Bid No. DEN 09/10/ENV

Environmental Management Framework for John Taolo Gaetsewe District Municipality

28 February, 2011

Literature Review

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1 REPORT OVERVIEW

1.1 Introduction

The aim of the Literature Review is to ensure a sound base for the development of the Environmental Management Framework (EMF) for the John Taolo Gaetsewe District Municipality (JTGDM). This document will therefore act as a gap analysis of any relevant documentation for the area as well as the legislative requirements for EMF studies. This information will be used to inform the EMF on issues which need to be addressed in the subsequent phases of the project.

All relevant legislation including any possible environmental by-laws pertinent to this study has been identified as well as local and provincial policies and guidelines. Specialist studies are also scanned to identify areas where more investigation is needed as well as areas of high importance. The literature is then interpreted and all major implications for the EMF identified.

A summary section is also provided for a brief description on various specialist studies conducted for the area. The summary section focuses on background information presented in each document and not necessarily a description of the information applicable for John Taolo Gaetsewe District Municipality. However, the key findings of each section provide either a description or a listing of the information that is useful for the EMF.

1.2 Project Area

Northern Cape Department of Environment and Nature Conservation (JTGDM) is one of 4 districts in the Northern Cape, and consists of 3 Local Municipalities (Moshaweng, Ga-Segonyani, Gamagara) and a District Management Area (DMA).

The John Taolo Gaetsewe Municipal Area is characterised by a mixture of land uses of which agriculture and mining are dominant. JTGDM was the richest mining region in the Northern Cape until a decline in mining employment and the near extinction of the asbestos mining industry in the 1980s. Today, minerals mined include manganese ore, iron ore and tiger's eye. The Sishen iron-ore mine is one of the largest open-cast mines in the world and the iron-ore railway from Sishen to Saldanha is one of the longest iron-ore carriers in the world. The rural land in the district is used extensively for cattle, sheep, goat and game farming. The area is also well known for its good commercial hunting in the winter, and holds potential as a tourism destination.

The District has a population of less than 200 000 persons, the majority of which reside in the Moshaweng municipal area. The District is mostly occupied by rural communities who have poor access to services and low level of skills. Within the whole District there is a recorded negative growth of population. The biggest contributing factor to the negative growth is HIV/AIDS and migration of people out of the district. Within the district, migration is mainly from the most rural areas such as Moshaweng to the urban areas such as Kuruman and Kathu. This is a very important consideration for the development of the EMF.

2 SUMMARY TABLE

The table below provides a list of documents included in this literature review:

TABLE 1: LIST OF ALL THE DOCUMENTS REVIEWED IN THIS REPORT

	NAME OF REPORT	DATE
A. LOCAL DOCUMENTATION AND STUDIES		
	Moshaweng Local Municipality Spatial Development Framework (SDF)	**2005**
	Ga-Segonyana Local Municipality Revised Integrated Development Plan (IDP)	**2009/2010**
	Ga-Segonyana Local Municipality Spatial Development Framework	**2007**
	Gamagara Local Municipality Spatial Development Framework	**2008**
	Kgalagadi District Municipality Spatial Development Framework	**2006/2007**
	John Taolo Gaetsewe District Municipality: Synopsis of the Review Integrated Development Plan 2010-2011 Financial Year	**2010-2011**
B. PROVINCIAL DOCUMENTATION AND STUDIES		
	Northern Cape State of the Environment Report:	**2004**
	• Atmosphere and Climate Change Specialist Report	
	• Biodiversity Specialist Report	
	• Human Settlements Specialist Report	
	• Land Specialist Report	
	• Freshwater Specialist Report	
C. OTHER SOURCES OF INFORMATION		
	Kumba Iron Ore: Sustainable Development Report Review *Private*	**2009**
	Kathu Forest declared a protected woodland *WESSA*	**2009**
D. ENVIRONMENTAL LEGISLATION		
	The National Environmental Management Act, 1998 (Act No 107 of 1998) (NEMA)	**1998**
	The Development Facilitation Act, 1995 (Act No 67 of 1995) (DFA)	**1995**
	The National Environmental Management: Protected Areas Act, 2003 (Act No 57 of 2003) (NEM:PAA)	**2003**
	The National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) (NEM:BA)	**2004**
	Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002) (MPRDA)	**2002**
	Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983)	**1983**
E. ENVIRONMENTAL REGULATIONS		
	Environmental Impact Assessment regulations in terms of Chapter 5 of NEMA (Act 107 of 1998) as published in Government Notice R.543 of 18 June 2010.	**1998**

3 LOCAL DOCUMENTATION / STUDIES

3.1 Kgalagadi District Municipality Spatial Development Framework (2006/2007)

3.1.1 District Composition

The Kgalagadi District Municipality (previous name for John Taolo Gaetsewe District Municipality) is one of 4 districts in the Northern Cape, and consists of 3 Local Municipalities (Moshaweng, Ga-Seonyani, Gamagara) and the District Management Area (DMA). Within these local municipalities there are 186 towns and settlements of which the 80% are villages in the Moshaweng Local Municipality.

Of the total population 25.5% have no education with only 1.9% having completed tertiary education. Unemployment is at 18.8% with the majority (58.6%) of the population under the age of 15 and therefore do not contribute to economic growth.

Land uses and settlements of the region are mainly characterised as Stock farming, Parks and nature reserves, Mining and mining settlements, and Agriculture and agro-processing. The land uses of each local municipal area and the DMA can be described as follows:

Gamagara Municipal Area

Rural land use: Mining and Agriculture

Urban land use: Industrial, Residential land use, Facilities and Security services, and Parks and open spaces

Ga-Segonyana Municipal Area

Rural land use: Agriculture

Urban land use: Commercial and Industrial, Residential land use, and Facilities and security services

