regulations, 2006, must be taken into account in the consideration of applications for environmental authorisation.

The SDFs that are developed for Ekurhuleni, at its different scales, should also take the EMF into account and incorporate its information as appropriate. In instances where especially Local SDFs generate more detailed information than what is currently contained in the EMF, such information should be made available for inclusion in periodic updates of the EMF.

[1] The report deals with the Northern Service Delivery Region and includes the OR Tambo International Airport, Kempton Park, Clayville, Tembisa, Bapsfontein, Bredell, Bedfordview, Putfontein, Daveyton, Pomona Agricultural Holdings, Benoni, Rynfield, parts of Boksburg (Jetpark), Edenvale, Isando, Sunnyridge and Bedfordview. Sections of three major freeways – ie the R21, R24 and N12 – traverse the area.

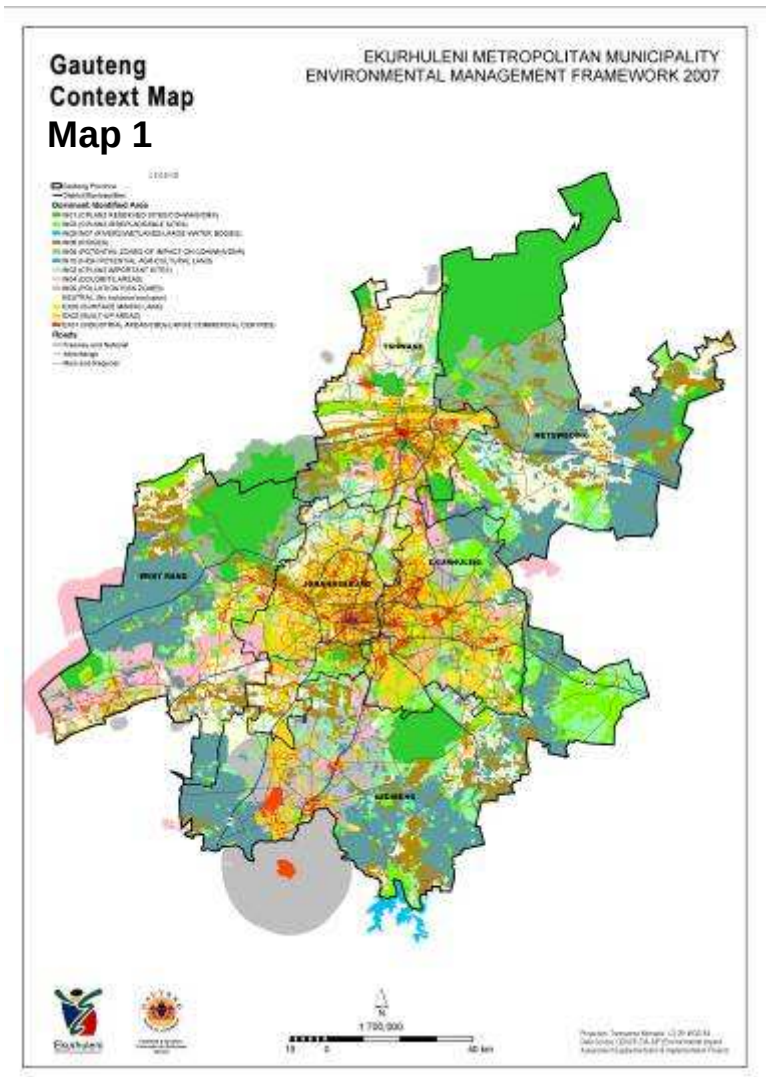
[2] The report deals with the Eastern and Southern Service Delivery Area and encompasses Germiston, Boksburg, Brakpan and Strubenvale in the north to Eden Park, Palm Ridge, Vosloorus, Duduza and Nigel in the south. The N3, N12, R24 and R23 form axes through this area and link industrial and commercial nodes.

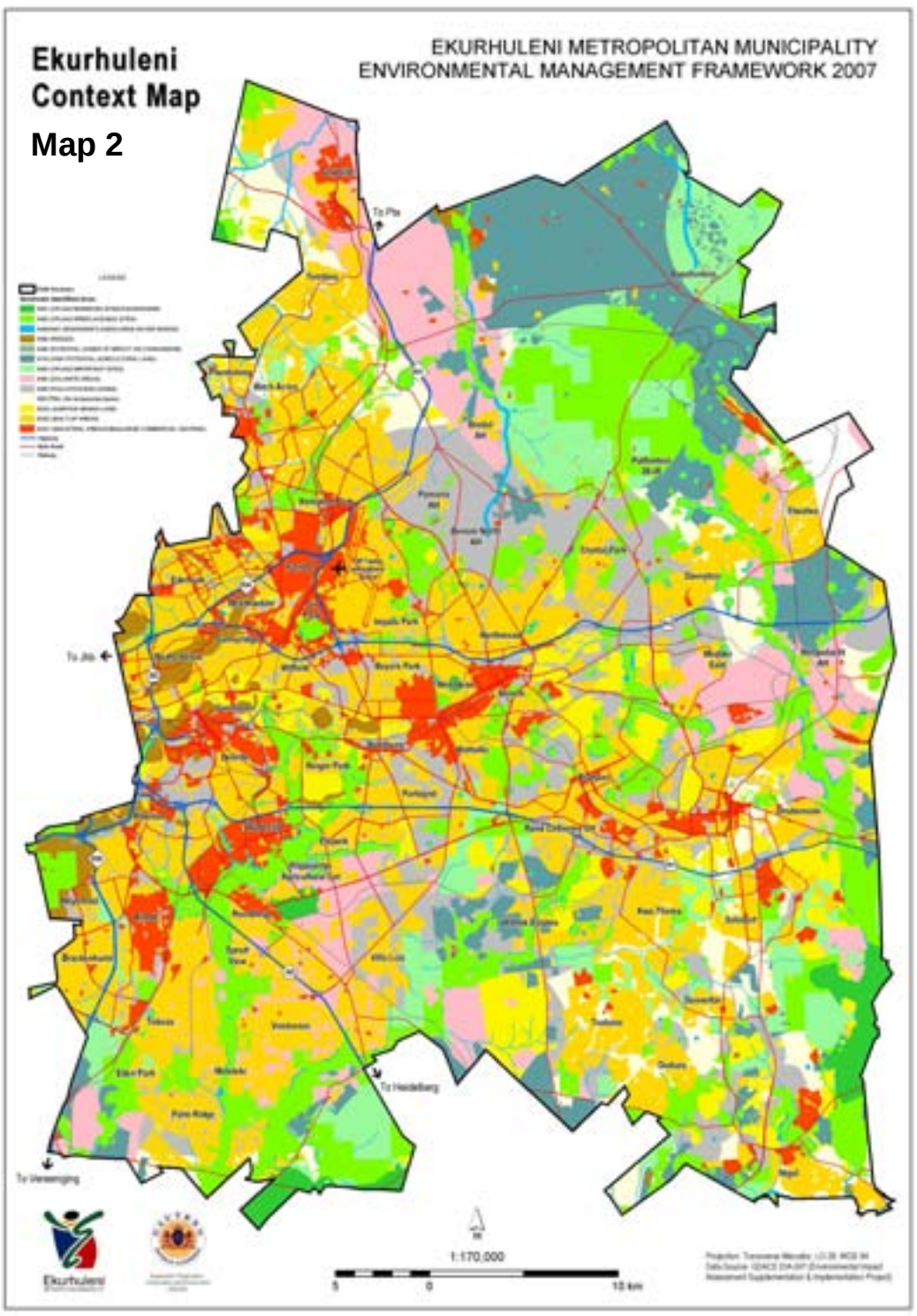
SECTION A: Background Information

1. The regional context

In 2006 GDACE produced a map, as depicted in Map 1, that indicates the extent of urban development together with conservation areas, sensitive areas and areas with high agricultural potential. In addition to its other functions, the map gives a good indication of the spatial characteristics of the Gauteng as a whole. The light yellow areas (indicated as “NEUTRAL” in the legend) are of particular significance as these areas are the most likely areas for further urban expansion from an environmental perspective as it is still vacant land and also, at a provincial scale, have relatively few environmental constraints.

Due to its relatively central location also means that it will continue to have a high demand for development. Compared to the rest of Gauteng, Ekurhuleni has very little “spare capacity” to accommodate additional development in areas that have little to no constraints. Ekurhuleni therefore faces a significant challenge to densify and redevelop existing built up areas as well as old mining and other land that is no longer used optimally.





2. Geology

Five main geological formations dominate the study area.

In the north-west at Tembisa and to the west of Clayville, areas of granite-gneiss are found.

Dolomite dominates the northern area between Clayville in the west and Bapsfontein in the east and all along the eastern boundary of the study area towards Putfontein, Strubenvale as far south as Kwa-Thema and Dunnotar.

Another extensive area of dolomite is found in the south-west of Ekurhuleni in the Katorus area.

Quartsite dominates the north-south central area from the west of Clayville in the north through Kaalfontein, to the east of OR Tambo Airport and in a broad band from west to east from Germiston to Springs. It also occurs north of Bapsfontein. Surface shale is found in the west, south of Bapsfontein and in the east, south of OR Tambo International Airport towards Germiston.

Amphibolite occur in the area around Edenvale east of Kempton Park and OR Tambo International Airport. A small area of surface dolorite occurs in the extreme south between Duduza and Vosloorus**.**

The geology of the area is indicated on Map 3.

The geological stability of an area should be one of the key considerations when planning development. The possibility of sink holes or earth tremors should be taken into account when considering medium to long-term development projects. Dolomitic areas that may be problematic as well as shallowly undermined areas are indicated on Map 4. The potential negative effects that this may hold for development should in all cases be assessed before development is allowed in these areas.

Earth tremors are quite common in the central area of the study area where deep gold mining takes place and extensive areas have been undermined. Such tremors sometimes result in the cracks appearing in buildings, roads and other structures and this should be considered in the planning of new developments.

Sink holes are not uncommon in the dolomitic areas of Gauteng, especially in areas where substantial extraction of underground water takes place.

A typical sinkhole

Sinkhole study for Bapsfontein

EMM appointed Jones and Wagener to investigate the stability of the area near the Bapsfontein Hotel in view of a sinkhole that attracted media attention and is a concern to the local population and the authorities. Jones and Wagener completed the first phase of their study and the following summary is taken from sections of their report numbered JW21/04/9401 and dated 16 February 2004.

The study focused on a localized area of approximately 2 km² around the intersection of the R25 and R50. However, the findings are also applicable to the wider area stretching from Rietvlei Dam in the north in a south-easterly direction through the study area. This area has similar geological and land-use conditions in the band of dolomite overlain by an intermittent layer of Karoo rocks such as sandstone and shale of a much younger age. A number of sinkholes and dolines are visible in the area. The area at Bapsfontein is characterised by densely populated agricultural holdings each with its own infrastructure, an informal settlement, the Bapsfontein Hotel and chicken and mushroom farms. The study confirmed that the large-scale pumping for irrigation purposes from the aquifer is a probable primary cause of sinkhole formation. Intensive maize and vegetable crop farming is being practiced in the immediate area and as far afield as Delmas, with many centre-pivot irrigation installations.

The extent of the sinkhole at Bapsfontein

The process of sinkhole formation is closely linked to the lowering of the water table in the substrata. The stability is then dependent on the rate of abstraction, continued infiltration of water from the surface, the size of the cavity and the thickness of cover over the cavity. Recent sinkholes of up to 30 m in diameter have appeared at Bapsfontein. The water table in the aquifer has shown a marked decrease in recent years. The recently developed sinkhole is a cause for concern due to its proximity to a densely populated informal housing settlement, as well as subsidence of the R25 that presents a traffic safety hazard. Further studies should be undertaken in the wider dolomitic area and strict controls in terms of land use and infrastructure development should be placed on any applications for further development.

Several dolomite studies have also been completed for the Katorus area. These were further supported by an awareness sustainability proposal. While de-watering is the major cause of sinkhole formation in the northern part of Ekurhuleni, the leaking wet municipal services is the main cause of sinkhole formation in the Katorus area.

3. Topography

The study area forms part of the major watershed between the rivers that drain west towards the Atlantic Ocean and those that drain east towards the Indian Ocean. The area can generally be regarded as flat with few outstanding topographical features. The following topographical features occur:

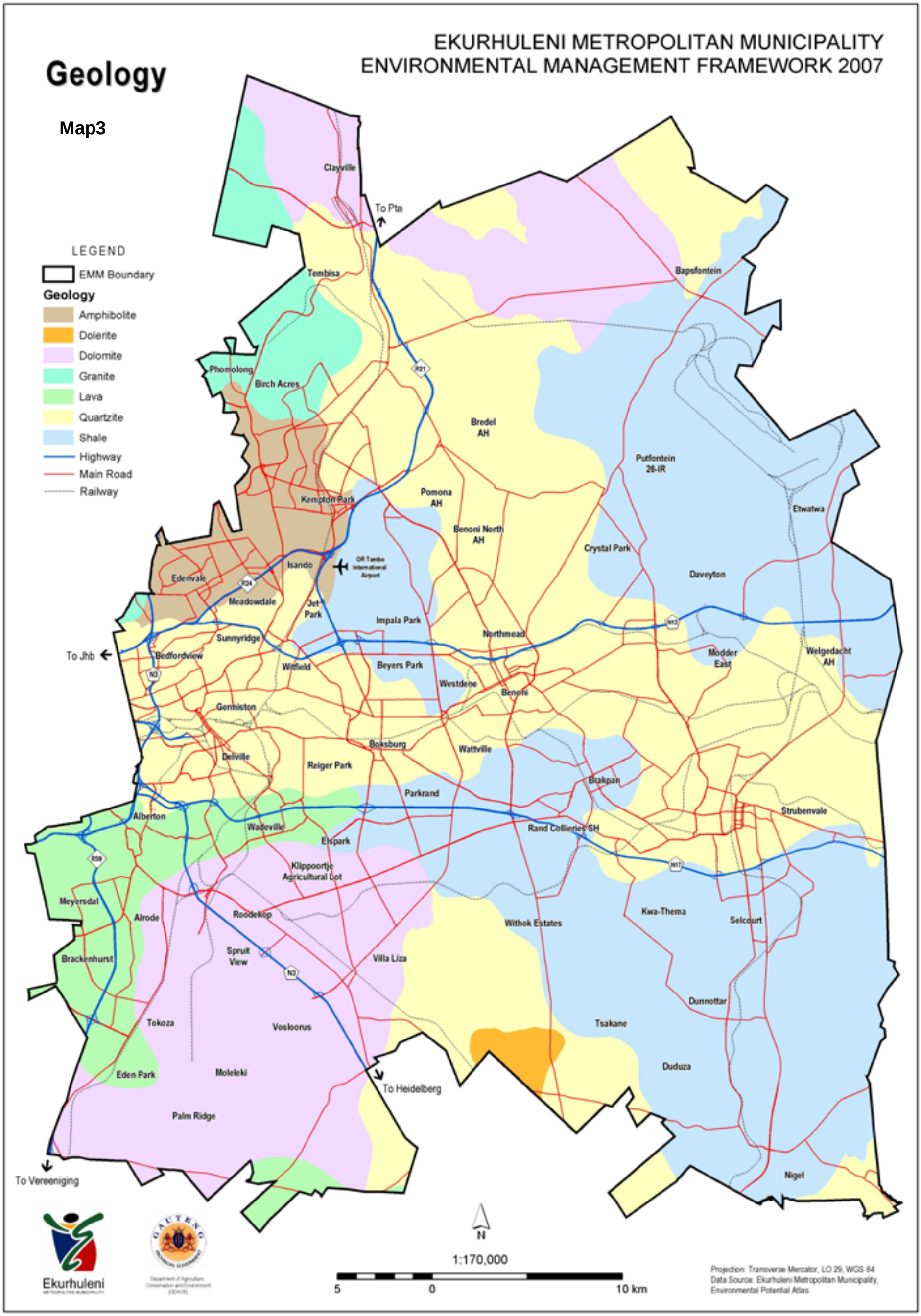
- Plains with pans
- Undulating plains with pans
- Strongly undulating plains
- Superimposed river valley (Blesbok Spruit) on plains with pans
- Ridges

The topography is depicted on Map 5.