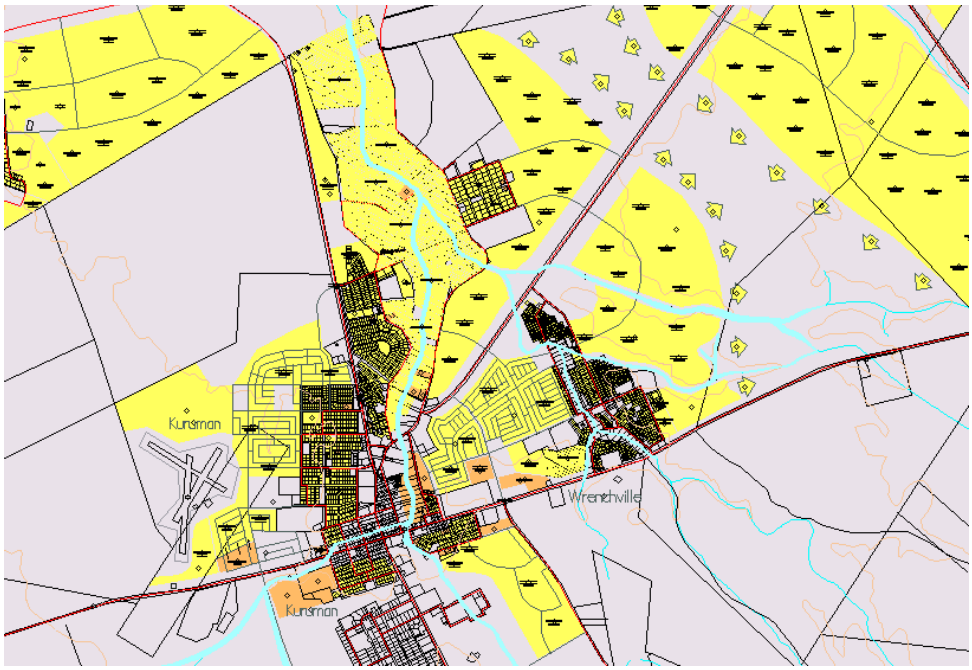

FIGURE 1: PROPOSED RESIDENTIAL DEVELOPMENT OF KURUMAN AND WRENCHVILLE

Moshaweng Municipal Area

Rural land use: Rural tribal villages or rural farms and Agriculture

Urban land use: Commercial and Industrial, Residential land use, and Facilities and security services

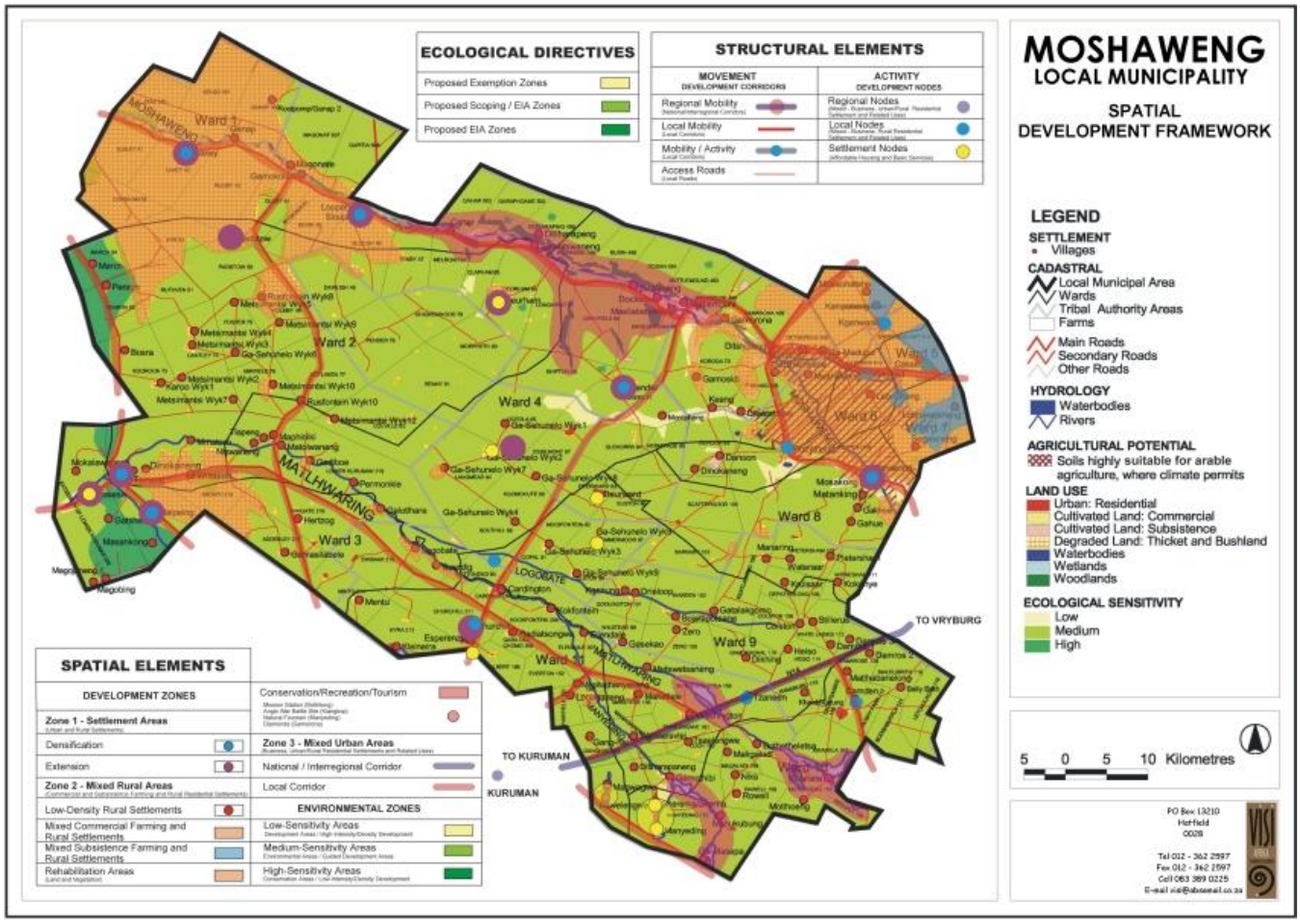

FIGURE 2: SDF FOR MOSHAWENG LOCAL MUNICIPALITY

DMA

Rural land use: Mining and Agriculture

Urban land use: Commercial and Industrial, Residential land use, and Facilities and security services

The John Taolo District Municipality SDF

The JTGDM SDF describes the preferred growth patterns and development trends for the district as a whole. The maps below describe some of these trends.