Geology

Map3

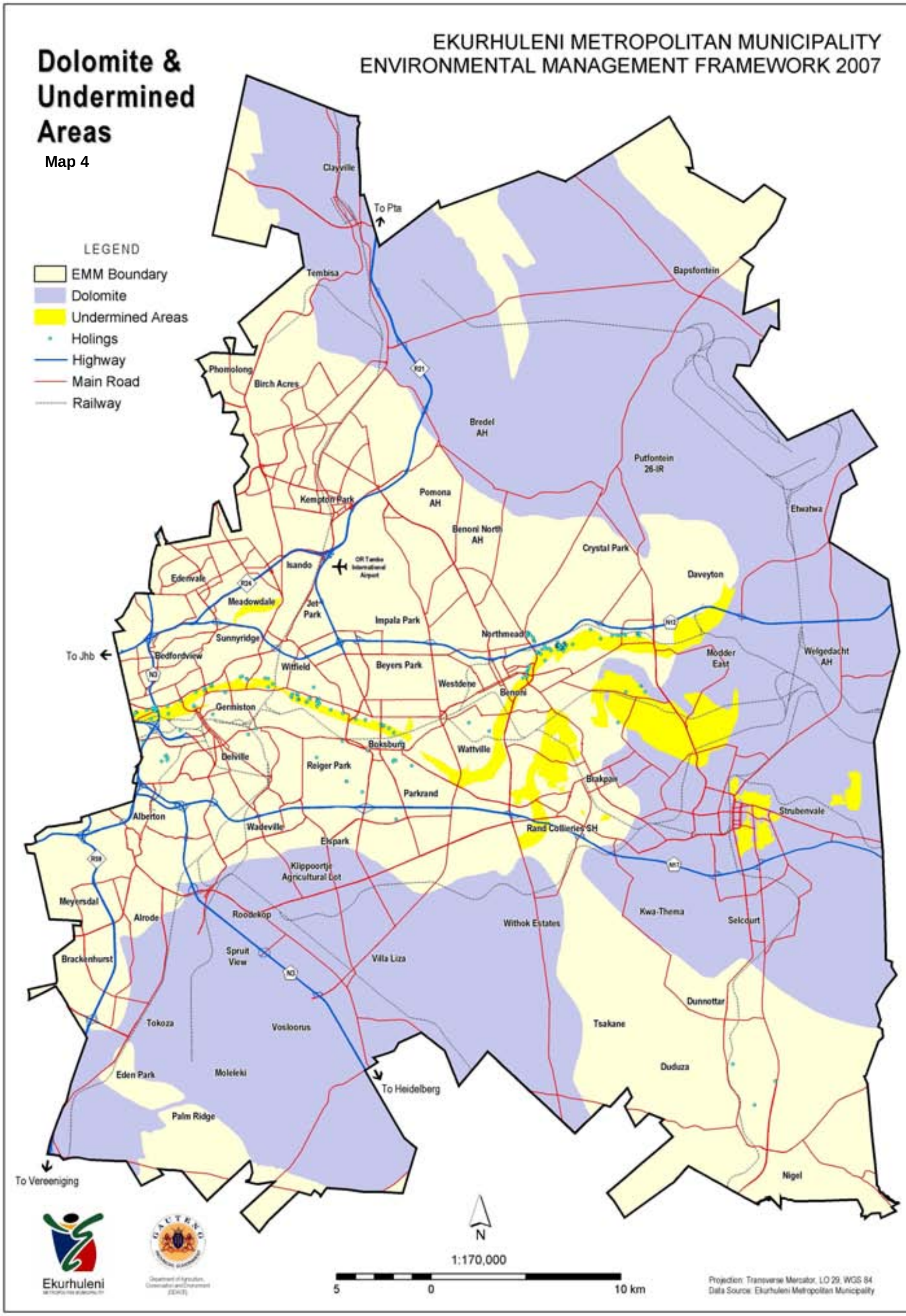
EKURHULENI METROPOLITAN MUNICIPALITY
ENVIRONMENTAL MANAGEMENT FRAMEWORK 2007



Dolomite & Undermined Areas

Map 4

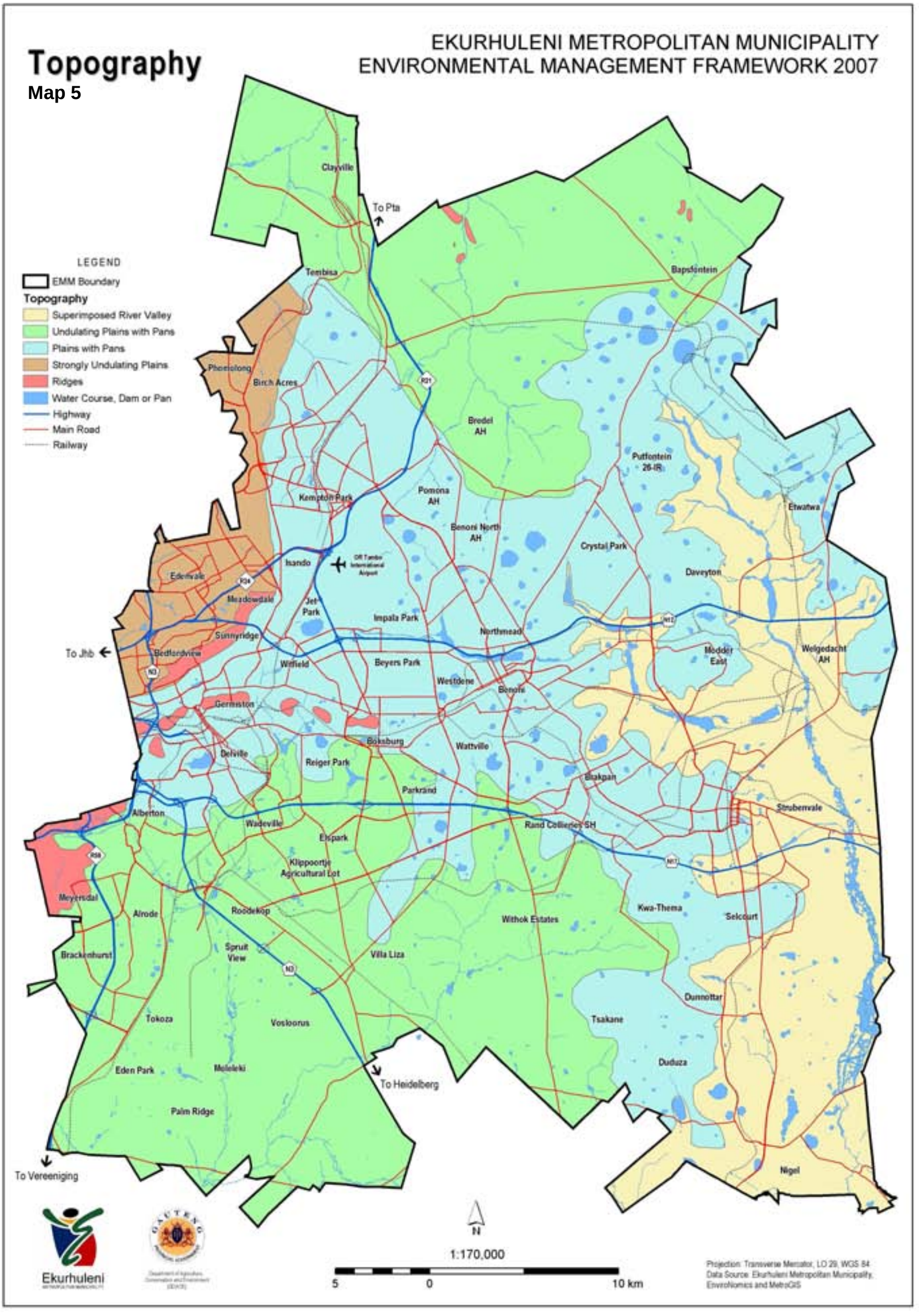
EKURHULENI METROPOLITAN MUNICIPALITY
ENVIRONMENTAL MANAGEMENT FRAMEWORK 2007



Topography

Map 5

EKURHULENI METROPOLITAN MUNICIPALITY
ENVIRONMENTAL MANAGEMENT FRAMEWORK 2007



4. Hydrology

The study area is dominated by dolomite of the Chuniespoort Group and tillites of the Dwyka group, both of which carry water. The presence of various geological structures, such as faults, fissures, and fracture zones, as well as contact zones of intrusions such as dykes and sills, dictate the occurrence of groundwater.

The extensive Blesbok Spruit hydrological system flanked by mining and other activities

Karst and Intergranular and Fractured Aquifers are the two dominant aquifer types in the study area. The Karst Aquifers occur in the dolomites of the Chuniespoort Group. This is the most important aquifer type in South Africa. Infiltrating rainwater containing weak carbonic acid dissolves dolomites resulting in caves and cavities that may facilitate the formation of sinkholes, especially if the water from these cavities is extracted through boreholes. Boreholes with the highest yield are found in the dolomites that occur from Wadeville to a point south of Vosloorus. Yields of more than 10 litres per second are common. High recharge of underground water and significant underground flow result in low density surface drainage in dolomitic areas. This underground flow often supports high yielding springs at an impermeable boundary, such as a dyke or lithological contact point. Ground water quality in the study area is generally acceptable for any use. In some areas contamination with chlorides, sulphates and nitrates has been recorded and care should be taken with groundwater used for human consumption.

Part of the Blesbok Spruit

Groundwater from the Dwyka Group is generally suitable for any use. Groundwater yield from aquifers in this formation is, however, low.

The surface hydrological system, together with a relief of the area, is depicted on Map 6. The following rivers, draining towards the Atlantic Ocean, occur in the area:

- **Blesbok Spruit**

The Blesbok Spruit originates to the north of Benoni and Daveyton and flows southwards through Springs and Nigel towards the Vaal River. It is a site of international importance, as it has been accepted as a wetland under the Ramsar Convention. The catchment also include the Marievale Nature Reserve. The eastern part of the catchment contains extensive natural wetlands, while the western part is highly modified by agriculture and human settlement. Key industries, such as mines (mine dumps and slimes dams), waste disposal sites, intensive agriculture and sewage works impact negatively on water quality.

- **Klip River and its tributaries**

Riet Spruit originates south-west of Benoni and joins the Klip River outside the study area. Another tributary of the Klip River, Natal Spruit, rises in and around Germiston and Boksburg. The upper reaches of the Klip River proper originate in Katlehong. These spruits are all very polluted due to farming, human settlement and industries. Due to the fact that the rivers join the Vaal River below the Vaal Dam, it however does not have major implication for the quality of drinking water in Gauteng as Rand Water subtracts it water from the Vaal Dam. The aesthetic impact on the recreational use of the Vaal River in the Barrage area represents the biggest current impact of this pollution. The following rivers draining towards the Indian Ocean occur in the area:

- **Kaal Spruit/Olifant Spruit**

These spruits originate at Kempton Park and Tembisa and flow northwards to join the Hennops River in Centurion. Agricultural activities and human settlements are responsible for serious pollution.

- **Jukskei Spruit**

Numerous small tributaries of the Jukskei Spruit drain a small portion of the south-western areas of the northern service delivery area.

- **Bronkhorst Spruit**

Koffie Spruit in the Sentrarand area and Os Spruit in the Bronkhorst Spruit Agricultural Holdings area drain two small areas on the eastern side of the northern service delivery area.

- **Rietvlei River**

This river rises in the smallholding areas of Kempton Park and flows northwards past the OR Tambo International Airport to Rietvlei Dam. The Rietvlei Dam contributes a high percentage of the water supplied by the Tshwane Municipality. The primary water supply to this river originates from agricultural run-off and industrial areas. The river is also fed by a tributary, Grootvlei River, which originates in the Bapsfontein area. Sewage works situated at Kempton Park is responsible for serious pollution. A series of wetlands between the sewage works and the dam, however, filters out most of the pollution. The Tshwane Metropolitan Municipalty, nevertheless, operates an extensive filtering plant at the dam.

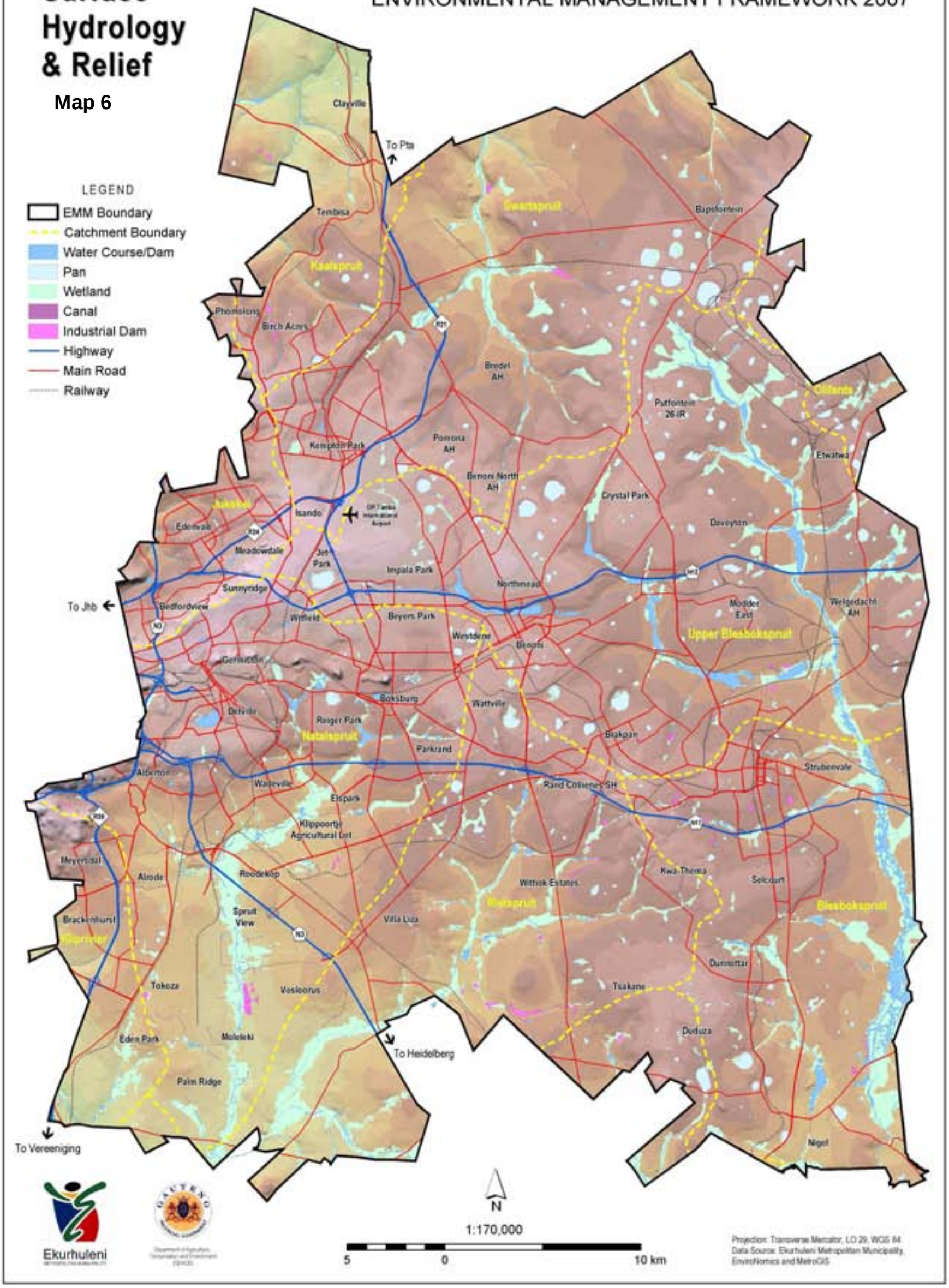
The prevalence of a large number of pans across Ekurhuleni is one of the outstanding characteristics of the area and is directly linked to the flat topography. They cover a total area of 3 559 ha and are mostly seasonal. A few are perennial and most are in agricultural areas. A number of lakes also occur. These were mostly created by the gold mines in the area and some are extensively utilised as outdoor recreational parks. The Germiston, Benoni and Boksburg lakes are typical examples.

Most of the rivers and spruits have been dammed for agricultural purposes. Only a few dams were created for industrial or recreational purposes. Many of the rivers have been canalised, mostly for storm-water control in build-up areas or for agricultural purposes. The lakes, pans and the abundant wetlands (vlei's and spruits) attract large numbers of water birds and other aquatic life. Due to ever increasing human pressure, the wetlands of the area are unfortunately in an downward cycle of deterioration.

Surface Hydrology & Relief

Map 6

EKURHULENI METROPOLITAN MUNICIPALITY
ENVIRONMENTAL MANAGEMENT FRAMEWORK 2007



5. Water quality

The term “water quality” is used to describe the microbial, physical, chemical, toxological and radiological properties of water. Information supplied by the Department of Water Affairs and Forestry was used for the Eastern and Southern Service delivery Regions (ESSDR). Eight variables were used to determine water quality, i.e temperature, pH, faecal coliform bacteria, dissolved oxygen, total suspended solids, turbidity, total phosphate and total nitrate.

In the ESSDR, the results from samples taken from the two major catchments, revealed that river health is below acceptable standards, but within tolerable limits. All indications are that the water quality is deteriorating, mainly due to industrial pollution, treated waste water from sewage treatment plants and mining operations.

At one of the sample points in the Blesbok Spruit, phosphate levels are above tolerable levels. In the Klip River catchment, unacceptable levels of pollution were recorded at three sample points. Sulphates, chloride and sodium should be included as monitoring parameters in future in order to adequately capture the impacts of mining and industry.

Most of the streams and rivers in the Northern Service Delivery Region (NSDR) have good quality water, although very poor water quality was found in the lower reaches of the Rietvlei River and Kaal Spruit. Poor water quality was recorded downstream of Tembisa and Olifantsfontein and three of the tributaries of the Jukskei River.

In the NSDR the ability of the aquatic habitats to support a wide variety of organisms was calculated through the assessment of the absence/presence of various aquatic creatures.

The river health classification in the NSDR, based on aquatic insect diversity, ranges between fair and poor. The top northern reaches of the Blesbok Spruit are most probably the cleanest of the rivers in the northern region. Water in the middle reaches of the Swart Spruit was found to be acceptable during a survey. The Swart Spruit, however, suffers severe environmental degradation from time to time. Waste water treatment plants at Hartebeestfontein are mostly to blame. Waste water treatment at Kempton Park is similarly responsible for the polluted waters of Rietvlei River. Illegal squatting, such as at Kaalfontein and Tembisa, causes littering and dumping in river and stream beds.

Poor stormwater management also impacts negatively on streams. Only a few of the stormwater control systems include retention ponds and pollution control litter traps. Regular stormwater management audits should be undertaken at construction sites, slimes dams, feedlots and livestock sheds. Regular clearing of dirt road shoulders, kerbs and drains could also alleviate the problem. A problem common to all areas is the degradation and erosion of stream and river banks. All sectors should be alerted to this problem. Loss of soil, loss of riparian vegetation, loss of aquatic habitats and loss of biodiversity should also be addressed.

The ingress of polluted surface water into mines and the groundwater is also a potential significant problem that needs to be addressed further.

6. Climate

Rainfall in the study area is typical of the Highveld summer rainfall where more than 80% occur from October to April. Average rainfall is 715mm to 735mm annually. Hail can be expected periodically and mild damage to fruit usually occurs in two out of three years, while severe damage occurs every two out of five years. According to the agricultural potential criteria of the National Department of Agriculture, the study area is suitable for rainfed crop production, provided that the crops are grown in areas with deep soil which stores water for use during dry periods in the growing season.

Severe frost occurs frequently from mid-April to September. Temperatures below freezing are common in winter. Summers are mild with temperatures seldom above 30ºC.

Northerly and north-westerly winds blow during winter and spring and north-easterly to north-north-easterly winds during summer. Winds are usually gentle, and strong winds are only experienced 15% of the time. Moderately high-speed winds occur from late winter to early spring. Wind damage to field crops is rare, but damage to deciduous fruit quite common.

7. Agricultural potential

The Gauteng policy on the protection of high potential agricultural land (2006) defines high potential agricultural land as *“Having the soil and terrain quality, growing season and available moisture supply needed to produce sustained high yields of crops economically when treated and managed according to best possible farming practices”.*

Applying this definition, a land capability mapping study was completed during 2006 for Gauteng Province with the objective to identify and protect areas of high agricultural potential. The result of this study was subsequently classified and grouped into the following 5 classes:

- ***Agricultural hubs:*** High potential agricultural land that resides outside the urban edge. Seven hubs have been identified in the Gauteng Province.
- ***Important agricultural sites:*** All land identified as high agricultural potential land and located outside the urban edge but not within an identified Agricultural hub. A complete agricultural specialist study is required for any proposed development on these areas.
- ***Incorporated within the urban edge*** [3] ***:*** All land identified and classified as high potential agricultural land but incorporated completely within the boundaries of the urban edge will not be regarded as viable land for future agricultural development.
- ***Overlapping the urban edge*** [3] ***:*** High potential agricultural land that is located in close proximity and / or overlapping the urban edge boundary is regarded as agricultural land that could be utilized for agricultural production purposes. A complete agricultural specialist study is required for any proposed development on these areas.
- ***Protected area:*** High potential agricultural land within protected areas will not be used for agricultural purposes.