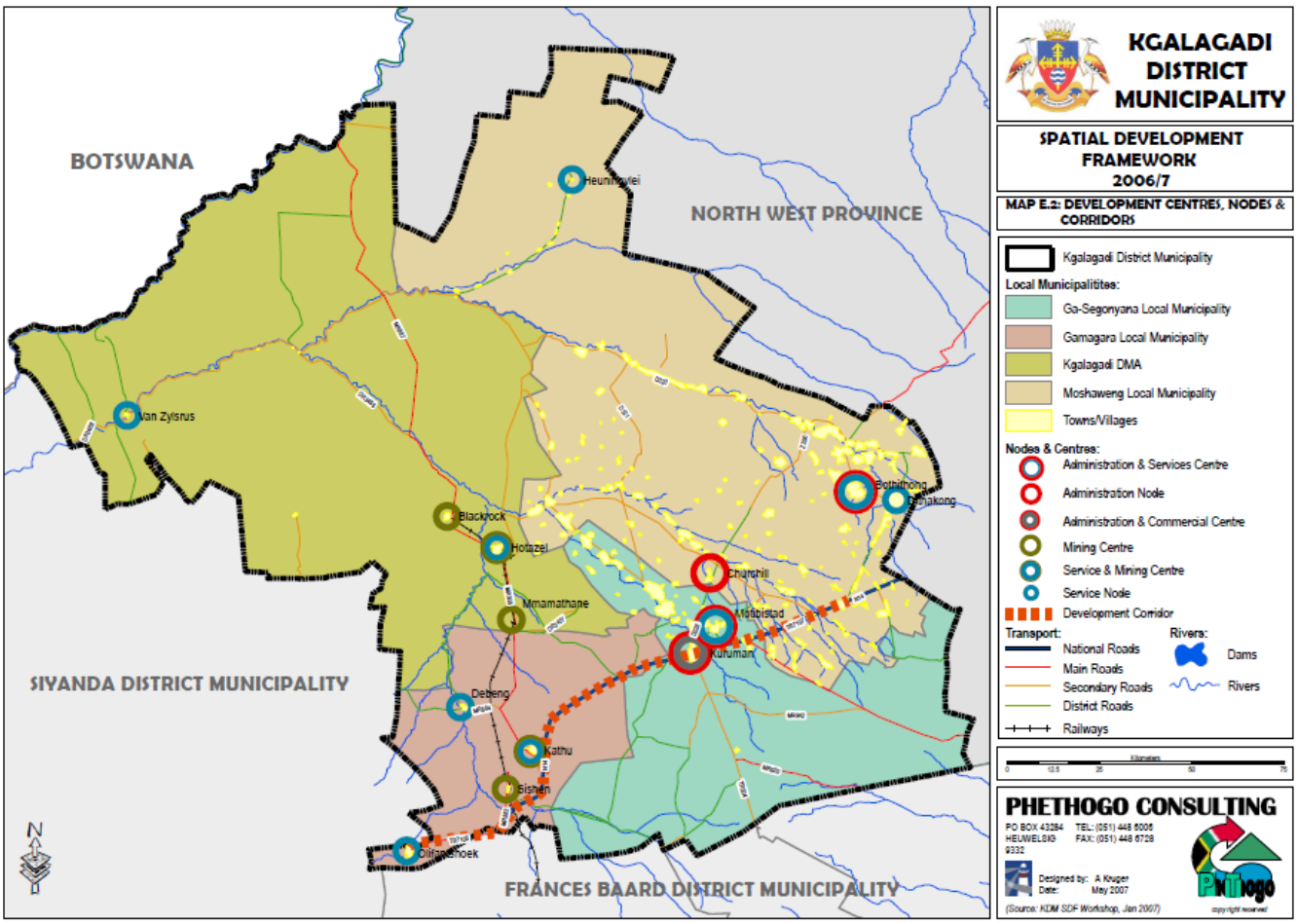

FIGURE 3: DEVELOPMENT CENTRES, NODES AND CORRIDORS FOR JTG DM

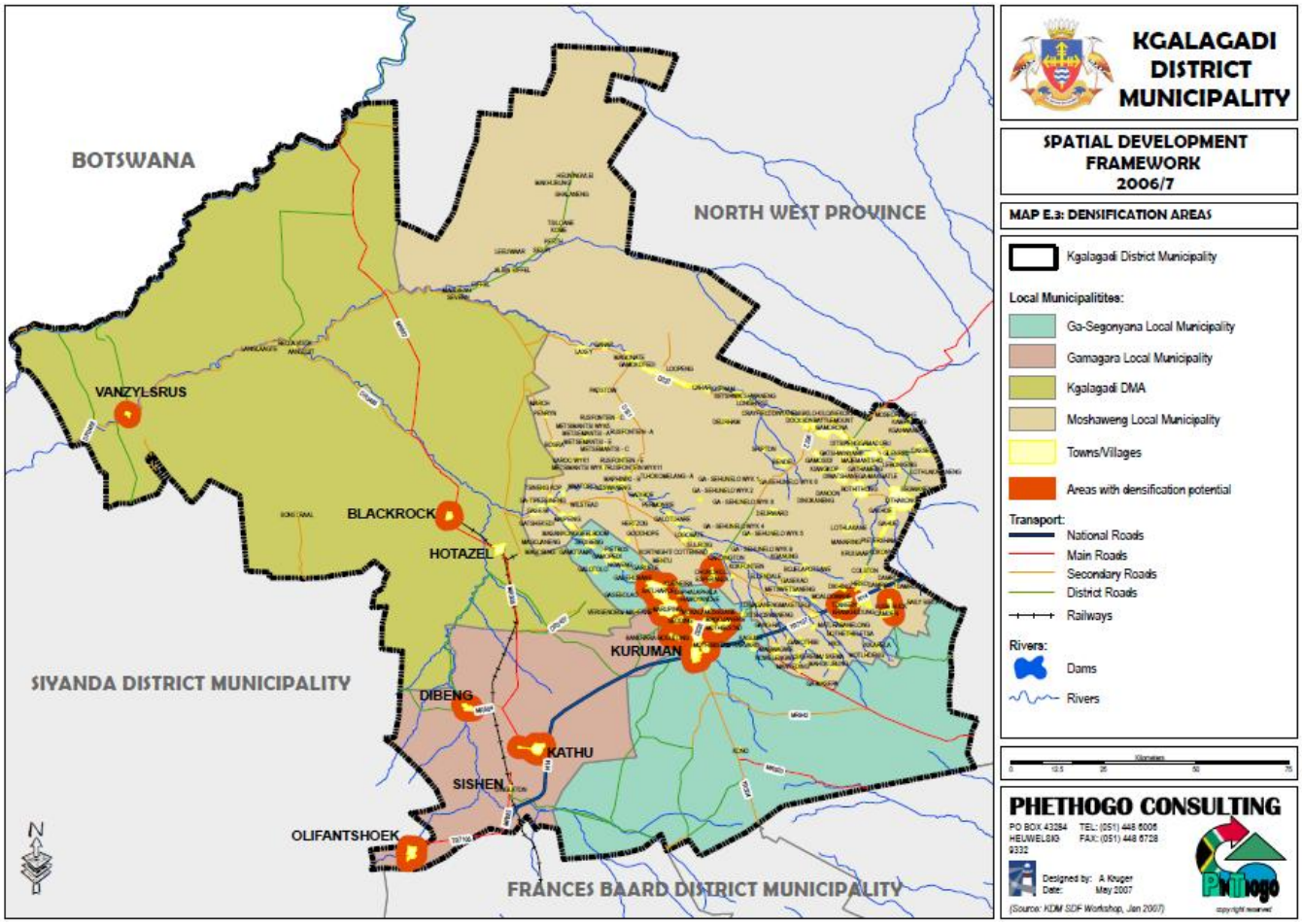

FIGURE 4: AREAS FOR Ddensification IN JTG DM

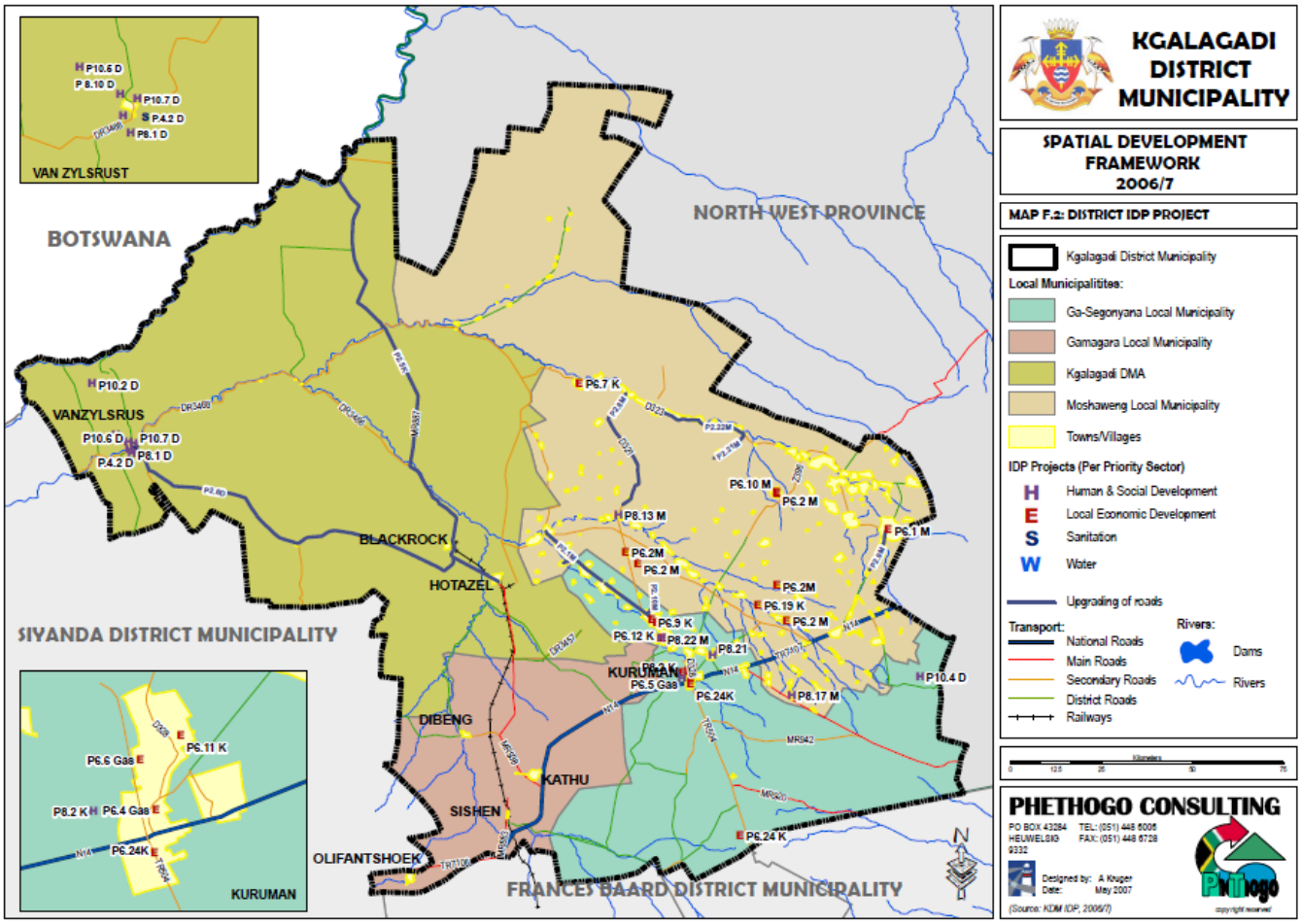

FIGURE 5: IDP DISTRICT PRIORITY PROJECTS

3.1.2 Climate

3.1.2.1 Rainfall

Annual rainfall varies from 500 mm in the east to 200 mm in the west, which is below the generally accepted average of 500 mm for dry land cropping. Rainfall occurs mainly during late summer (February) and can be highly erratic.

3.1.3 Temperatures

Mean annual temperatures range between 16°C and 20°C, and the mean annual minimum/maximum temperatures are estimated to range between 8°C and 28°C.

3.1.4 Biological Productivity

- The area encompasses four separate ecological regions, which extend beyond the region's boundaries:
- No bio-geographical unit is unique to the area;
- The ecological regions of the area are not as rich in species as many such similar regions located outside of the area;
- The diversity of species in itself does not warrant the establishment of a conservation reserve; and
- At a more detailed level, accepting that the species composition, vegetation form and individual landscape units change over small distances there are some 60 vegetation-landscape units which are unique to the District Municipal Area.