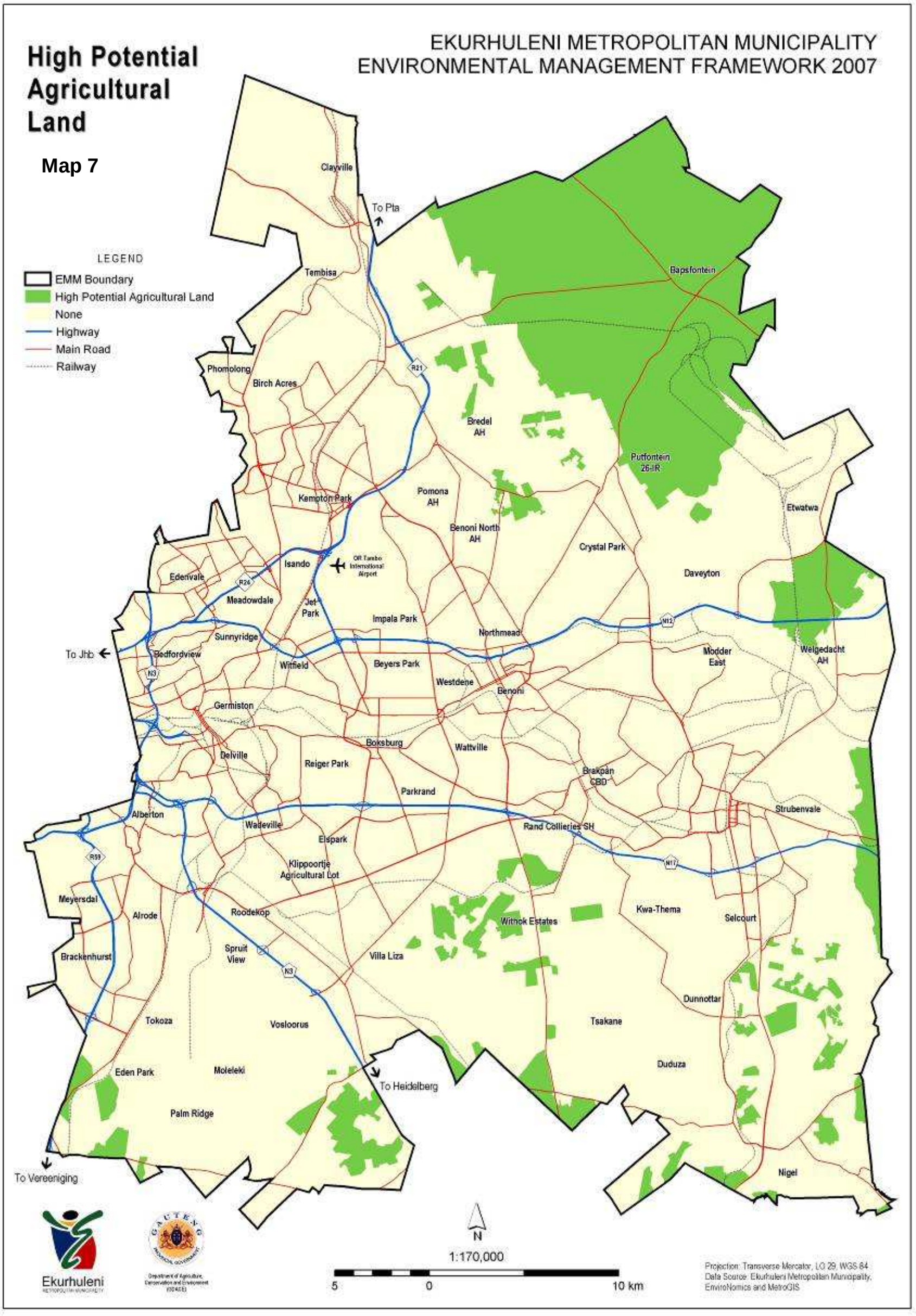
The high potential agricultural land in Ekurhuleni is depicted on Map 7 Only one *agricultural hub* as defined by GDACE, occurs in Ekurhuleni in the Bapsfontein area. Several important agricultural areas are scattered across Ekurhuleni and are also indicated.

[3] The urban edge refers specifically to the Gauteng Provincial Urban Edge of 2002).

High Potential Agricultural Land

Map 7

EKURHULENI METROPOLITAN MUNICIPALITY
ENVIRONMENTAL MANAGEMENT FRAMEWORK 2007



8. Biological environment

A large percentage of South Africa's biodiversity is represented in this small area of Gauteng province. The number of species per unit area is exceptionally high. This biodiversity is, however, threatened by the high levels of industrial, economic and urban development activities.

The entire study area falls within the Grassland Biome in which grass dominates and geophytes occur abundantly. Trees are usually absent, except along river courses and on koppies. Establishment of trees is curtailed by frost, veld fires and grazing. Today, only a few areas of high quality grassland remain, due to the severe transformation that has taken place. Only 34% of the total area remains under natural vegetation in various states. The eastern parts of Gauteng is covered by Acocks' veld type 48 (*Cymbopogon/Themeda* veld). The dominant grass is red grass (*Themeda triandra*). It grows on sandstones and shales with deep sandy loam soils. In Ekurhuleni this veld type covers the area south of Bapsfontein and east of Benoni North and almost the entire Southern and Eastern service delivery areas. According to the SANBI 2004 Vegetation Map of South Africa, Lesotho and Swaziland (VEGMAP), depicted on Map 8, three sub-types of vegetation occur:

- Eastern Highveld Grassland;
- Soweto Highveld Grassland; and
- Tsakane Clay Grassland.

Veld type 61 (Bankenveld) covers the area in the northern part of the area. Dominant grass species include giant speargrass (*Trachypogon spicatus*), broadleaf bluestem (*Diheteropogon amplectens*), red autumn grass (*Schizachyrium sanguineum*), *Loudetia simplex* and many others. Trees occur in a scattered clusters with common hook thorn (*Acacia caffra)* dominant, and white stinkwood (*Celtis africana*), blue guarri (*Euclea crispa*) and sweet thorn (*Acacia karroo*) are also present.

The VEGMAP, identifies three sub-types of vegetation:

- Carletonville Dolomite Grassland;
- Egoli Granite Grassland; and
- Rand Highveld Grassland.

A small area of Mountain Bushveld occurs west and north of Alberton to the west of highway R59 and also north of the N12 highway. Small patches of this veld type also occur along the Blesbok Spruit south of Springs towards Nigel.

Wetlands represent the most important habitat type in the Ekurhuleni area because of their vital role in the regulation of water, filtering capabilities and harbouring of biodiversity. Wetlands are superimposed over the grassland types of the study area and represent a transition between aquatic and terrestrial systems. Dominant vegetation in these wetlands are *Phragmitis australis* (reed) and *Typha capensis* (bulrush).

The Blesbok Spruit wetland, depicted on Map 9, enjoys a high conservation priority, as it includes the Maryvale provincial nature reserve and the Blesbok Spruit internationally recognised RAMSAR site. Unfortunately, mining, human habitation, and industries impact extremely negatively on the system. Siltation occurs due to road and pipe crossings and industrial effluents are discharged in the system.

Alien invasive species, mainly *Eucalyptus*-species (gums) and Australian wattles (*Acacia dealbata,* silver wattle; *Acacia mearnsii* , black wattle and *Acacia decurrens*, green wattle) are the most common invaders in Gauteng. Other significant invaders include lantana, poplars, bugweed, white mulberry and privet.

Red Listed plant species that occur in the study area include:

- *Khadia beswickii* (khadi – a species of mesemb or vygie) is Critically Endangered. It is endemic to Gauteng Province where it grows in open areas and in shallow soils over rocks in grasslands. The plant is threatened by urban settlement, invasive alien vegetation and harvesting for beer brewing purposes. Approximately 50% of the known populations of the plant occur in the study area
- *Delospermum purpereum* - (Endangered) a mesemb, 30% of the known population occur in the area
- *Cineraria longipes* – (Endangered) 20% of known population occur in area
- *Trachyandra erythrorhiza* - (Vulnerable) (lily species), 25% of known population in area
- *Boweia volubilis* (Near threatened)
- *Calamagrostis egyus* var.*capensis* – (Near threatened)
- *Habenaria bicolour* - (Near threatened), a ground orchid
- *Kniphofia typhoides*- (Near threatened) red hot poker

The following threatened bird species occur in the study area:

- Greater Flamingo
- Grass owl
- Painted snipe
- Lanner falcon
- Melodious lark – near Tembisa

The threatened bullfrog, marsh sylph butterfly (*Metisella meninx) and the* white-tailed rat also occur in the area.

9. The Gauteng Conservation Plan

Biodiversity data collected for the Gauteng province as part of the Gauteng Biodiversity Gap Analysis Project (Gauteng BGAP) was analysed to produce the Gauteng Conservation Plan (Version 2). The purpose of the Gauteng BGAP is to identify and map areas that are of conservation significance, and to provide recommendations and policy strategies for the conservation and management of these areas.

Version 2 of the Gauteng Conservation Plan contains three different types of sites:

- Irreplaceable sites, which are essential in meeting targets set for the conservation of biodiversity in Gauteng. Irreplaceable sites specifically contribute towards the conservation of confirmed populations and suitable habitat of Red Data and other conservation-worthy species of fauna and flora and should be protected from transforming land uses.
- Important sites are sensitive areas that are important for the conservation of biodiversity in Gauteng. Important sites specifically contribute towards the conservation of vegetation types and some Red Data bird species, as well as the conservation of localities of conservation-worthy plant and invertebrate species.
- Reserved sites, include all existing level 1 and 2 protected areas. Level 1 protected areas are proclaimed in terms of relevant legislation specifically for the protection of biodiversity (or for purposes of nature conservation) and are subject to an ecological management plan with conservation of biodiversity as the primary management objective. Level 2 protected areas are proclaimed in terms of relevant legislation specifically for the protection of biodiversity (or for the purposes of nature conservation) or are subject to an ecological management plan with conservation of biodiversity as the primary management objective.

Version 2 also includes a layer that maps spatial surrogates which support ecological processes that are essential for the maintenance and generation of

biodiversity in sensitive areas. Spatial surrogates include dolomite, ridges, perennial and non-perennial rivers, wetlands and representative quaternary catchments that retain a high proportion of their natural or remnant ecological functions.

C-Plan 2 irreplaceable and important sites are indicated over the vegetation of the area on Map 8b

Biodiversity in the EMM area is under a lot of pressure from certain human activities. The conversion of natural habitats into man-made structures has fragmented the natural Grasslands in the EMM. Pans have been filled in for urban development, and wetlands and surface water bodies have become isolated. All these developments in the area have resulted in the loss of natural ecosystem function and biodiversity.

Natural migration of animal species is prohibited by fences and walls built on the edges of the pans and wetlands. The symbiotic relationship within the ecosystem is also disturbed by human activities and the introduction of alien invasive species. Trade in medicinal plants has increased and is practiced in an unsustainable manner by traditional healers, shop traders, street traders and commercial gatherers in the area. The EMM area is also faced with the challenge of increasing its number of protected areas. It also needs to involve the Working for Water Programme to identify and remove the vast number of invasive alien plant species.

10. Conservation assessment

As part of the EMF study an overall broad assessment of the conservation potential was undertaken. The results this assessment are incorporated in the GIS of the EMF that will be available for the EMM and GDACE for further more detailed evaluation and ground truthing.

A summary of the most salient aspect of the assessment is included in Tables 1,2 and 3.

Table 1 Extracts from the National Spatial Biodiversity Assessment 2004

Vegetation type	Original Area (ha)	Remaining Area (ha)	% remaining	% protected	Conservation target	Ecosystem Status	Protection level
Andesite Mountain Bushveld	199530	169605	85	6	24	LT	hardly protected
Carletonville Dolomite Grassland	911780	693463	76	2	24	VU	hardly protected
Eastern Highveld Grassland	1266904	702248	55	0	24	EN	hardly protected
Egoli Granite Grassland	109319	34523	32	1	24	EN	hardly protected
Gold Reef Mountain Bushveld	203098	171727	85	21	24	LT	moderately protected
Rand Highveld Grassland	1026192	599136	58	1	24	EN	hardly protected
Soweto Highveld Grassland	1451033	761968	53	0	24	EN	hardly protected
Tsakane Clay Grassland	128381	71429	56	1	24	EN	hardly protected

Table 2: Vegetation type assessment in Ekurhuleni

Vegetation Type	Area (ha)	Percentage	% of national remaining in Ekurhuleni
Altered Urban	115153.39	59.79	N/A
Andesite Mountain Bushveld	1850.48	0.96	1.09
Carletonville Dolomite Grassland	15117.76	7.85	2.18
Eastern Highveld Grassland	5116.80	2.66	0.73
Egoli Granite Grassland	2017.10	1.05	5.84
Gold Reef Mountain Bushveld	161.49	0.08	0.09
Rand Highveld Grassland	2240.59	1.16	0.37
Soweto Highveld Grassland	14833.25	7.70	1.95
Tsakane Clay Grassland	19219.78	9.98	26.91
Water courses and pans	5165.82	2.68	N/A
Wetlands and associated wet grassland	11709.54	6.08	N/A

Table 3: Conservation opportunity analysis (area based, quality information not available)

Vegetation type	Proposed priority for conservation (1 = highest)	Remaining areas <100ha	Remainaing areas 100ha to 300ha	Remaining areas 300ha to 500ha	Remaining areas >500ha
Andesite Mountain Bushveld	7	479.13	813.75	N/A	557.61
Carletonville Dolomite Grassland	6	4531.30	1556.98	2550.84	6478.64
Eastern Highveld Grassland	4	1385.72	593.90	N/A	3137.19
Egoli Granite Grassland	2	356.76	327.20	399.30	933.84
Gold Reef Mountain Bushveld	8	161.49	N/A	N/A	N/A
Rand Highveld Grassland	5	43.82	314.96	406.66	1475.15
Soweto Highveld Grassland	3	5502.31	2565.00	732.72	6033.23
Tsakane Clay Grassland	1	3923.65	2626.65	2868.51	9800.97
Wetlands and associated wet grasslands	1	8022.53	2936.25	750.76	N/A

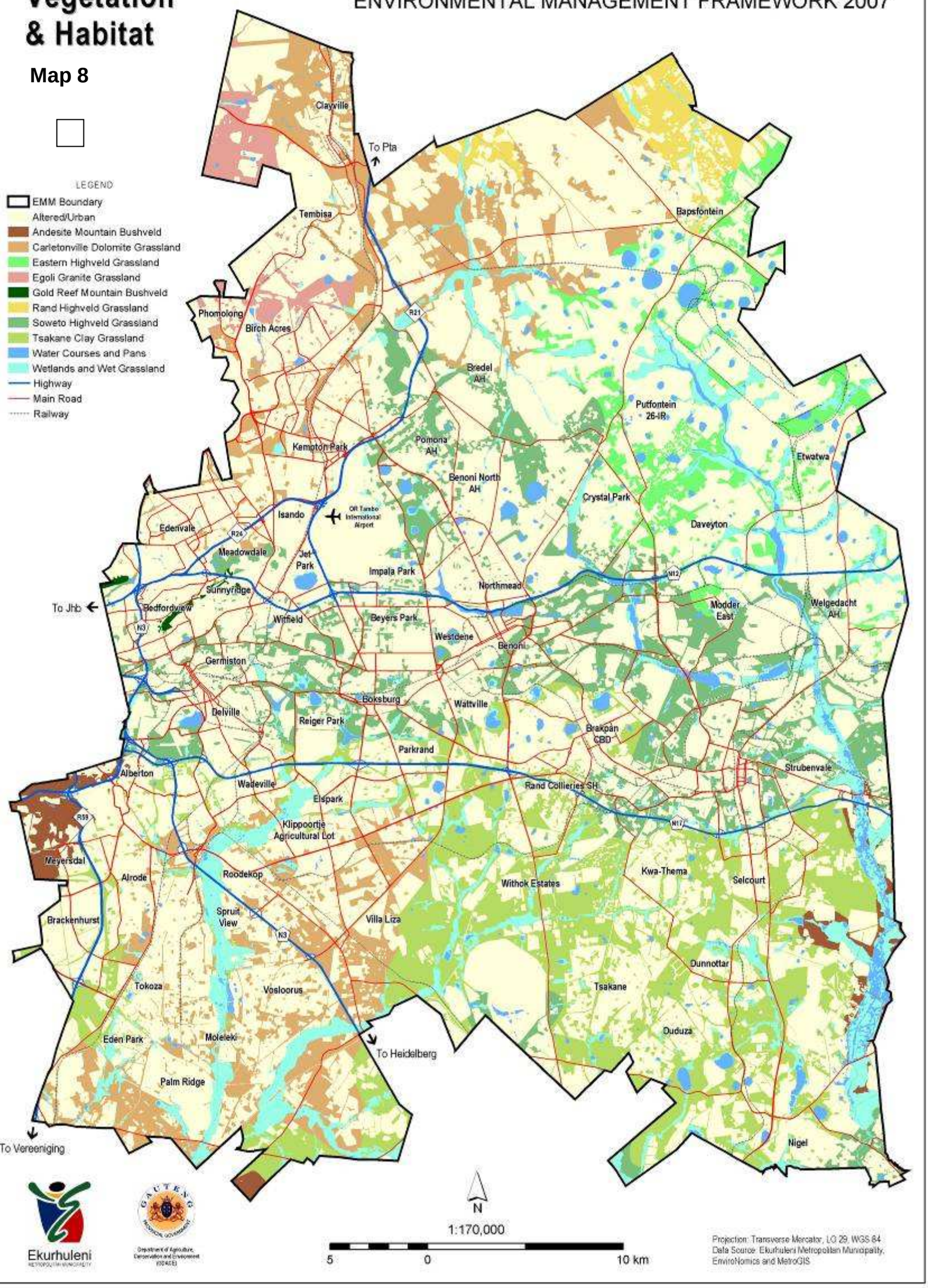
11. Blesbok Spruit Ramsar Site

The extent of the Ramsar site is indicated in the context of its catchment (only the Ekurhuleni portion). It is evident that the catchment is significantly affected by development and stands to be affected even more in the longer term. GDACE has undertaken done several investigations into the management and protection of the area. It is however not recommended that the boundaries of the site be extended at this stage as the management implications are by no means clear. As a fist step a catchment assessment should be undertaken to pin down the activities that impact on the site more precisely, That will enable better management and also provide ground for extending the site or not.

Vegetation & Habitat

Map 8

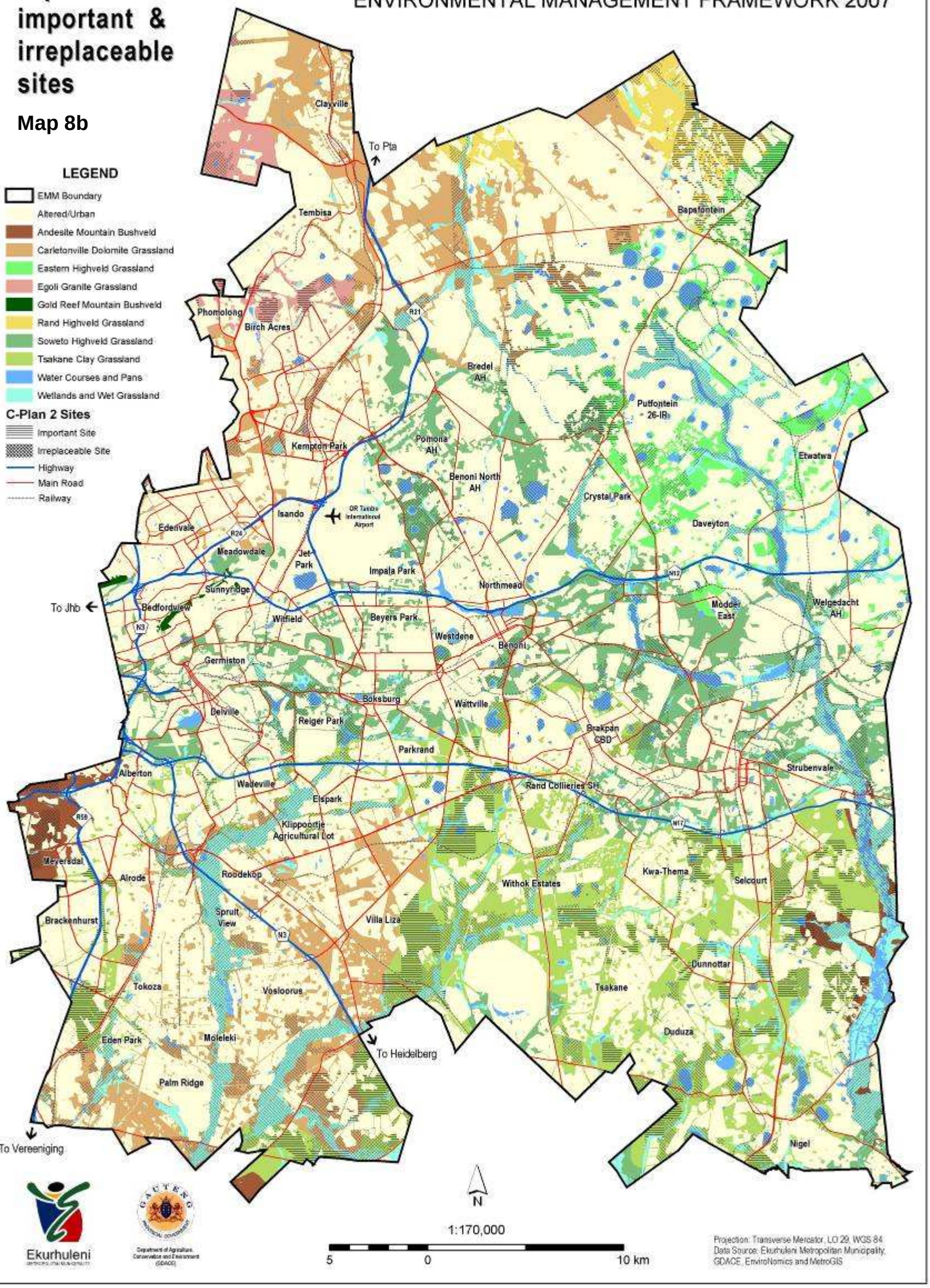
EKURHULENI METROPOLITAN MUNICIPALITY
ENVIRONMENTAL MANAGEMENT FRAMEWORK 2007



C-plan 2 important & irreplaceable sites

Map 8b

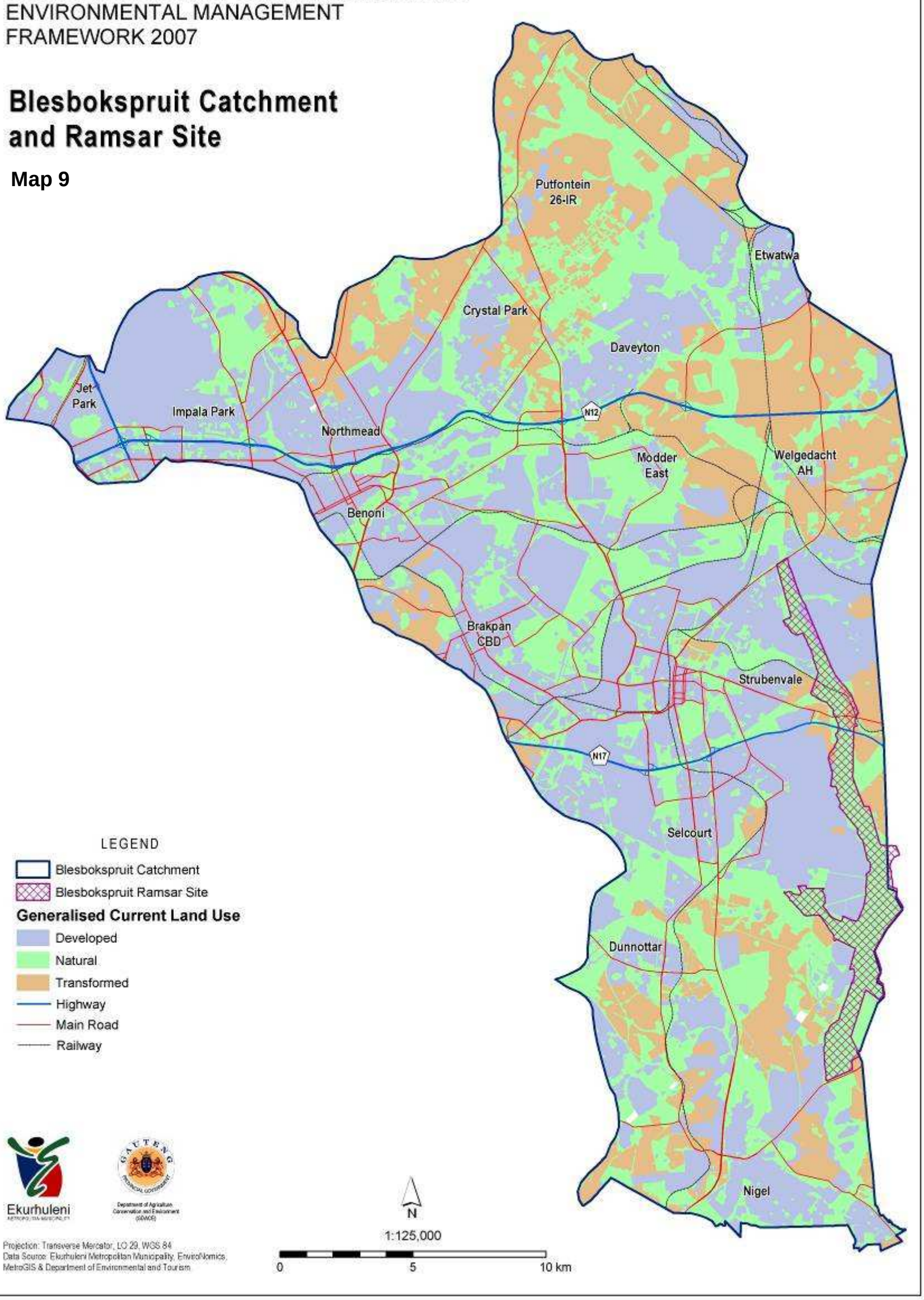
EKURHULENI METROPOLITAN MUNICIPALITY
ENVIRONMENTAL MANAGEMENT FRAMEWORK 2007



EKURHULENI METROPOLITAN MUNICIPALITY
ENVIRONMENTAL MANAGEMENT
FRAMEWORK 2007

Blesbokspruit Catchment and Ramsar Site

Map 9



12. Use of land and transportation

The current use of land in Ekurhuleni is reflected in Table 1 below and depicted on Map 10 and transportation infrastructure is reflected on Map 11.

Table 4: Use of land in Ekurhuleni

Category	Feature	North 74679.68ha			East 69850.97ha			South 47624.3ha			Total Area 192154.25ha		
		Area (ha)	% of category	% of area	Area (ha)	% of category	% of area	Area (ha)	% of category	% of area	Area (ha)	% of category	% of area
Agriculture	Dry Land Agriculture	13769	84	18	9519	86	14	2564	64	5	25852	**1**	13
	Grain Storage Cilos	6	0	0	3	0	0	0	0	0	9	**0**	0
	Intensive Agriculture	272	2	0	50	0	0	7	0	0	329	**0**	0
	Irrigated Agriculture	2315	14	3	1453	13	2	985	24	2	4752	**0**	2
	Urban Agriculture	0	0	0	20	0	0	473	12	1	493	**0**	0
	Total	**16362**	**100**	**22**	**11044**	**100**	**16**	**4029**	**100**	**8**	**31435**	**100**	**16**
Airfields	Airfields and landing strips	**1865**	**100**	**2**	**75**	**100**	**0**	**74**	**100**	**0**	**2014**	**1*100**	**1**
Business/Commercial	CBD - Mixed use	1	0	0	204	25	0	287	25	1	492	18	0
	Commercial/Industrial	295	39	0	440	54	1	642	57	1	1377	51	1
	Public Garage	0	0	0	24	3	0	48	4	0	72	3	0
	Retail	467	61	1	146	18	0	151	13	0	764	28	0
	Total	**763**	**100**	**1**	**814**	**100**	**1**	**1128**	**100**	**2**	**2705**	**100**	**1**
Engineering Services	Electricity Sub Station	*[4]	*	*	32	17	0	53	22	0	86	20	0
	Sewage Works	*	*	*	122	64	0	137	56	0	259	59	0
	Water Reservoirs	*	*	*	36	19	0	56	23	0	92	21	0
	Total				**190**	**100**	**0**	**246**	**100**	**1**	**437**	**100**	**0**
Industrial	Industrial Use	3364	100	5	1511	73	2	2728	85	6	7603	88	4
	Open Veld	9	0	0	556	27	1	474	15	1	1039	12	1
	Total	**3373**	**100**	**5**	**2068**	**100**	**3**	**3202**	**100**	**7**	**8642**	**100**	**4**
Mining	Disturbed Land	*	*	*	1873	16	3	155	4	0	2027	12	1
	Evaporation Paddocks	6	0	0	402	3	1	15	0	0	422	3	0
	Industrial Use	34	2	0	358	3	1	96	3	0	487	3	0
	Mine Dumps	573	38	1	1542	13	2	186	5	0	2300	14	1
	Open Veld	122	8	0	2951	25	4	1922	51	4	4995	30	3
	Quarries/Borrow Pits	545	36	1	311	3	0	7	0	0	863	5	0
	Residential	21	1	0	205	2	0	30	1	0	257	2	0
	Sand Mines & Pits	51	3	0	17	0	0	0	0	0	68	0	0
	Slimes Dam	144	10	0	3955	34	6	1323	35	3	5421	32	3
	Total	**1495**	**100**	**2**	**11613**	**100**	**17**	**3734**	**100**	**8**	**16842**	**100**	**9**
Open Space	Disturbed Land	605	2	1	540	2	1	874	6	2	2019	3	1
	Golf Course	6	0	0	416	2	1	156	1	0	578	1	0
	Open Veld	18712	75	25	21330	84	31	12109	78	25	52151	79	27
	Parks And Passive Recreational Areas	4580	18	6	2938	12	4	2365	15	5	9884	15	5
	Road & Rail Reserves	757	3	1	25	0	0	0	0	0	782	1	0
	Conservation Areas	434	2	1	0	0	0	76	0	0	510	1	0
	Total	**25095**	**100**	**34**	**25249**	**100**	**36**	**15580**	**100**	**33**	**65924**	**100**	**34**
Residential	Farm Workers Houses	86	1	0	31	0	0	5	0	0	122	0	0
	Farmstead	422	3	1	120	1	0	73	1	0	615	1	0
	New Residential Development	347	2	0	245	2	0	215	2	0	808	2	0
	Residential	14289	89	19	10800	82	15	12495	94	26	37583	88	20
	Unsurveyed Informal Settlement	861	5	1	1943	15	3	570	4	1	3374	8	2
	Total	**16005**	**100**	**21**	**13139**	**100**	**19**	**13358**	**100**	**28**	**42502**	**100**	**22**
Services	Cemetery	93	4	0	267	13	0	235	13	0	595	10	0
	Community Hall	3	0	0	37	2	0	33	2	0	72	1	0
	Educational Facilities	718	32	1	483	23	1	367	20	1	1568	26	1
	Electricity Sub Station	46	2	0	1	0	0	0	0	0	48	1	0
	Emergency And Security Services	37	2	0	14	1	0	12	1	0	63	1	0
	Hazardous Waste Disposal Sites	236	10	0	64	3	0	0	0	0	300	5	0
	Health Services	59	3	0	69	3	0	46	3	0	174	3	0
	Institutional And Government	41	2	0	219	10	0	170	9	0	430	7	0
	Religious	0	0	0	8	0	0	4	0	0	12	0	0
	Sewage Works	72	3	0	46	2	0	0	0	0	117	2	0
	Sports Fields & Active Recreational Areas	935	41	1	716	34	1	861	48	2	2512	41	1
	Waste Disposal	15	1	0	170	8	0	63	4	0	249	4	0
	Total	**2255**	**100**	**3**	**2093**	**100**	**3**	**1791**	**100**	**3**	**6139**	**100**	**3**
Small Holdings	Commercial/Industrial	*	*	*	104	5	0	105	5	0	209	2	0
	Dry Land Agriculture	1726	25	2	28	1	0	106	5	0	1860	17	1
	Irrigated Agriculture	*	*	*	10	1	0	10	1	0	20	0	0
	Open Veld	*	*	*	1488	73	2	1493	76	3	2981	27	2
	Residential	5140	74	7	410	20	1	248	13	1	5798	53	3
	Unidentified	120	2	0	0	0	0	0	0	0	120	1	0
	Total	**6987**	**100**	**9**	**2041**	**100**	**3**	**1961**	**100**	**4**	**10989**	**100**	**6**
Transportation	Railway Station	405	90	1	226	15	0	73	3	0	704	16	0
	Road & Rail Reserves	43	10	0	1236	84	2	2301	96	5	3579	83	2
	Taxi Rank	*	*	*	16	1	0	27	1	0	43	1	0
	Total	**448**	**100**	**1**	**1478**	**100**	**2**	**2401**	**100**	**5**	**4326**	**100**	**2**
Unidentified	Unidentified	**33**	**100**	**0**	**48**	**100**	**0**	**120**	**100**	**0**	**200**	**100**	**0**
TOTALS	**Total**	**74679**		**100**	**69850**		**100**	**47624**		**100**	**192154**		**100**

[4] In the NSDR these elements were captured and included inr other categories. Please also note that the categories in which Electricity sub-stations and sewage works were captured are also not consistent though the three service delivery regions (reflected under “services” or “engineering services”).

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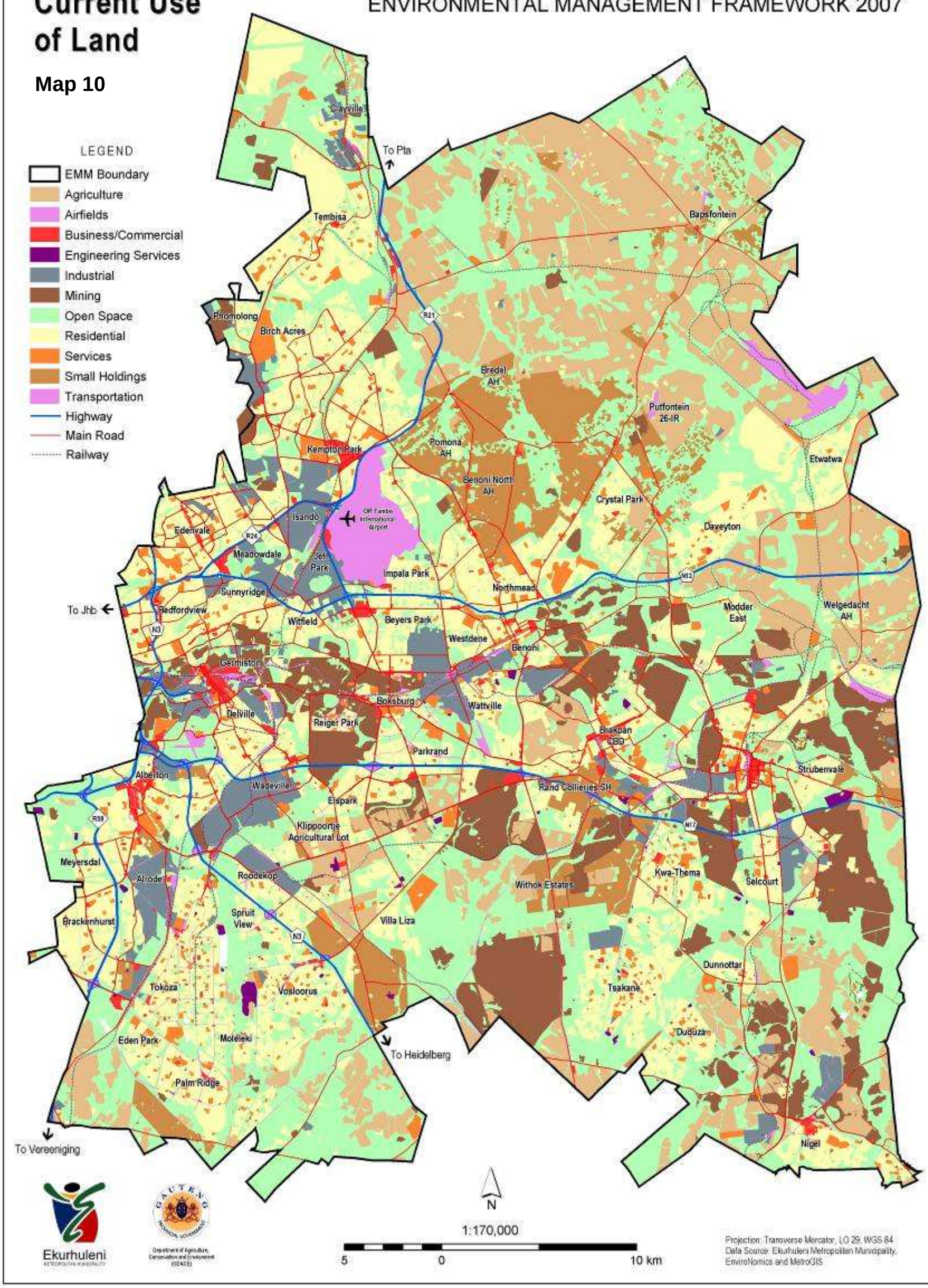
Current Use of Land