The key features include the following:

- Kalahari Thornveld
- Ghaap Plateau
- Rocky Hills and Ridges
- Kuruman Sourveld

3.1.5 Grazing Capacity

In the past, the continued healthy existence of the veld was due to the uneven geographic distribution of grazing pressures. With the increased provision of stock-water points, two trends are evident:

- Grazing pressures are greater, relative to the climatic capacity for increased vegetative growth;
- The development of previously undeveloped grazing areas through the increased provision of watering-points has enabled greater numbers of stock to graze over a larger area, reducing the proportion of ungrazed veld and directly reduced the ability of certain areas to re-vegetate after drier periods.

3.1.6 Land Degradation

Although the overall rate of land degradation is decreasing in the Northern Cape, the province ranks third highest on the country's land degradation index.

Land degradation due to soil erosion is related to a lack of vegetation cover mainly due to overgrazing and deforestation, with wind and sheet erosion being the most common problems.

Land rehabilitation of areas disturbed by mining activities is still not done to the best practice standards while Department of Minerals and Energy (now the Department of Mineral Resources), and the sterilisation of soil under the footprint of mine residue dumps remains a serious concern.

3.1.7 Demographics

The new demarcated district area has a population of approximately 188 833 persons, of which the majority reside in the Moshaweng municipal area.

The District is mostly occupied by rural communities who have poor access to services and low level of skills.

Within the whole District there is a recorded negative growth of population with an estimated population growth of -0.29% by 2015 (this is mostly due to migration of people from rural areas to urban).

3.1.8 Kgalagadi District Management Area

The DMA is the biggest in land coverage and has a total population of 6 230. Of the total population only 25.5% has no education with only 1.9% having completed tertiary education. Unemployment is at 18.8% with the majority (58.6%) of the population being under the age of 15 thus not being able to participate in the job market.

3.1.9 Population Density

The District can be classified as 'urbanized', with 3% of households living dispersed on farms and 78% of the population living in densely populated tribal settlements, the remainder live within urban areas.

- Apartheid style of planning in the municipal areas of Gamagara and Ga-Segonyana has resulted in distinct township and suburb areas.
- Moshaweng area is characterised by a large number of urban sprawls with low densities.

3.1.10 Population and Households

- Moshaweng (the largest municipality) has a population of close to 85 000 persons, living in more than 18 000 households, and the DMA has less than 2 500 households.
- Approximately 18% of the population of all five Northern Cape districts live in the District.
- The average household size in John Taolo Gaetsewe District Municipality is 4.05 persons.

- Approximately 53% of the population is female compared to 51% of the Northern Cape population that is female.

3.1.11 Population Growth and Migration

3.1.11.1 Historical Growth

From 1996 to 2001 Gamagara and Ga-Segonyana experienced positive population growth while Moshaweng and the DMA experience a negative growth rate.

3.1.11.2 Population Migration

- Migration is a determinant of population growth.
- A rapid decline in net migration into the Province is predicted.
- Although immigrants are not attracted to the area there tends to be rural – urban migration.
- People living in the DMA and Gamagara (predominantly mining areas) are more mobile than the average Northern Cape person.
- The District average is 11%, in contrast, 29% of DMA inhabitants have moved in the last 5 years, while 26% of Gamagara population were living elsewhere 5 years ago.

3.1.11.3 Future Growth

While the population of John Taolo Gaetsewe District Municipality was 180 686 in 1996, the population in 2001 was estimated at 176 967. A negative growth rate is forecast for the rural population and by 2015 the towns are also expected to show a negative growth. This can be attributed to declining mining industry, lack of migration and HIV/AIDS.

3.1.12 Socio-economics

3.1.12.1 Education profile

The Census 2001 does not distinguish between learners (children and/or adults) in a particular grade and adults/school drop-outs whose highest educational level achieved a specific grade.

The highest levels of education represented within the Municipal Area are illustrated in the SDF Report as *Table 2.6A Highest Level of Education for old demarcated area and Table 2.6B, for New Demarcated Area* (page 23). Map *B.5: Education Facilities* indicates the location of education facilities though out the district area (page 23).

3.1.12.2 Employment Status

- The highest percentages of housewives/homemakers are found in the DMA
- Full time scholars are found in high percentages in Ga-Segonyana and Moshaweng
- Pensioners and retired people are predominantly found in Ga-Segonyana and Moshaweng
- A high percentage of employed are living in the DMA and Gamagara.

3.1.12.3 Unemployment

- On average 58% of the population is unemployed,
- The highest rate of unemployment is in Moshaweng (80%) followed by Ga-Segonyana (58%).
- The overall results regarding the employment status of the actual available workforce/potential economically active group in the area: 29,84% employed and 51,11% unemployed.
- The district has 82% of its economically active people employed and 18% unemployed, followed by Gamagara with 76% employed and 24% unemployed.
- The Ga-Segonyana Municipal Area has only 42% of its economically active people employed and 58% unemployed
- Moshaweng has only 20% employed and 80% unemployed
- The above is summarised in Table 2.8. Unemployment and Employment levels according to the above definition.

3.1.12.4 Household Income

The majority of households (30%) in the District fall within the "*No income*" category. This is a combination of widely differential figures for the different regions:

- 9% for Gamagara,
- 31% for Ga-Segonyana,
- 32% for Moshaweng
- 4% for the DMA.

3.1.12.5 Health Facilities

Hospitals are located in Kuruman and Bathlaros.

3.1.13 Cross-reference for the Kgalagadi SDF

TABLE 2: LIST OF TABLES AND FIGURES IN THE KGALGADI DISTRICT MUNICIPALITY SDF

3.2 Moshaweng Local Municipality Spatial Development Framework (2005)

3.2.1 Introduction

The Spatial Development Framework for Moshaweng Local Municipality has been formulated in line with the Integrated Development Plan for the area to inform development for approximately the next 20 years. This SDF document is broken down into four parts, namely:

1. Introduction
2. Normative Framework
3. Realities Framework
4. Spatial Framework

The SDF has also been aligned with the Municipal Systems Act and section 17 (1) of the Land Use Management Bill (2003) to meet all legislative requirements for spatial planning and development of the local municipality.