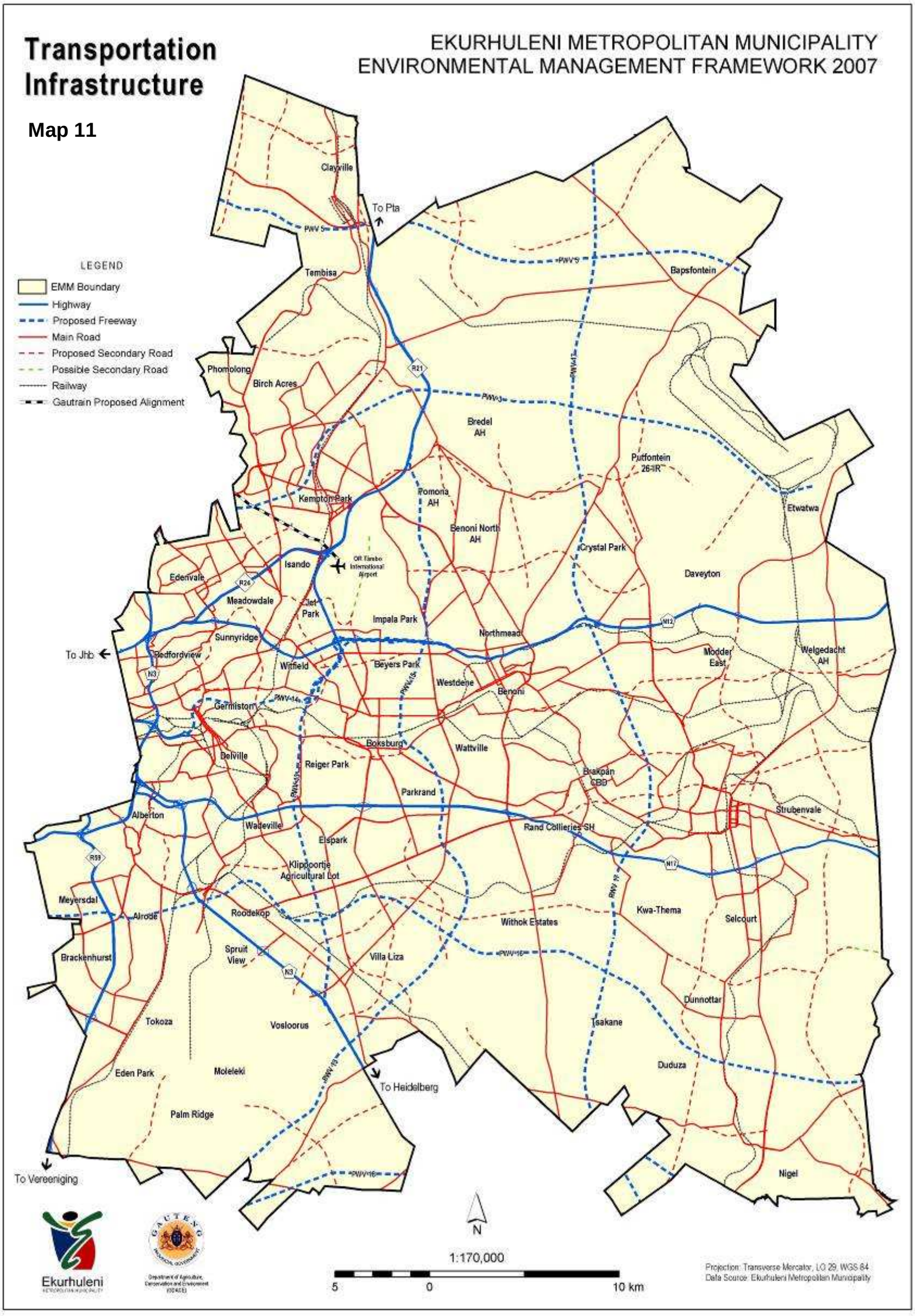
Map 10



Transportation Infrastructure

Map 11

EKURHULENI METROPOLITAN MUNICIPALITY
ENVIRONMENTAL MANAGEMENT FRAMEWORK 2007



13. Waste management

Domestic waste disposal

The Ekurhuleni Metropolitan Municipality offers a comprehensive waste management service in the area at substantial expenditure. Waste collection services are provided by the municipality, either with own staff and equipment, or through agents. Five strategically located landfill sites are operated in the area. In the Eastern Region, Weltevreden is permitted to receive general waste. Rietfontein is permitted to receive general waste as well as delisted waste, liquids and incinerated medical waste. In the Southern Region Rooikraal is permitted to receive general waste as well as asbestos powder and solids, while Simmer & Jack is permitted to receive general waste. In the Northern Region the private Chloorkop waste disposal site is permitted to receive general waste and the proposed new Zesfontein will receive only general waste.

The current life expectancy of the waste sites varies between 15 and 30 years, but in the light of the rapid growth being experienced in the areas these life expectancies may have to be adjusted downwards.

Four of these are situated in the southern service delivery area and the fifth one is located on the border between the northern and eastern service delivery regions. An additional site has been proposed for the northern region east of Bredell. This site will have a lifespan of seventy years if approved. The location of landfill sites are indicated on Map 12.

Disposal of waste on a landfill site

Operation of these sites is allocated to private waste management contractors under strict performance criteria. The sites were constructed to conform to the minimum requirements of the Department of Water Affairs and Forestry and are externally audited every year. Eight transfer sites are also operated where the waste is collected, compacted and loaded for transport in an effort to optimise the payloads of trucks. The private company, Enviroserv, operates a commercial landfill site at Chloorkop. Almost 1, 5 million tons of waste is handled annually at these landfill sites. The rate of disposal has increased by 6% per annum over the past three years. The expected lifespan of the sites are estimated from 14 years for the site at Simmer and Jack to 27 years for the site at Rooikraal and 30 to 70 years for the other sites. Public off-loading and voluntary recycling are available at each site. Safe disposal of household hazardous waste, such as batteries, oil and paint is provided at Rietfontein and Weltevreden sites.

The municipality launched its first project to extract methane and carbon dioxide from the Weltevreden site during 1998. The methane was initially compressed and used to power diesel engines of waste collection vehicles. The project was successful but not sustainable. Investigations into the potential use of landfill gas are, however, continuing. During 2004, four landfill sites were investigated for gas yield potential and extraction continued. Advantages of these schemes include; reduced risk of explosions, reduced emissions of greenhouse gases, more efficient use of dumping space, job creation, as well as energy production from sources other than fossil fuels.

Hazardous and industrial waste

The only hazardous landfill site in Gauteng is situated at Holfontein within the study area. It is operated by Enviroserve. This landfill site accepts all hazardous waste types including waste for encapsulation. The site accepts on average 263 446 tons of waste per annum. The quantity of hazardous waste received for disposal has increased by an average of less than 1% per year over the last three years. The landfill site at Platkop also accepts asbestos waste.

A facility for the treatment of hazardous waste through incineration has been established at Olifantsfontein. The plant accepts most hazardous waste types for destruction, including health-care risk waste and mercury. It is the only high temperature hazardous waste treatment plant in Gauteng.

Plastic in the waste stream

The EMM does not provide a comprehensive health-care risk waste treatment service. However, a privately-owned facility has been established at Dunswart. It treats 300 tons of health- care waste per month. Two thermal treatment facilities are planned for the EMM, one at Dunswart and one at Wadeville. A pilot system for the collection of small quantities of health-care waste (e.g. needles and dialysis equipment) from minor sources, were implemented. Small-scale sources, such as general practitioners, home users of needles, traditional healers and mortuaries are targeted.

Associated issues

An integrated waste management plan should be formulated that *inter alia* address the following issues:

- The potential water and air pollution of landfill sites;
- the identification of additional landfill sites in a strategic and environmentally risk averse manner to cater for the eventual closure of existing sites; and
- waste avoidance, reduction and recycling.

14. Pollution

Air, water and soil pollution sources in the study area include:

- Mines and quarries;
- Industry and transport;
- Landfill sites;
- Irrigated agriculture; and
- Sewage treatment plants.

Noise pollution is mainly caused by airports and major roads.

The potential pollution sources are indicated on Map 12.

Water pollution

Water pollution is discussed in previous chapters under the headings, *Hydrology* and *Water Quality.*

Air pollution

The Air Quality management plan for EMM, 2005, Identified the following sources to be significant in terms of their contributions to ambient air pollutant concentrations and associated health risks:

- Household fuel burning;
- Industrial and commercial fuel burning;
- Vehicle exhaust emissions;
- OR Tambo International Airport;
- Unrehabilitated tailings and impoundments; and
- Large industries associated with various stack, vent and fugitive emissions.

It also identified priority areas that may be subject to elevated levels of air pollutants that include:

- Household fuel burning areas;
- Central business districts and residential areas transacted by highways, on-ramps and main feeder roads;
- Residential areas in close proximity to industrial areas such as Olifantfontein, Clayville, Isando, Wadeville, Alrode, Benoni South, Apex, Nuffield and New Era;
- Residential areas in the proximity of the OR Tambo International airport; and
- Residential areas near uncontrolled mine tailing dams.

A potential pollution incident

Noise

Noise pollution sources are not static and change continuously.

The major sources of noise pollution in the study area are the OR Tambo Airport and high traffic volume roads and railway lines.

Noise contours around an airport change depending on factors such as number of take-offs and landings, improvement and changes in aircraft and airports, changes in flight paths, take-off and landing directions and frequency of use of certain runways.

Noise from OR Tambo Airport could impact on the future potential of the R21 development corridor.

Using current noise contours and the national noise standards as guides, the following limits are proposed:

- Sound sensitive land use such as hospitals and educational facilities should be restricted to areas outside the 45dB(A) contour.
- Residential and office development should be restricted to areas outside the 55dB(A) contour but should preferably be accommodated outside the 50dB(A) contour.
- Retail and general commercial activities should be restricted to areas outside the 60dB(A) contour, but preferably outside the 55dB(A) contour.
- Industrial activities should be restricted to areas outside the 70dB(A) contour, but preferably outside the 65dB(A) contour.
- No development of land uses other than service infrastructure should be allowed inside the 75dB(A) contour.

Freeways are significant sources of noise

Noise contours for roads and railway lines in the study area are not available. The same criteria as for OR Tambo International Airport and other airports should be applied. It is recommended that noise impact assessments be undertaken in zones of 800 m from all major highways and roads in the area, and where educational and health care facilities, as well as residential and office development are being considered.

Impact of mining on groundwater

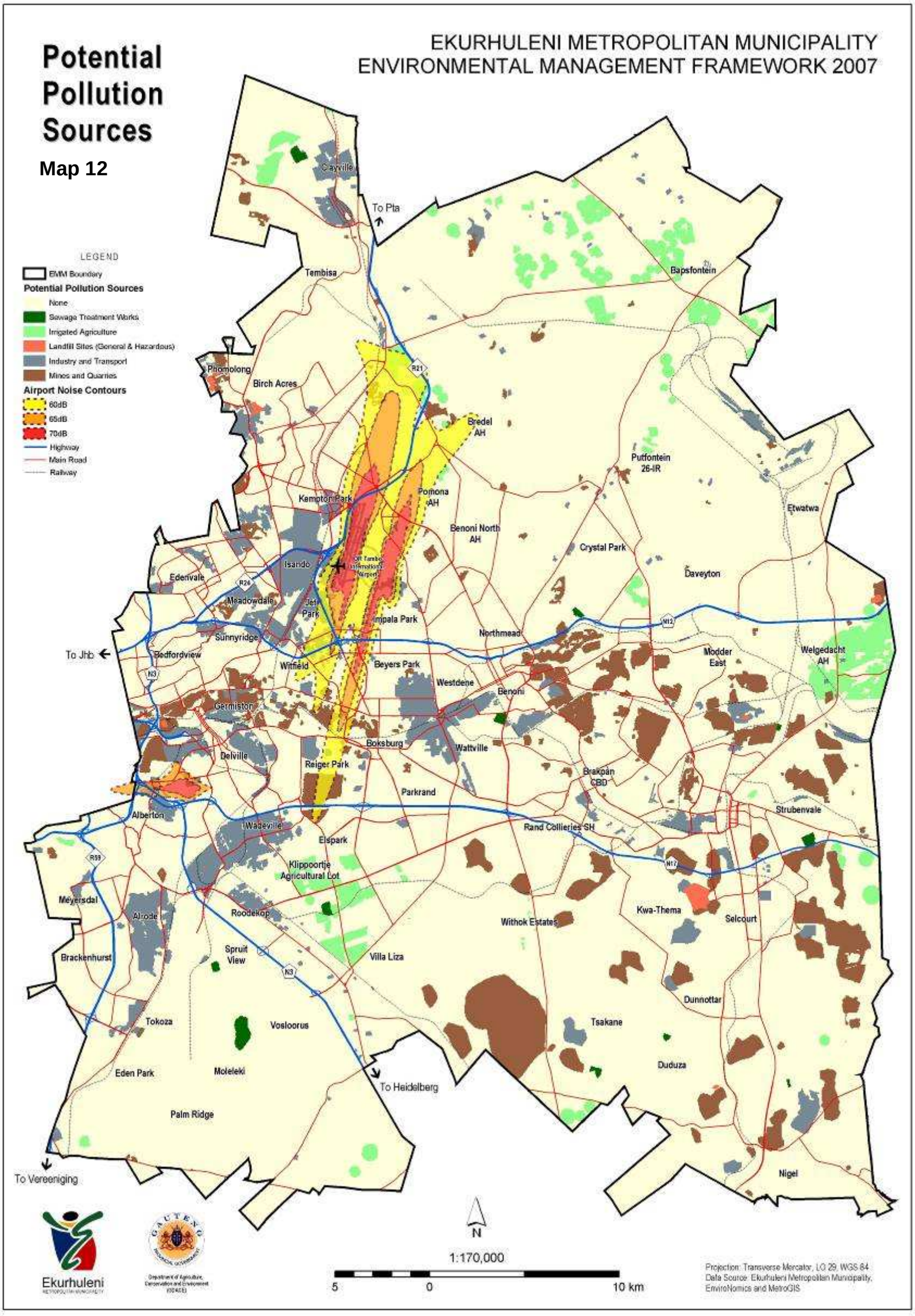
Mining in the areas has a significant impact on the quality (especially acidification) of groundwater as well on fluctuations of the water levels in the area. Inadequate information in this respect is available at this stage to make definite recommendations. There is a need to investigate the matter further and if the relevant information cannot be obtained from the Department of Minerals and Energy, extensive further studies may be necessary.

The potential impact of radon gas emissions and the general toxicity of soils should be investigated where it is proposed to reuse old slimes dam sites before plans for the re-use of such areas are formulated. The assessments should focus on finding the most appropriate land use options for such areas.

Potential Pollution Sources

Map 12

EKURHULENI METROPOLITAN MUNICIPALITY
ENVIRONMENTAL MANAGEMENT FRAMEWORK 2007



15. Cultural and historic features

Early history

The cultural heritage of the study area has been shaped by almost continuous human occupation over the past 500 000 years. Occupation of the area began during the early Stone Age and stretches through Iron Age settlement to colonial settlement in the 1840s. In the early years, human use of the area was focussed on hunting, gathering and farming. Relatively little has remained of early settlements, except in less disturbed areas, where development has not encroached on archaeological sites.

Stone Age sites probably occurred throughout the study area, but most have been obliterated by mining and other development activities.

A considerable number of Late Iron Age stone-walled sites, dating from the 18th and 19th centuries, occur along the top of rocky ridges in the area. Some of these may have been occupied as early as the 16th century. Pottery shards and metal items are common on the sites.

Sotho-Tswana speaking peoples who herded livestock, probably occupied these settlements. This occupation was disrupted during the *difiqane* when Mzilikazi lived near the Vaal River before he moved north across the Magaliesberg.

Recent history

The first Europeans appeared in the area during the early 1820s. They were hunters, traders, missionaries and explorers. Permanent occupation by Europeans started with the arrival of the Voortrekkers in the early 1840s. The farms which they occupied were only formally surveyed and mapped in the 1880s. The original farms were subdivided many times as the number of farmers increased.

The discovery of gold on the Witwatersrand completely changed the cultural heritage of the area. The discovery of coal led to the construction of railway lines to supply the gold fields with coal. The lines were linked to the Orange Free State and the Cape in 1892 and to Pretoria in 1893. The railway connection to Natal followed in 1896. All these lines connected at Elandsfontein (Germiston). The railway stimulated the development of villages and the supply of electricity became necessary. The first coal-fired power station north of the Vaal River was built at Brakpan in the 1890s.

Gold and coal was the driving force of the economy until it was superseded by commerce and manufacturing. Municipalities were proclaimed in the early 1900s.

The management of the cultural heritage of this area took place on *ad hoc* manner. Many heritage sites have been vandalised and/or neglected due to lack of funds, lack of capacity and low priority. This applies in particular to the following heritage resources:

- Old mining sites (headgear, offices, workshops, houses, compounds);
- Monuments and memorials;
- Cemeteries;
- Railway sites and;
- Late Iron Age sites.

A list of heritage resources are contained in the status quo reports on the three service delivery regions.

16. Population characteristics

Background

The EMM's area of jurisdiction includes the municipal areas of Kempton Park, Tembisa, Edenvale, Boksburg, Benoni (including Daveyton and Etwatwa), Brakpan (including Tsakane), Springs (including Kwa-Thema), Nigel (including Duduza), Germiston and Alberton.

Population distribution

Population growth for the total EMM area is 2,7% per annum. The largest portion of the EMM's population resides in the southern service delivery area (38%).The total population of the northern service delivery area has grown by more than 30% between 1996 and 2001, while the population in the southern and eastern service delivery area has grown by 20% during the same period.

Statistics on the various population groups during 2001 were as follows:

- Black 1 914 485
- Coloured 66 504
- Indian 32 228
- White 465 577

In the northern service delivery area, the Indian population has shown the highest growth of all groups over the period 1996 to 2001 (175,6%), while the same group grew by only 17,7% in the southern and eastern service delivery region.

The Coloured population grew by 78% in the northern region and by 14,8% in the south and east.

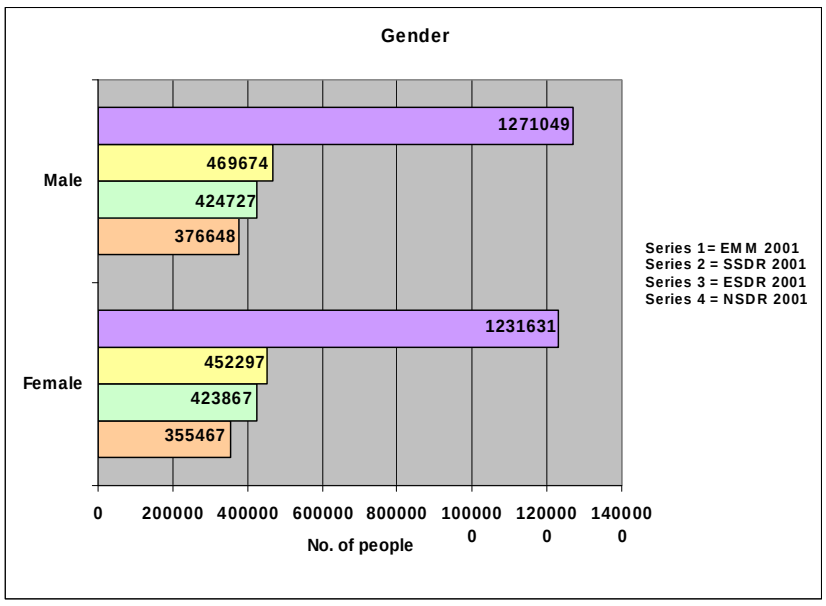
The Black population has shown the highest growth rate of all the groups in the east, as well as in the south (24%). The population of Blacks increased by 40% in the north.

The White population grew by 12,5% in the northern area and by 1,66% in the south and east.

Proportionately, the number of Black has has grown to 65% of the total population in the north and to 80,15% in the south and east. In the north, the proportion of Whites decreased from 39% to 34%, and from 14,85% to 12,53% in the south and east.

Population structure (age and gender)

The majority of people living in the EMM fall in the age group 15 to 35. Almost 51% are males.



Income distribution

In the northern service delivery region, 16% of households have no income, compared to 25% in the southern and eastern region. In the north, 44% of households have an

annual income of less than R19 200, compared to 60% in the southern and eastern region. While the northern region has both high and low income, the latter in informal settlements, the eastern and southern region is characterised by middle to high income areas, as well as low income in the informal settlements.

Education and literacy

In the entire EMM, 9% of the adult population have no schooling. In the year 1996 to 2001, the proportion of adults without any schooling decreased from 8,2 to 7,2% in the northern region and from 11,32 to 10,5% in the south and east.

People with a Grade 12 diploma increased from 28,8% to 33% in the northern region and from 19% to 24,6% in the south and east.

Individuals with a higher education increased from 8,9% to 14,8% in the north and from 4,67 to 7,45% in the south and east.

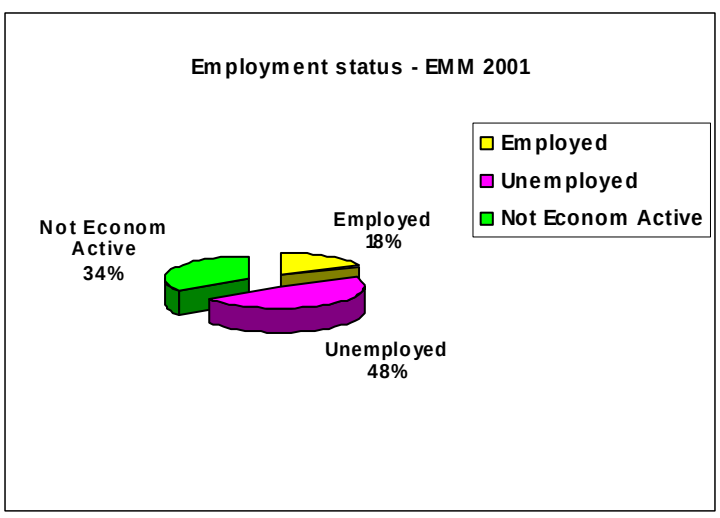
17. Economic characteristics

The economic output of Ekurhuleni in 2002 was R44,5 billion measured against constant 1995 prices. The EMM has set itself the following economic targets:

- Economic diversification;
- Job creation;
- Skills development;
- Tourism promotion;
- Investment promotion; and
- Economic transformation.

Employment sectors

According to the 2001 Sensus information the unemployment figure for the EMM is 48%.



Employment by sector for the entire study area is as follows:

- Manufacturing 22,9%
- Trade 20,2%
- Community services 15,7%
- Finance 13,6%
- Households 10,7%
- Transport 8,1%
- Construction 4,6%
- Mining 2%
- Electricity 1,1%
- Agriculture 1,1%

There is a growing trend to make use of labour contractors and temporary workers.

According to statistics it is evident that 19,54% of employed persons in the southern area work in elementary occupations (14,06% in craft or trade, 13% as clerks and 7% as professionals), while the percentage in the eastern area is 22% (15,8% in craft and trade, 12% as clerks and 5,4% as professionals). In the northern region, the figure is 17,9% (14,3% as clerks, 11% as technicians and service workers and 10% as professionals).

18. Economic drivers

Economic drivers are the influences and activities that underpin economic growth and development. There are two kinds of drivers, namely external drivers (legislation and policy) and internal drivers (economic activities).

External drivers

South Africa's government has entered into various treaties with its trade associates which impact on economic growth in the country. Various government policies also aim to address economic growth and development in the African continent as a whole (NEPAD). The fulfilment of the NEPAD initiatives will to a large extent rely on the Gauteng Trade and Industry Strategy 2003, as well as the Gauteng Province as a source of investment and resources.

Internal drivers

The various activities that drive the Ekurhuleni economy are as follows:

- Mining and quarrying: Do not contribute much to the GDP.
- Industry/Manufacturing: A significant portion of the economy is derived from manufactured goods.
- Electricity, gas and water supply is principally centred in Germiston and has a low contribution to the economy.
- Agriculture provides a marginal share (1%) of the GDP.
- Construction. The area experienced an overall increase of 14% in home construction between 2002 and 2003. Kempton Park had the highest increase (92%) in non-residential construction, while some areas, such as Edenvale and Boksburg, saw a decline.
- Wholesale and Trade. In the northern service delivery region, Eastgate and Eastrand Mall are the major retail trade centres, while the central business districts of Kempton Park, Edenvale and Bedfordview also contribute substantially to retail trade in the area. In the southern and eastern region, the central business districts of Germiston, Boksburg, Brakpan, Alberton, Springs, as well as smaller centres added almost R1,5 million net profit to the economy of the area.
- Transport and communication: This sector is the second biggest contributor to the economy of the northern service delivery region. This is mainly due to OR Tambo International Airport and the R21, as well as N12 corridor. The development of secondary industries, such as warehousing, logistics and export/import businesses in the area, is the result of the excellent locality and accessibility of the area. The Gautrain project will ensure a strategic investment of ± R7 billion and will create 57 000 jobs during construction and 2 200 jobs when completed.
- Financial services. This sector is concentrated in and around Germiston. It contributes approximately 20% of the gross value added value of the Ekurhuleni economy.
- Informal sector. Because of the informality of this sector, it is impossible to quantify.

Growth sectors

Sectors with the highest growth potential, are business tourism, transport and logistics, and residential development.

Transport and logistics, and business tourism are coupled with the presence of OR Tambo Airport while residential

development is coupled with a growing upper and middle class in post-apartheid South Africa.

19. Land use planning policies

A range of policy documents govern land use planning in the EMM. These include, *inter alia,* policies on accommodation establishment, crèches, home enterprises, rezoning of land, second dwellings, security townships, spaza shops, street naming, taverns, cellular masts and base stations, and guest houses. The Ekurhuleni Metropolitan Spatial Development Framework of 2005 is the primary tool for land use planning in this area. This framework is part of the Metropolitan Integrated Development Plan. The EMM has established three spatial planning levels:

- Metropolitan Spatial Development Framework;
- Regional Spatial Development Framework; and
- Local/Zonal/Precinct Spatial Development Framework.

These frameworks are not blueprints or master plans aimed at rigid control of all physical development. The aim is to provide strategic guidance for the location and nature of future development.

The urban development boundary

An urban development boundary has been identified. The main aim is to contain urban sprawl and to protect the rural character of the land surrounding the urban complex. Development is not prohibited outside this boundary, but land uses that are rural in nature are considered to be more desirable and are therefore promoted. These include extensive agriculture, regional open space and peripheral uses such as smallholdings, rural residential, low intensity service industries and urban agriculture.

Development objectives and principles

A series of principles and proposals have been formulated under the Spatial Development Framework in an effort to guide sustainable development inside the EMM. These include:

- To create a single, uniform identity for the EMM;
- enforce more effective control over land use;
- promote the development of a sustainable, compact urban structure;
- promote the development of industrial/commercial hubs, such as the OR Tambo International Airport and surrounding area;
- improve and expand the existing public transport system;
- develop the proposed provincial roads (e.g. PWV15 and 13) to improve mobility;
- upgrade existing internal road systems;
- find a balance between funding bulk municipal services and upgrading of services for lower income residential areas;
- finalise all outstanding demarcation of municipal boundaries;
- create a sustainable and continuous open space network that is accessible to the public;
- increase the rate of provision of subsidy housing and reduce the number and magnitude of informal settlements;
- integrate disadvantaged communities into the urban fabric;
- establish multi-purpose service/community centres close to communities;
- promote regeneration of central business districts and moribund industrial areas;
- identify and utilise land and facilities with the potential as skills training centres;
- optimise the job creation capacity of the formal economy; and
- establish an environment that will attract investment for the development of business in lower income areas.

Spatial structuring elements

The following spatial structuring elements were identified:

- The urban development boundary;
- OR Tambo International Airport and Rand Airport;
- freeways and major roads;
- railway lines and stations (including the Gautrain); and
- the R21 development corridor.

Precinct plans

Detailed precinct plans have been compiled. These are mainly plans for new development areas, especially areas where agricultural holdings or farm portions are changed to other land uses.

OR Tambo International Airport – gateway to South Africa

20. Public perceptions

Public participation and stakeholder engagement play an important role in the environmental management framework. Mawatsan was part of the team of specialists involved in this study. It conducted stakeholder engagement processes involving as many potential interested and affected parties as possible. This engagement process gave stakeholders the opportunity to participate and ensure that their needs and requirements will be taken into consideration in the planning process.

Advertisements were placed in a variety of local newspapers, an open day was held and public surveys were conducted.

Respondents were requested to indicate their views on the general sensitivity of the environment, their views on pollution in the area and on other critical issues.

The concerns expressed were in line with concerns expressed in other areas in South Africa:

- A need for the promotion of local equity (job creation, poverty alleviation, and social benefits for the previously disadvantaged);
- the need for an integrated development approach;
- the need for promoting environmental sustainability.

During the survey, respondents were asked to articulate specific needs. All needs were of a development nature, such as, electricity, housing, water supplies, clinics and hospitals, schools, job creation and safety and security.

SECTION B: STRATEGIC ENVIRONMENTAL MANAGEMENT PLAN

21. Introduction to the SEMP

The strategic environmental management plan is the result of the integration of the baseline information as contained in the baseline information after assessing it in terms of current policies and after key stakeholders were consulted. Development constraint zones and geographical areas in term of NEMA could then be formulated.

The main purpose of the strategic environmental management plan is to establish constraint zones and geographical areas within which some additional activities are proposed to be listed for impact assessment in certain areas, while a number of exiting activities on the list for impact assessment is proposed to be excluded from having to under impact assessment.

The development constraint zones (as reflected in the environmental parameters for development on Map 13) indicate the environmental suitability of land parcels for various types of land uses or activities. The management plan does not specify which land uses should occur in which zones, but rather indicate specific minimum environmental requirements which must be met before applications for development projects can be considered. The strategic environmental management plan also indicates the level of assessment required and should be used as environmental input in the integrated development plan. It fulfils the requirements for environmental management set by the GDACE and EMM and does not impose land uses on the planning processes of the EMM.

22. Development constraint zones

Five constraint zones were identified namely:

- Low to no constraint zone;
- Agricultural constraint zone;
- Geotechnical constraint zone;
- Hydrological constraint zone; and
- Ecological constraint zone

In many places these constraint zones overlap and combinations of constraints occur. The zones are reflected on Map 13 in a hierarchy of low to high for visual purposes. It must be remembered that in certain areas it is actually layered and for accurate information abstraction the GIS layers should be used.

Low or no constraint zone

This zone consist of all the areas where there are no or low constraints to development (indicated as none on Map 13).
These are areas which are already developed to a high degree. Ecological, hydrological, agricultural and geotechnical constraints are mostly absent. Most developments can be considered, some without further assessment, some after basic assessment and others after scoping and environmental impact assessment.

Agricultural constraint zone

The agricultural constraint zone is defined by the agricultural hub and important agricultural sites, depicted on Map 7.

Grazing of animals and agricultural activities (excluding agro-industrial activities, abattoirs and feedlots) may be allowed without further assessment. Some land uses can be considered after basic assessment and may include residences and schools for farm workers, guest houses, engineering and service infrastructure, as well as retail and commercial activities for the farming community.

Scoping and environmental impact assessments should be undertaken for developments such as filling stations, agricultural processing and packaging, abattoirs and feedlots, as well as for subdivision of land for rural residential use.

Land uses that should not be considered include urban development, industrial activities, chemical storage facilities and any activities that produce effluent and can pollute water.

Geotechnical constraint zone

This constraint zone is made up out of *dolomite areas, undermined areas* and *holings*[5] as depicted on Map 4.

Conservation activities and land use, as well as grazing of animals, sport fields, recreational areas and certain agricultural activities can be allowed without further assessment. Certain land use and activities such as educational, retail, residential, industrial, engineering services, filling stations and agricultural processing and packaging may be considered after geotechnical investigations.

Land uses producing effluent that can cause water pollution should not be allowed.

Hydrological constraint zone

The hydrological constraint zone consists of the watercourses, dams, pans and wetlands as depicted on Map 5.

Conservation land use or activities aimed at conservation can be allowed without further assessment. Certain conservation-related infrastructure, essential engineering services such as road, rail, pipeline and cable crossings, bridges, outfall sewers and storm water systems, can only be considered after environmental impact assessment. Similarly, urban open space containing recreational facilities and developments that cover wide areas and impact on sensitive areas, should be subject to environmental impact assessments.

Any land use or activity that will have a negative impact on vegetation cover or the hydrological function of an area, should not be allowed.

Ecological constraint zone

Ecological constraint zone consist of natural vegetation areas as depicted on Map 8. It however does not include any of the elements in the hydrological constraint zone as all the parameters for the ecological constraint zone is also present in the hydrological constraint zone.

Conservation land use or activities aimed at conservation can be allowed without further assessment. Certain conservation-related infrastructure, essential engineering services such as road, rail, pipeline and cable crossings, bridges, outfall sewers and storm water systems, can only be considered after environmental impact assessment. Similarly, urban open space containing recreational facilities and developments that cover wide areas and impact on sensitive areas, should be subject to environmental impact assessments.

Any land use or activity that will have a negative impact on vegetation cover or the hydrological function of an area, should not be allowed.

Pollution and noise constraints

Areas with potential noise and pollution constraints are indicated on Map 14. Development proposals must take these potential constraints into account by applying the relevant government policies and standards.

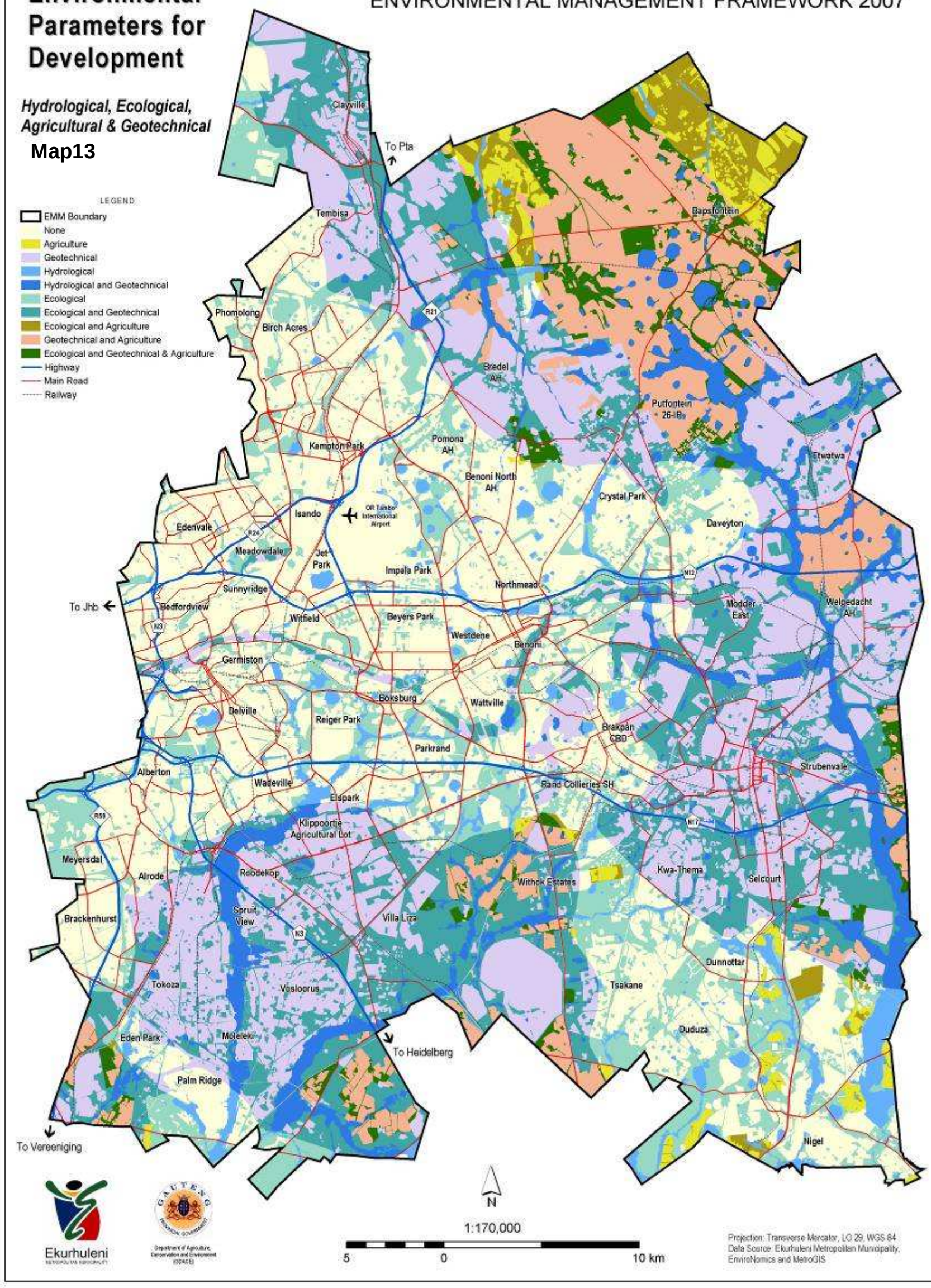
[5] "Holings" is a term that is used for holes that break the surface in undermined areas an can be anything from old shafts to sinkholes into undermined areas.