3.2.2 Part One: Introduction

The introduction outlines the need for the SDF, the vision for the local municipality and its goals. This provides a base for the requirements of the SDF and the areas which it must cover.

3.2.3 Part Two: Normative Framework

The normative framework is fundamental for determining how the outcomes of the SDF will be put into action, and is based on the Local Agenda 21. This agenda is an approach and a planning framework for sustainable development at local level. In its most basic form it is a planning approach to management of urban and rural settlements in a sustainable manner.

Local Agenda 21 is based on seven broad principles:

1. Ecological limits

All people and communities must learn to live within the Earth's carrying capacity.

2. Partnerships

Alliances among all stakeholders are established for collective responsibility, decision-making and planning.

3. Accountability

All stakeholders are accountable for their actions.

4. Participation and transparency

All major groups of society are directly involved in sustainable development planning and all information is easily available to the general public.

5. Systemic approach

Solutions address the underlying causes of problems of entire systems, which are affected and not only the symptoms of those problems.

6. Equity and justice

Environmentally sound, socially just and equitable economic development must go hand in hand.

7. Concern for the future

Sustainable development plans and actions address short-term and long-term trends and needs.

3.2.4 Part three: Realities Framework

This section deals with spatial development, environmental profile, issues and challenges for the area.

3.2.5 Part four: Spatial Framework

This section outlines the directions, interventions and evaluation criteria which need to be incorporated with the SDF. The following categories are outlined:

a) Spatial development policy
   - Land use
   - Environment
   - Transport and infrastructure
   - Economic development

b) Spatial development guidelines
   - Management for sustainability
   - Containing urban sprawl
   - Residential intensification
   - Integration
   - Redressing imbalances
   - Creating quality living environments

c) Spatial development indicators

d) Proposed spatial development interventions
   - Strategic spatial development proposals
   - Concrete spatial development strategies
   - Indicators
   - interventions

e) Proposed spatial evaluation criteria (please refer to Figure 2: SDF for Moshaweng as an example)
   - Transport
   - Housing
   - Environment
   - Management
   - Composite management life costs

3.3 Ga-Segonyana Local Municipality Revised Integrated Development Plan (2009/2010)

The IDP is a five year strategic development tool used to guide planning, budgets for the municipality, implementation and annual review performance. This document represents the second review of the IDP within the new 5 year cycle running from 2007-2012.

The local municipality views this document as a planning tool supporting the vision of:

> *"an integrated municipality with a better life for all its people through sustainable development" (Ga-Segonyana IDP, 2010, pp 1)*

The mission of the local municipality is as follows:

> *"Ensuring the delivery of quality and affordable services, in a sustainable manner that enhances good governance, equity and responsibility to the people of Ga-Segonyana" (Ga-Segonyana IDP, 2010, pp 27)*

3.3.1 Spatial Development Framework

Ga-Segonyana Municipality developed a Spatial Development Framework during the 2002/03 financial year. The first phase of the review took place during the 2007-2008 financial year. This is now the second phase of the review. However, the review of wards 4-9 still needs to be completed.

The SDF contains basic principles pertaining to long term spatial development, as well as possible strategies and policies on how to achieve this desired spatial form. It guides decision-making and action over a multi-year period to promote integrated and sustainable cities, towns and residential areas.

3.3.2 National Spatial Development Plan (NSDP): Vision

Government's National Spatial Development vision can be described as follows:

"South Africa will become a nation in which investment in infrastructure and development programmes support government's growth and development objectives" (The Presidency, 2007)

NSDP Categories of Development Potential

Categories of development potential proposed by the NSDP include:

- Innovation and experimentation;
- Production – high value, differentiated goods (not strongly dependent on labour costs);
- Production – labour intensive, mass-produced goods (more dependent on labour costs and/or natural resource exploitation);
- Public services and administration;
- Retail and services;
- Tourism.

3.3.3 Combined development needs

The Northern Cape towns have been categorised in terms of development need. This was based on the following indicators:

- Number of disabled people per locality;
- The percentage of people without schooling or with limited schooling per locality;
- The percentage of people who are unemployed;
- Number of households residing in informal dwellings;
- Number of people without access to adequate sanitation;
- Number of people without access to water within 200m from their stand;
- Number of people with a monthly income below R 3,500 (resulting in a classification as 'poor').

3.3.4 Integrated Environmental Programme

Ga-Segonyana developed the programme with Kgalagadi (now known as John Taolo Gaetsewe) District Municipality and the other 2 local municipalities in 2005. It consists of a Strategic Environmental Assessment (SEA) which was used as the base for concrete environmental related programmes and projects for the Municipality.

3.3.5 Integrated Local Economic Development (LED) and Poverty Reduction

- Ga-Segonyana currently does not have an approved LED Plan. A draft plan is however being circulated for community comments.
- Approximately 2644 temporary jobs were created over the past year.
- R228,243 was spent on LED projects.
- Visits to main tourist attractions decreased by an average of 27% during the year. However the income generated increased by an average of 33%. For the past year there was a further decrease of approximately 40% to visits as well as a decrease in income, which is partly as a result of problems at the Caravan Park.
- The tourism industry alone cannot generate sufficient jobs to boost the local economy.
- The lack of monetary and human capacity means that issues of job creation and poverty alleviation are not being addressed.

3.4 Ga-Segonyana Local Municipality Spatial Development Framework

3.4.1 Introduction

The SDF is a strategic document which is part of the IDP, and should therefore be read in conjunction with the IDP. It focuses on the short term capital investments associated with projects within the municipality's budget. The SDF is reviewed annually to ensure the document remains dynamic and within the trends and development possibilities.

The SDF is a strategic framework to guides decision making over a multi-year period, to create integratable and habitable cities, towns and residential areas. Its main purpose includes:

- Inform the decisions of development tribunals, housing developments and relevant development communities, investors and developers;
- Create a framework of investment confidence that facilitates both public and private sector investment
- It should spatially reflect the vision of how the municipal areas (Kuruman, Wrenchville, Bankhara-Bodulong, Mothibistad and the Tribal areas) should develop in a broad sense.
- It should reflect the needs of the community identified in the IDP process.
- It should integrate the strategies of various sector plans that form part of the IDP development
- It provides a legally binding spatial framework for Ga-Segonyana Municipality, which promotes sustainable economic- and social development within the community.
- It must set out objectives that reflect the desired spatial form of the area.
- It should serve as an information source and guide to inform and direct land use management.
- It is not possible for the SDF to deal with every part of the municipal area at the same level of detail and thus the document focuses on focal areas and identified aspects of the IDP.