EKURHULENI METROPOLITAN MUNICIPALITY
ENVIRONMENTAL MANAGEMENT FRAMEWORK 2007

Environmental Parameters for Development

Hydrological, Ecological, Agricultural & Geotechnical

Map13

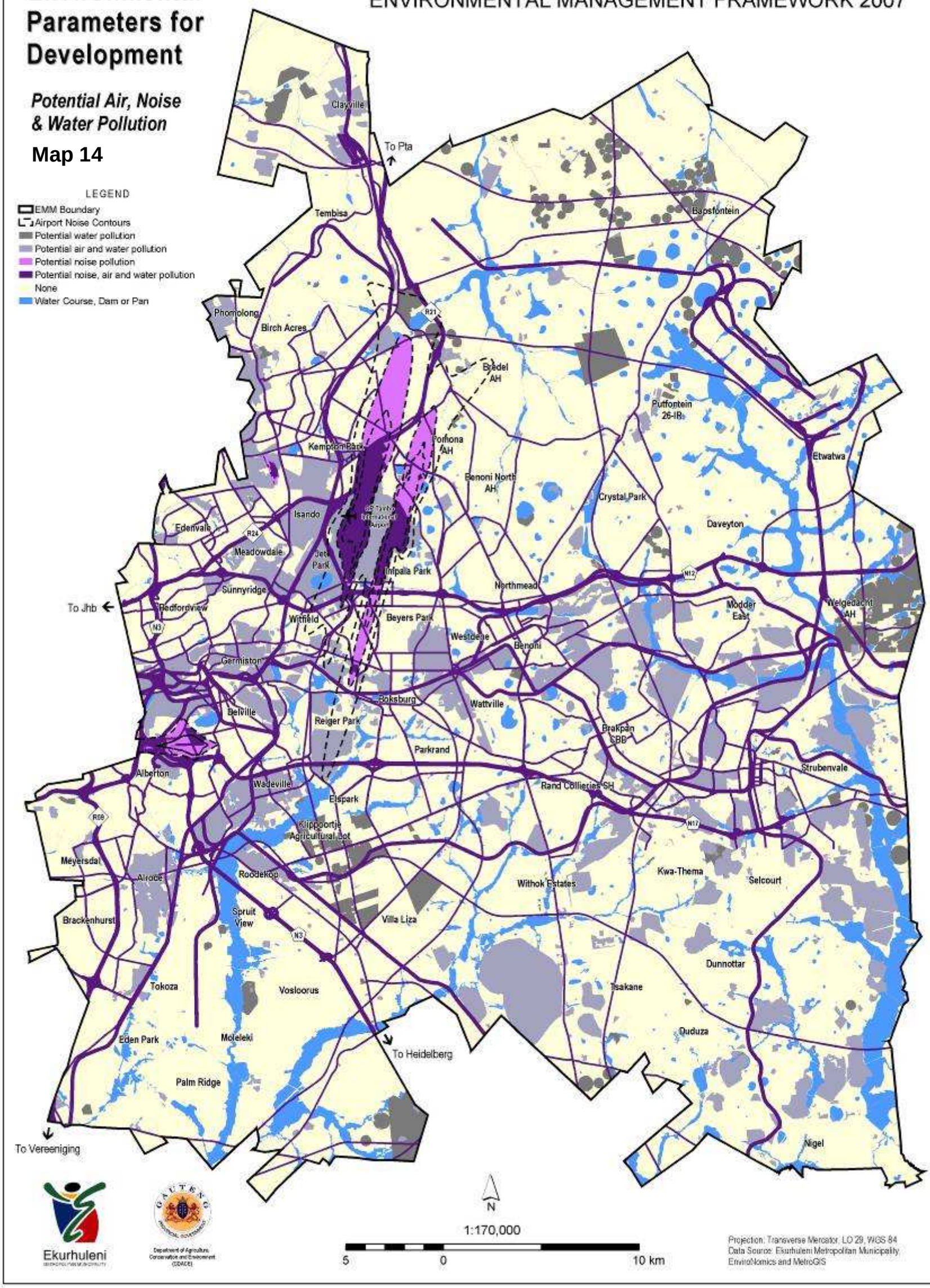


Environmental Parameters for Development

Potential Air, Noise & Water Pollution

Map 14

EKURHULENI METROPOLITAN MUNICIPALITY
ENVIRONMENTAL MANAGEMENT FRAMEWORK 2007



23. Areas identified in terms of NEMA

Areas identified in terms of section 22(2)(b) of NEMA

This section deals with the identification of areas and the specification of activities in terms of section 24(2)(b) of NEMA. The identification of geographical areas was based on environmental attributes of the areas. Identified areas also overlap with other identified areas in some instances and some areas are wholly contained within other areas. This is not clear and not possible to display on the map in the report at the scale in which it is represented. It must therefore be interpreted from the GIS. The approach adopted consists of a matrix of identified geographical areas within which the areas are defined according to their environmental attributes that are linked to specified activities. The end result is a spatial data layer that consists of facets that are each made up of one or more identified areas as displayed on Map 17. Each facet type (each possible combination of identified geographical areas) is linked to a unique list of specified activities.

Dolomite cavity showing the exposed rock

A typical housing development

Table 5: Area/activity matrix for additional specified activities in identified geographical areas

Activity No.	Specified activities	GEOGRAPHICAL AREAS[6]								
		Rivers and wetland	Conservation areas	C-Plan 2 irreplaceable sites	Ridges	C-Plan 2 important sites	Dolomite and undermined land	High potential agricultural land	Air and water pollution risk	Water pollution risk zones
1.	The construction or creation, of any path, track, or road for motorized vehicles	B	B	B	B					
2.	The construction of facilities or infrastructure, including associated structures or infrastructure for resorts, lodges, hotels, tourism and hospitality facilities including associated conference facilities	B	B	B	B	B				
3.	The establishment of structures or infrastructure for camping sites, picnic sites, braai areas, look-out points or recreational activities with an extent of greater than 100m^2	B	B	B	B					
4.	Transformation or removal of indigenous vegetation of an area greater than 100m^2	B	B	B	B	B				
5.	The construction of facilities or infrastructure, including associated structures or infrastructure, for the generation of water pressure by means of elevated water pressure tanks with a combined capacity of 10 000 liters or more, or where the top of the structure is higher than 4.5m, measured from the ground	B	B	B	B					
6.	The installation of underground pipelines and cables with a length greater than 100m in length with a trench width in excess of 0.5m				B					
7.	The construction of facilities or infrastructure, including associated structures or infrastructure, for above-ground electricity supply and telecommunication lines.		B	B	B					
9.	The draining of a wetland			B						
10.	The change of agricultural land use to any other use							B		
11.	The release of untreated sewage and effluent into the ground						B			
12.	The abstraction of groundwater						B			
13	The establishment of new residential townships								B	
14	The use of surface water for human consumption									B

[6] (B indicates “Basic Assessment” and S indicates “Scoping and EIA”.

Areas Identified terms of section 22(2)(c) of NEMA

This section deals with the identification of areas and the specification of activities in terms of sections 24(2)(c) of the Act. The specified activities on the national lists are excluded from Basic Assessment (Government Notice R. 386) or Scoping and EIA (Government Notice R. 387), as the case may be within the indicated identified geographical areas as represented on Map 17.

Road construction

The purpose is to limit the number of applications to the minimum that are necessary.

Table 6: Area/Activity matrix for the exclusion of certain activities from assessment

Activity number [7]	Activity description	Industrial and commercial areas	Built-up areas	Mine surface land
EXCLUDED FROM BASIC ASSESSMENT				
1(a)	The construction of facilities or infrastructure, including associated structures or infrastructure, for the generation of electricity where the electricity output is more than 10 megawatts but less than 20 megawatts	**X**		**X**
1(b)	The construction of facilities or infrastructure, including associated structures or infrastructure, for the above ground storage of less than 50 000 tons of ore, where the ore is stored indoors.	**X**		**X**
1(e)	The construction of facilities or infrastructure, including associated structures or infrastructure, for any purpose where lawns, playing fields or sports tracks covering an area of more than three hectares, but less than 10 hectares, will be established.	**X**	**X**	**X**
1(f)	The construction of facilities or infrastructure, including associated structures or infrastructure, for sports facilities with the capacity to hold 8000 spectators or more.	**X**		**X**
1(i)	The construction of facilities or infrastructure, including associated structures or infrastructure, for aquaculture production, including mariculture and algae farms, with a product throughput of 10 000 kilograms or more per year;	**X**		**X**
1(k)	The construction of facilities or infrastructure, including associated structures or infrastructure, for the bulk transportation of sewage and water, including stormwater, in pipelines with - (i) an internal diameter of 0,36 metres or more; or (ii) a peak throughput of 120 litres per second or more.	**X**	**X**	**X**
1(l)	The construction of facilities or infrastructure, including associated structures or infrastructure, for the transmission and distribution of electricity above ground with a capacity of more than 33 kilovolts and less than 120 kilovolts.	**X**	**X**	**X**
1(o)	The construction of facilities or infrastructure, including associated structures or infrastructure, for the recycling, re-use, handling, temporary storage or treatment of general waste with a throughput capacity of 20 cubic metres or more daily average measured over a period of 30 days, but less than 50 tons daily average measured over a period of 30 days.	**X**		**X**
1(p)	The temporary storage of hazardous waste	**X**		**X**
1(q)	The construction of facilities or infrastructure, including associated structures or infrastructure, for the parking and maintenance of aircraft including - (iii) structures for equipment and aircraft storage; (iv) structures for maintenance and repair (vi) structures for air cargo handling.	**X**		**X**
1(u)	The construction of facilities or infrastructure, including associated structures or infrastructure, for above ground cableways and funiculars	**X**	**X**	**X**
14i.	The construction of masts of any material or type and that do not exceed 35 metres in height.	**X**		**X**
14ii.	The construction of masts of any material or type and that do not exceed 20 metres in height.		**X**	
15.	The construction of a road that is wider than 4 metres or that has a reserve wider than 6 metres, excluding roads that fall within the ambit of another listed activity or which are access roads of less than 30 metres long.	**X**	**X**	**X**
16.	The transformation of undeveloped, vacant or derelict land to – (a) establish infill development covering an area of 5 hectares or more, but less than 20 hectares; or (b) residential, mixed, retail, commercial, industrial or institutional use where such development does not constitute infill and where the total area to be transformed is bigger than 1 hectare	**X**	**X**	**X**
18.	The subdivision of portions of land 9 hectares or larger into portions of 5 hectares or less.	**X**	**X**	**X**
EXCLUDED FROM SCOPING AND EIA				
1(s)	The construction of facilities or infrastructure, including associated structures or infrastructure, for rail transportation, excluding railway lines and sidings in industrial areas and underground railway lines in mines, but including – (i) railway lines;	**X**	**X**	**X**
2.	Any development activity, including associated structures and infrastructure, where the total area of the developed area is, or is intended to be, 20 hectares or more.	**X**		**X**
5.	The route determination of roads and design of associated physical infrastructure, including roads that have not yet been built for which routes have been determined before the publication of this notice and which has not been authorised by a competent authority in terms of the Environmental Impact Assessment Regulations, 2006 made under section 24(5) of the Act and published in Government Notice No. R. 385 of 2006, where – (a) it is a national road as defined in section 40 of the South African National Roads Agency Limited and National Roads Act, 1998 (Act No. 7 of 1998); (b) it is a road administered by a provincial authority; (c) the road reserve is wider than 30 metres; or the road will cater for more than one lane of traffic in both directions.	**X**		**X**

The R21 Development Corridor

The listed activities as defined in Tables 6 and 7 as well as the relevant national lists in terms of the EIA Regulations, 2006, will also apply in the R 21 Development Corridor as defined in paragraph 2.5.9 of the Environmental Management Framework of the Northern Service Delivery Region of the Ekurhuleni Metropolitan Municipality and the R21 Corridor Local Spatial Development Framework (LSDF). The evaluation of applications should however take cognisance of the planning precincts defined in the LSDF.

[7] Refer to number in Government Notice R.386 of 21 April 2006.

Geographical Areas

EKURHULENI METROPOLITAN MUNICIPALITY
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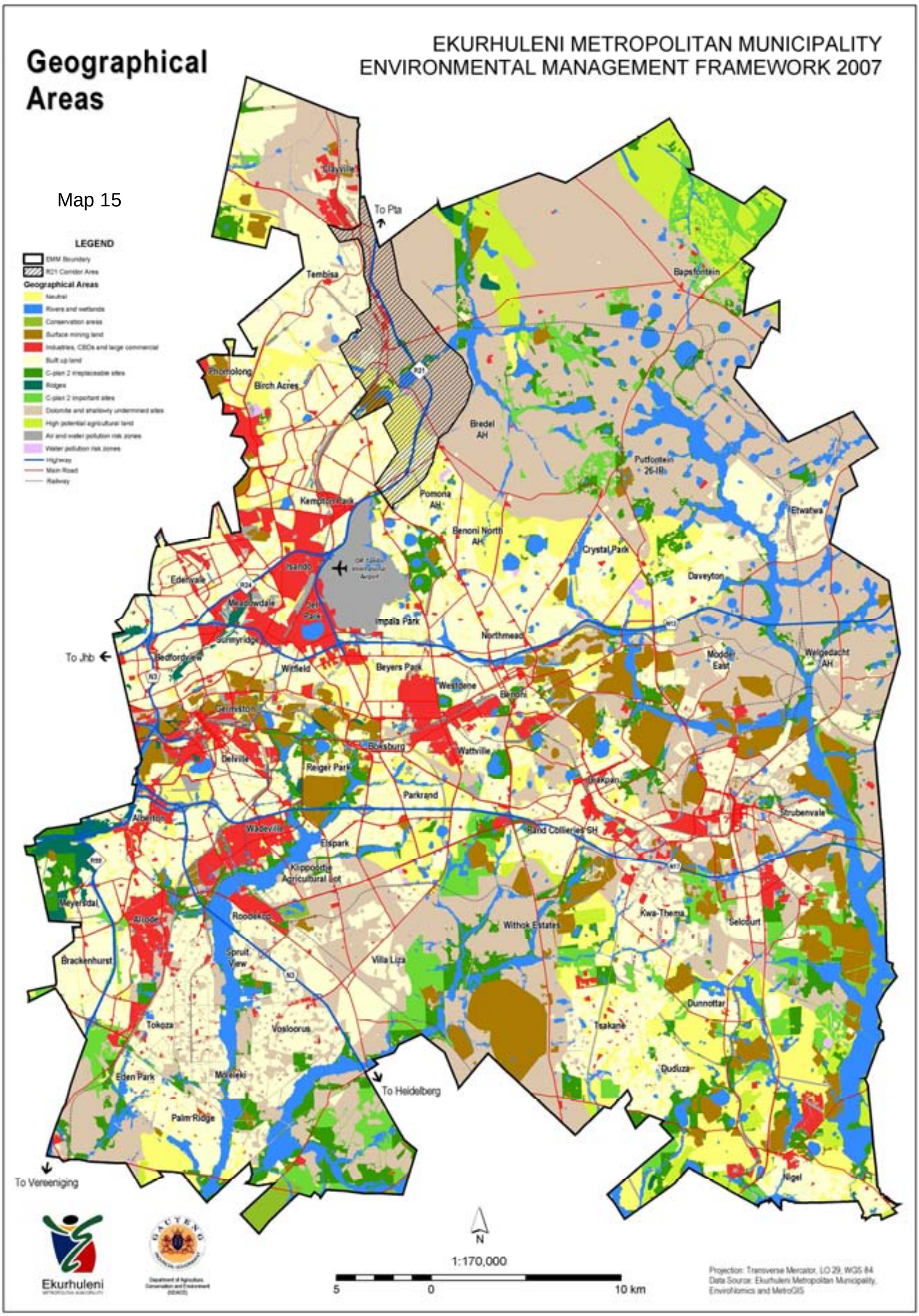
Map 15



SECTION C: ENVIRONMENTAL STRATEGY

24. Introduction to strategy

In an effort to achieve sustainable development in the area, it is necessary to formulate an environmental strategy. Such a strategy will ensure that concerns in the environmental management framework are addressed by the authorities responsible for the area.

25. Key aspects that must be incorporated into the strategy

Sustainable development principles

The modern view of sustainability is that it is a relationship between a healthy environment, social well-being and economic prosperity. It is not a trade-off between these aspects. In practice sustainable development should strive to accommodate two main objectives. Firstly, it should strive to improve the well-being of the present generation through equitable allocation and utilisation of resources. Secondly, it should strive to put future generations in a better situation than that experienced by the present generation.

The International Union for the Conservation of Nature (IUCN) has defined the following principles for sustainable development:

- Respect and care for the community of life;
- improving the quality of human life;
- conserving the earth's vitality and diversity;
- minimising the depletion of non-renewable resources;
- keeping within the earth's carrying capacity;
- changing personal attitudes and practices;
- enabling communities to care for the environment;
- providing frameworks for integrating development and conservation; and
- creating alliances at all levels.

Other principles

Environmental management principles contained in the ***National Environmental Management Act, 1998*** are extensive. The problem with these principles is that they are idealistic and often not attainable in the South African development context. These principles can only be used as a rough guide in decision-making, as a narrow interpretation will result in violation of the first principle – *" Environmental management must place people and their needs at the forefront of its concern and serve their physical, psychological, developmental, cultural and social interests equitably"*.

Principals were also published in the document, *Integrated Environmental Management Procedure* of the Department of Environmental Affairs and Tourism (1992). Again, these principles must be read in the context of the legislation and must be interpreted as wide guidelines.

Procedures

New procedures for environmental impact assessments came into force on 3 July 2006 with the publication of Government Notices 385, 386 and 387 of 21 April 2006. These new regulations now provide for environmental management frameworks. The purpose of environmental management frameworks is to:

- Provide a basis for identifying areas where environmental impact procedures for certain activities can be excluded; and
- Provide a mechanism for other authorities, such as municipalities, to control the environmental impact of certain activities in some areas through the planning process.

GDACE policies and guidelines

GDACE have several decision-support tools that are used in assessing development applications in Gauteng. These include:

- Gauteng Open Space Project Phase 2 (GDACE, 2001);
- Gauteng Agricultural Potential Atlas (GDACE, 2002);
- Development Guidelines for Ridges (GDACE, 2001);
- Information layers and buffer zones for industries, sewage treatment works, landfill sites and mine dumps (GDACE, 2002);
- Information layers and buffer zones for industries in Gauteng (GDACE, 2003).
- Geotechnical Suitability Study of Vacant Land in Gauteng Province (DPLG, 2002);
- Gauteng Communication Network Strategy (Gaucons) (GDACE, 2002);
- The Drafting and Promulgation of Provincial regulations in terms of Section 24 (2) of the National Environmental Management Act, 1998 (Act 107 of 1998) for Gauteng (2001);
- The concerns about potential detrimental environmental impacts of the resultant approach towards low-density (high income) residential developments by the Gauteng Department of Agriculture, Conservation, Environment and Land Affairs (GDACE, 2001);
- Red Data Plant Policy for Environmental Impact Evaluations (GDACE, 2001);
- A Conservation Plan for Gauteng (GDACE, 2003);
- EIA Administrative Guidelines: Guideline for the Construction and upgrade of filling stations and associated tank installations (GDACE, 2001); and
- Guidelines for the development of integrated waste management plans for local governments (2001).

Applicable legislation, policies and other guidelines

The following legislation, policies and guidelines should also be taken into account:

- The Constitution of the Republic of South Africa, 1996 (Act 108 of 1996);
- The Environment Conservation Act, 1989 (Act 73 of 1989), as amended;
- The National Environmental Management Act, 1998 (Act 107 of 1998)(NEMA);
- The National Environmental Management Amendment Act, 2003, (Act 46 of 2003);
- The National Environmental Management Amendment Act, 2004, (Act 8 of 2004);
- The Environment Conservation Amendment Act, 2003 (Act 50 of 2003);
- The Environmental Impact Assessment Regulations ;
- The National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004);
- The National Environmental Management: Protected Areas Act. 2004 (Act 57 of 2003);
- The Development Facilitation Act (DFA), 1995 (Act 67 of 1995); and
- The Gauteng Spatial Development Framework (GSDF); and
- The Intergovernmental Relations Framework Bill (2004).

26. Formulating an environmental strategy

Identifying priority issues

In a context of limited financial and institutional resources, effective environmental management means that government has to identify the most severe environmental problems because the range of issues that can be addressed is restricted. **Deciding what the priority environmental issues are, is a political process and not a technical one**. Communities affected by environmental degradation, major polluters, environmental experts, NGOs and government agencies should try to reach consensus on what the most critical problems are. This dialogue, however, needs to be informed by sound technical and socio-economic analysis.

The EMM EMF together with the Ekurhuleni State of the Environment Report provides a strong information base for the area. Priority issues need to be identified on the basis of transparent criteria. These criteria should include the impacts of environmental problems on aspects that are understood by people such as:

- human health;
- economic productivity;
- ecological functions;
- ecosystem integrity;
- amenity values;
- number of people affected;
- effects on the poor;
- risk and uncertainty;
- expert opinion; and
- public concerns.

From a provincial (GDACE) point of view the priority issues for the area are:

- Densification of urban development to make maximum use of existing infrastructure and to enhance the viability of future public services, thereby limiting the overall footprint of development on the environment;
- protection of high potential agricultural land to ensure that it remains available as a strategic resource for future generations;
- protection of biodiversity with emphasis on the protection of habitats where red data species occur;
- fighting poverty and building secure and sustainable communities; and
- enabling faster economic growth and job creation.

From a local authority perspective (EMM incorporating both the environmental, planning and housing functions) the priorities for the area are:

- The development of an urban core area that will define the city as a development growth centre;
- appropriate industrial and commercial development founded on the key strengths in the area especially in terms of the OR Tambo International Airport and the location of the area in terms of accessibility to the rest of Gauteng;
- the provision of appropriate residential areas to attract a skilled workforce to the area;
- the provision of adequate areas for the immense low-cost housing need in appropriate areas with adequate services and access to job opportunities and amenities; and
- the maintenance and expansion of the urban open space network as a key component in the urban structure.

From a public perspective[8] the main issues are:

- Creation of employment opportunities;
- provision of housing, especially for the poor; and
- maintenance of open space (of all kinds) and the development of more formal recreation and sport facilities.

Other significant issues raised by various parties include:

- The protection of water resources against all kinds of pollution;
- the minimisation of air pollution, especially in informal settlements and low cost housing areas; and
- the potential impact of noise, especially from the OR Tambo International Airport, on the development potential in the area.

Co-operative government

In formulating the strategy it is important that the different government agencies cooperate in a way that will attempt to address the priority issues in a systematic and logical manner. The roles and obligations of each agency should be clearly defined and a mechanism for conflict resolution should be established.

The Constitution of the Republic of South Africa requires all spheres of government to observe and adhere to the principles of cooperative government. The principles include, but are not limited to:

- Respect the constitutional status, institutions, powers and functions of government in the other spheres;
- not assume any power of function except those conferred on them in terms of the Constitution;
- exercise their powers and perform their functions in a manner that does not encroach on the geographical, functional or institutional integrity of government in another sphere; and
- cooperate with one another in mutual trust and good faith by:
    - fostering friendly relations;
    - assisting and supporting each other;
    - informing one another of, and consulting one another on matters of common interest;
    - coordinating their actions and legislation with one another;
    - adhering to agreed procedures; and
    - avoiding legal proceedings against one another.

The format, nature and structure for liaison between the authorities must be worked out between the authorities. A system that seems to work well in many countries is a committee comprising all authorities that meet on a regular basis that evaluates all issues and applications and make a joint or consensus recommendation to their respective decision makers. In this respect the following mechanisms already exist and should be explored:

- MEC/MMC meetings;
- the MEC/MMC Technical Working Group (TWG) meetings; and
- monthly EIA coordination meetings.

The role of the environmental management framework in the strategy

The EMF should form the basis for the strategy and should be used in the following ways:

- Inform policy and strategic decisions in respect of key government priorities such as provision for low cost housing;
- inform local authority planning;
- serve as a decision aide in the evaluation of impact assessments;
- inform decisions in respect to poverty alleviation and job creation; and
- serve as a conceptual guide to developers.

27. Environmental strategy

The environmental strategy can only have value if it determines the issues that must be addressed, suggests actions and allocate responsibility. In many instances it will require processes to be set in motion that will require action across different authorities.

It is important for the authorities to make capacity available to attend to the strategic priorities identified. Identified priorities will have to be incorporated into the functions of specific officials to ensure that they are in fact attended to. Different priorities will have to be attended to in different ways, which means that the interaction required for cooperative government will also differ from priority to priority. The following main types of interaction are foreseen:

- Where GDACE and the EMM share responsibility and have to cooperate and make joint decisions;
- Where GDACE has the responsibility for decision-making but the EMM should be consulted;
- Where the EMM has the responsibility for decision-making but GDACE should be consulted;
- Where GDACE has the sole responsibility;
- Where the EMM has the sole responsibility; and
- Where other authorities have to be consulted before decisions are made.

The protection and conservation of areas that are sensitive from an ecological and hydrological perspective

Areas of concern

The areas that should be covered include:

- GDACE provincial confirmed irreplaceable sites (biodiversity);
- rivers, streams and their floodplains;
- ridges;
- wetlands including sponge and seepage areas;
- areas of viable high quality remnant grassland;
- migration corridors and open space links; and
- existing protected areas.

Priority issues

The priority issues that were identified include:

- The extent of formally conserved areas should be increased;
- the majority of these areas fall within private properties, therefore complicating the conservation of these areas;
- inadequate funds are available at provincial and local level to buy out the areas;
- guidelines, policy and legislation exist but is fragmented, inaccessible and confusing (especially to the public);
- the mandates and jurisdiction of authorities overlap, creating uncertainty;
- emission and effluent cause pollution in these areas; and
- compliance and enforcement are inadequate.

Guidelines, policies and legal mechanisms

Guidelines, policy and legal mechanisms which are available, include:

- The National Environmental Management Act, 1998 (Act 107 of 1998)(NEMA)
- The National Environmental Management: Protected Areas Act, 2004 (Act 57 of 2003
- The National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004)
- The National Environmental Management Amendment Act, 2003, (Act 46 of 2003)
- The National Environmental Management Amendment Act, 2004, (Act 8 of 2004)
- The provincial Conservation Plan (C Plan) and related policies
- Gauteng Open Space Plan (GOSP)
- Gauteng Red Data Policy
- Gauteng Ridges Policy
- Town Planning Schemes
- Spatial development frameworks (SDF) and Integrated Development Plans (IDP)
- The Development Facilitation Act, 1995 (Act 67 of 1995).

Current programmes and projects

Current programmes and projects that could contribute include:

- Working for water (DWAF)
- River health project (DEAT)
- Land Care (GDACE).

Strategic priorities

Primary priorities include those actions that must be taken in order to achieve a desirable outcome for the priority issues listed above. They include:

- Clarify roles of provincial and local authorities. (Responsibility: GDACE and EMM together)
- Categorise areas in terms of ownership. (Responsibility: EMM)
- Prioritise and categorise areas in terms of sensitivity/conservation value. (Responsibility: GDACE in consultation with EMM)
- Prioritise and categorise areas in terms of current threats. (Responsibility: GDACE in consultation with EMM)
- Compile conservation plan (Responsibility: GDACE in consultation with EMM)
- Secure and formally conserve areas that belong to the government (local or provincial). (Responsibility: GDACE and EMM together)
- Monitor and compliance in conservation areas including monitoring of water quality. (Responsibility: GDACE and EMM together)
- Use Environmental education programmes – “duty of care” message. (Responsibility: EMM).

Secondary priorities include those actions that should be taken if capacity and funding allow. Addressing these priorities would contribute significantly to the management of areas that are sensitive from an ecological and hydrological perspective. They include:

- Acquire land for conservation according to priority where appropriate. (Responsibility: EMM or GDACE depending on level of conservation priority)
- Manage conservation areas (Responsibility: EMM or GDACE depending on ownership)
- Conceptualise, explain and make guidelines and policies accessible to the public in a user-friendly format. (Responsibility: EMM in concurrence with GDACE)
- Promote and ensure compliance and enforcement. (Responsibility: GDACE and EMM, coordinated by GDACE)
- Promote conservancies and other initiatives promoting conservation on private land. (Responsibility: EMM and GDACE together)
- Enter into public/private partnerships for the conservation of land. (Responsibility: EMM and GDACE together)
- Negotiate conservation/development compromises. (Responsibility: GDACE)

Protection and conservation of areas that have a high potential or value for agriculture

Areas of concern

The areas that should be covered include:

- Agricultural hubs; and
- Important agricultural sites.

Priority issues

The priority issues that were identified include:

- Importance of agriculture for job creation and economic growth;
- importance of agricultural production for food security. (National and provincial government sees agriculture, as a long-term strategic land use that must "feed the nation" and become one of the main drivers towards an industrialised country);
- importance of agriculture for black economic empowerment. Need to correct imbalances in terms of ownership (Agriculture is seen by national and provincial government as an industry that should contribute significantly to black empowerment);
- national and provincial government sees high potential agricultural land as a strategic resource that must be protected;
- local government sees agriculture as a high cost low return land use;
- development pressure on agricultural land use is severe in certain areas;
- current agriculture practices impacts negatively on bio-diversity in general and wetlands and hydrological systems specifically through ploughing, sedimentation and nutrient release;
- current economic activity suggests that supply in high potential agricultural land outstrips demand;
- the strong social demand for agriculture is impacted on by imbalances in land ownership and lack of accessibility to land for agriculture;
- economic pressure on agricultural cost structures makes commercial agricultural practices less and less viable over time (rise in operating costs and re-capitalisation outstrips rise in income by far);
- The perception that criminal activity has a negative impact on farming in highly accessible areas;
- inadequate funds available at national and provincial level to provide adequate incentives for farmers, including the acquisition of land for redistribution; and
- guidelines, policy and legislation exist but are fragmented, inaccessible and confusing.

Guidelines, policies and legal mechanisms

Guidelines, policy and legal mechanisms that are available:

- Agricultural Resources Act, 1970 (Act 70 of 1970);
- Gauteng Policy on the Protection of High Potential Agricultural Land (2006);
- Gauteng Growth and Economic Development Strategy; and
- Gauteng Strategy for Sustainable Development.

Current programmes and projects

Current programmes and projects that could contribute include:

- Resource audits;
- GAPA upgrades; and
- Rural Housing Strategy.

Strategic priorities

Primary priorities include those actions that must be taken in order to achieve a desirable outcome for the priority issues listed above. They include:

- Clarify roles of provincial and local authorities. (Responsibility: GDACE and EMM together);
- prioritise and categorise areas in terms of current threats. (Responsibility: GDACE in consultations with EMM);
- protect high potential agricultural land through zoning and development that creates defensible agricultural areas. (Responsibility: GDACE in consultation with EMM); and
- provide incentives to make access to land for agricultural purposes possible for previously disadvantaged people (Responsibility: DoA and GDACE).

Secondary priorities include those actions that should be taken if capacity and funding allow. Addressing these priorities would contribute significantly to the protection of areas with high agricultural potential. They include:

- Contextualise, explain and make guidelines and policies accessible to the public in a user-friendly format. (Responsibility: GDACE and EMM together);
- ensure compliance and enforcement where agriculture impact on the environment or where development impacts on the agricultural potential. (Responsibility: GDACE and EMM together);
- promote good agricultural practices. (Responsibility: GDACE);
- negotiate agriculture/development compromises. (Responsibility: GDACE); and
- agriculture education programme (Responsibility: GDACE).

Geotechnical constraints

Areas of concern

The areas that should be covered include:

- Unstable dolomitic areas; and
- shallowly undermined areas.

Priority issues

The priority issues that were identified include:

- Existing development on or close to dolines;
- excessive water abstraction from dolomitic areas;
- inappropriate engineering services;
- inadequate funds available at provincial and local level to buy out risk areas;
- guidelines, policy and legislation are vague, conflicting or non-existent;
- interpretation of information varies;
- the mandates and jurisdiction of authorities overlap; and
- compliance and enforcement is inadequate.

Guidelines, policies and legal mechanisms

Guidelines, policies and legal mechanisms which are available:

- National Water Act, 1998 (Act 36 of 1998);
- Dolomite Risk Management Plan approved for EMM 2004;
- NHBRC; and
- "Colour books".

Current programmes and projects

Current programmes and projects that could contribute include:

- Bapsfontein sinkhole study
- EMM RTCW dolomite study.

Strategic priorities

Primary priorities include those actions that must be taken in order to achieve a desirable outcome for the priority issues listed above. They include:

- Clarify roles of national, provincial and local authorities in respect of the priorities that follow;
- Identify currently developed areas that are at risk of sinkholes. (Responsibility: EMM);
- Develop a short-term contingency plan for currently developed areas that are at risk of sinkholes. (Responsibility: EMM); and
- Develop a medium to long-term relocation plan for currently developed areas that are at risk of sinkholes. (Responsibility: EMM in consultation with the Provincial Department of Housing and the national Department of Land Affairs).

Secondary priorities include those actions that should be taken if capacity and funding allow. Addressing these priorities would contribute significantly to lower risk and reduce costs for development. They include:

- Categorise areas in terms of risk (update and expansion of the Dolomite Risk Management Plan approved for EMM). (Responsibility: EMM); and
- ensure compliance and enforcement. (Responsibility: EMM)

Management of urban sprawl

Areas of concern

The areas that should be covered include:

- Areas suitable for "infill development";
- areas suitable for densification;
- areas inside the urban edge(s);
- areas outside the urban edge;
- areas where development will impact on the agricultural potential; and
- areas where development will impact on sensitive ecological, geological or hydrological features.

Priority issues

The priority issues that were identified include:

- Development must be contained to protect the natural environment and the agricultural potential;
- development must be at optimal density, but diverse and varied in density levels. It must use infrastructure and services optimally, thereby conserving energy and the need for additional infrastructure;
- demand for development is driven by factors such as amenity, visibility and accessibility and not necessarily location in relation to existing development;
- predicted accelerating influx of people into the area dominated by low to no income job seekers with a growing need for low cost housing;
- the urban edge concept is not commonly understood and has various interpretations;
- guidelines, policy and legislation exist but is fragmented, inaccessible and confusing;
- the mandates and jurisdiction of authorities overlap; and
- compliance and enforcement of existing legislation is inadequate.

Guidelines, policies and legal mechanisms

Guidelines, policies and legal mechanisms which are available:

- Strategic Development Frameworks;
- Integrated Development Plans;
- Gauteng Urban Edge Policy;
- Gauteng Densification Policy;
- National Housing Policy; and
- Development Facilitation Act.

Current programmes and projects

Current programmes and projects that could contribute include the R21 Corridor Project.

Strategic priorities

Primary priorities include those actions that must be taken in order to achieve a desirable outcome for the priority issues listed above. They include:

- Clarify roles of provincial and local authorities. (Responsibility: EMM and GDACE together);
- define the urban edge through a process that takes the priorities of conservation, agriculture and development into account. (Responsibility: EMM);
- categorise and grade "vacant" land, within the urban edge, in terms of suitability for development based on economic development criteria. (Responsibility: EMM);
- identify, define and protect sensitive areas and high potential agricultural land through planning mechanisms. (Responsibility: GDACE in consultation with EMM);
- promote higher densities in land use by various means. (Responsibility: EMM and GDACE together); and
- promote mixed densities and community centred development where people of different economic means can share amenities. (Responsibility: EMM and GDACE together).

Secondary priorities include those actions that should be taken to if capacity and funding allow. They include:

- Contextualise, explain and make guidelines and policies accessible to the public in a user-friendly format (give one government message). (Responsibility: EMM in consultation with GDACE); and
- negotiate conservation/agriculture/development/ compromises and synergies. (Responsibility: EMM and GDACE).

Management of urban open space

Areas of concern

The areas that should be covered include:

- Areas with hydrological and/or ecological functions;
- dams, lakes, pans, rivers and streams;
- sport fields; and
- formal parks.

Priority issues

The priority issues that were identified include:

- Maintenance of parks;
- protecting hydrological and ecological functions; and
- people feel there is a shortage in supply of parks for recreation and sport in the area.

Guidelines, policies and legal mechanisms

Guidelines, policies and legal mechanisms which are available:

- Strategic Development Frameworks; and
- Integrated Development Plans.

Current programmes and projects

No current programmes and projects that could contribute exist.

Strategic priorities

Primary priorities include those actions that must be taken in order to achieve a desirable outcome for the priority issues listed above. They include:

- Clarify roles of provincial and local authorities; and
- maintain existing urban open space in an acceptable condition (EMM).

Secondary priorities include those actions that should be taken if capacity and funding allow. They include:

- Ensure more urban open space, including sport facilities in new developments (EMM).

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