3.4.2 Status Quo

3.4.2.1 General Overview

Ga-Segonyana Municipality originally straddled the boundary between the North-West and Northern Cape Provinces. The process of amalgamation of the cross-boundary municipalities started in 2006, with the official handing over by the various departments taking place in 2007.

80% of the population of roughly 70 400 stays in rural villages, or lives and works on commercial farms. There are 33 residential areas divided into nine wards, and the council consists of nine ward and nine proportional representative councillors. The area, previously in the North–West, is also administered through a traditional authority system with two paramount chiefs.

The economy of Ga-Segonyana is based on mining and agriculture (both commercial and subsistence), with tourism and commercial sectors contributing to the economy.

The 2001 census statistics show that the population of 70 488 can be divided as 87% Africans, 7,6% Coloureds, 5,3% Whites and 0,1% Indians, with 48% of the residents being male and 52% female.

3.4.2.2 Existing Road Network

There is an existing road network throughout Ga-Segonyana Municipal area (tar roads such as the N14, to gravel roads in the rural areas that are not in a very good condition).

The N14 forms the major access road to the core of the economic development, where it crosses through Kuruman in an east/ west direction. In the centre of Kuruman the N14 conjuncts with the Hotazel/ Daniëlskuil road

3.4.2.3 Distribution of Residential Areas

The Ga-Segonyana area houses a number of residential areas with Kuruman town as the main business/ services centre. Two phases of housing formalisation is distinguished - the communities that form part of Phase I have all been formalized, but the communities that form part of Phase II, have mainly not been formalized. The areas counted under the two phases are listed as:

Phase I:

- Kuruman
- Wrenchville
- Mothibistad
- Bankhara Bodulong

Phase II:

- Kagung (Vlakfontein)
- Mapoteng
- Ditshoswaneng
- Magojaneng
- Seoding
- Seven Miles
- Mokalamosesane
- Galotolo
- Lokaleng
- Sedibeng
- Geelboom
- Gamopedi
- Gantatelang
- Thamoyanche
- Pietbos
- Ncweng
- Garuele
- Gasehubane
- Gasebolao
- Batlharos
- Maruping
- Vergenoeg

3.4.3 Distribution of Business Areas

3.4.3.1 Central Business District

Every community has a formal business sector, with the largest Central Business District (CBD) in Kuruman.

3.4.3.2 Residential Business Sector

Tuck shops, offices and residents working from home can be found throughout the municipal area.

3.4.3.3 Informal Business Sector

The informal sector is evident throughout the area, but with a concentration in Livingstone and Voortrekker Streets, near the Taxi ranks, and in the main streets of Maruping, Kagung and Batlharos.

3.4.4 Distribution of Industrial Areas

3.4.4.1 Formal Industries

Kuruman is the only town that houses a large number of formal industrial activities. This industrial sector has had a steady growth pattern over the past 10 years and will need to be expanded in the future.

3.4.4.2 Service Industry

The service industry has integrated with businesses in the central business area of Kuruman to form an integrated business area. The area with the largest concentration of service industry is found on the eastern periphery of the CBD alongside the N14 road to Vryburg.

3.4.4.3 Semi-Formal Industries, Small, Medium and Micro Businesses

These business are found throughout the Municipal area with a tendency of owners to start their business from home and move to the CBD as soon as the growth of the said business are adequate. These businesses are found throughout the Municipal area with a concentration thereof in the larger towns.

3.4.5 Existing Social Facilities

3.4.5.1 General

The most of the central facilities, including the Municipal buildings, libraries, clinics, Police Stations, are found in the larger towns with a concentration of facilities in Kuruman and Mothibistad.

3.4.5.2 Sport and Recreational Facilities

The best sport and recreational facilities are found in the larger towns (Kuruman, Wrenchville, Mothibistad, Bankhara, Bodulong and Batlharos). The smaller tribal settlements only house informal sport and recreational facilities.

3.4.5.3 Cemeteries

Every community has access to a cemetery in their immediate vicinity.

3.4.5.4 Education/ Schools

Kuruman houses the largest educational facilities. Most of the towns have a primary school with secondary schools in the larger towns.

3.4.5.5 Open Spaces

Open spaces and parks can be found throughout the Municipal area with a concentration in Kuruman, Wrenchville and Mothibistad.

3.4.5.6 Churches

Every community has its own church.

3.4.6 Rural Development

Ga-Segonyana Municipality has a large rural community with an extensive farming community located to the south of Kuruman and a tribal area that is located to the north.

3.4.7 Spatial Analysis

3.4.7.1 Vacant Land for Development

The Ga-Segonyana Municipality has ample access to vacant land for future development. However, only small portions of land exist within the Kuruman that can be utilized for development because most of the land is privately owned. However, there are areas that can be regarded as underutilized open spaces that can be developed. The larger portions of land for development are situated to the west of the town, the area southwest,

south and southeast of the Industrial terrain, the area between Wrenchville and Kuruman, and the area to the east of the agricultural plots, to the west of the Mothibistad road.

3.4.7.2 Spatial Trends

Certain spatial trends have developed throughout the Ga-Segonyana area of which the following are the most significant:

- Business development alongside the N14 route in Kuruman
- Industrial development to the south of Kuruman
- The redevelopment of the agricultural plots in Kuruman
- The development of townhouse complexes in the agricultural property.
- The development of a corridor between Mothibistad, Magojaneng and Seoding, extending to Maruping and Batlharos

3.4.7.3 Development Patterns and Physical Determinants

On the Spatial Analysis map the Municipal area is characteristically shown as a big round shape in the southern areas and a smaller wingtip-like shape in the northwest. Kuruman is situated very central to the rest of the area and it is also the location of the municipal offices of Ga-Segonyana.

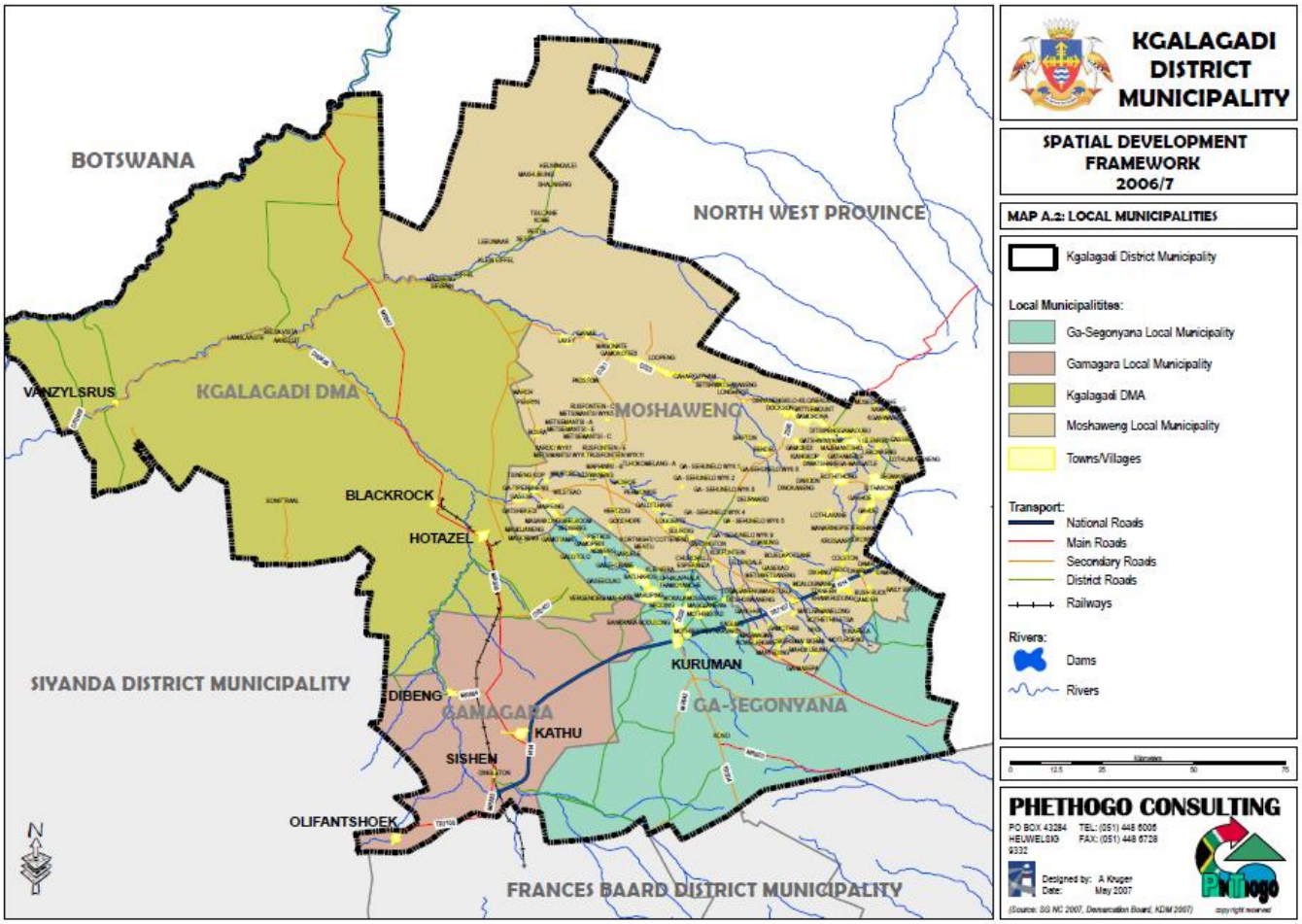

FIGURE 6: LOCAL MUNICIPALITIES FOR JTG DM

The Kuruman River dominates the area to the north of Kuruman and although it is not perennial, it still has a very large impact on the development pattern of the area. The southern parts of the Municipal area are characterised

by mountainous areas (Kuruman Hills) to the west, stretching north-westwards, west of Kuruman and further north. The area east of the mountains is fairly level with very few rivers of importance.

The existing bulk services to the agricultural plots in Kuruman could pose a development constraint in future. It is important that a bulk service development plan be compiled in order to accommodate future extensions, to facilitate higher density and infill planning.

3.4.8 Land Use Needs

The following aspects were identified in the IDP as land use needs for the residents:

- Water and Sanitation
- Land Reform and Housing
- Roads and Transportation
- Health
- LED/Unemployment
- HIV/AIDS
- Education
- Social Welfare
- Grazing Camps
- Sport and Recreation
- Cemeteries
- Electricity
- Telecommunication and Postal Services

3.4.9 Cross-reference for the Ga-Segonyana SDF

TABLE 3: LIST OF TABLES AND FIGURES IN THE GA-SEGONYANA LOCAL MUNICIPALITY SDF

3.5 Gamagara Local Municipality Spatial Development Framework

The SDF is a strategic framework for the formulation of an appropriate land use directive system that combines with the land use management system, to guide decision-making and development over a multi-year period.

The purpose of SDF for the community of Gamagara is as follows:

- Spatially reflect the vision of the municipal areas (Kathu, Sesheng, Dibeng and Dingleton)
- Reflect the needs of the community identified in the IDP process
- Integrate the strategies of various sector plans that form part of the IDP document
- Provides a legally binding spatial framework for Gamagara Municipality, which promotes sustainable economic- and social development within the community
- Formulate objectives that reflect the desired spatial form of the area
- Information source and guide to inform and direct land use management

The SDF has also been aligned with the Municipal Systems Act and section 17 (1) of the Land Use Management Bill (2003) to meet all legislative requirements for spatial planning and development of the local municipality.

It is not possible for the SDF to deal with every part of the municipal area at the same level of detail and thus the document focuses on focal areas and identified aspects of the IDP.

3.5.1 Status Quo

3.5.1.1 General

The municipal area of Gamagara consists of 3 towns, a large farming community and the mining corporations.

- Kathu forms the largest town within the area and is also where the Administrative office of the Gamagara Municipality is located.
- Dibeng is the second largest town and is located on the banks of the Gamagara River to the northwest of Kathu.
- Dingleton is the smallest of the 3 towns and is located in the centre of the mining activities directly south of Kathu.

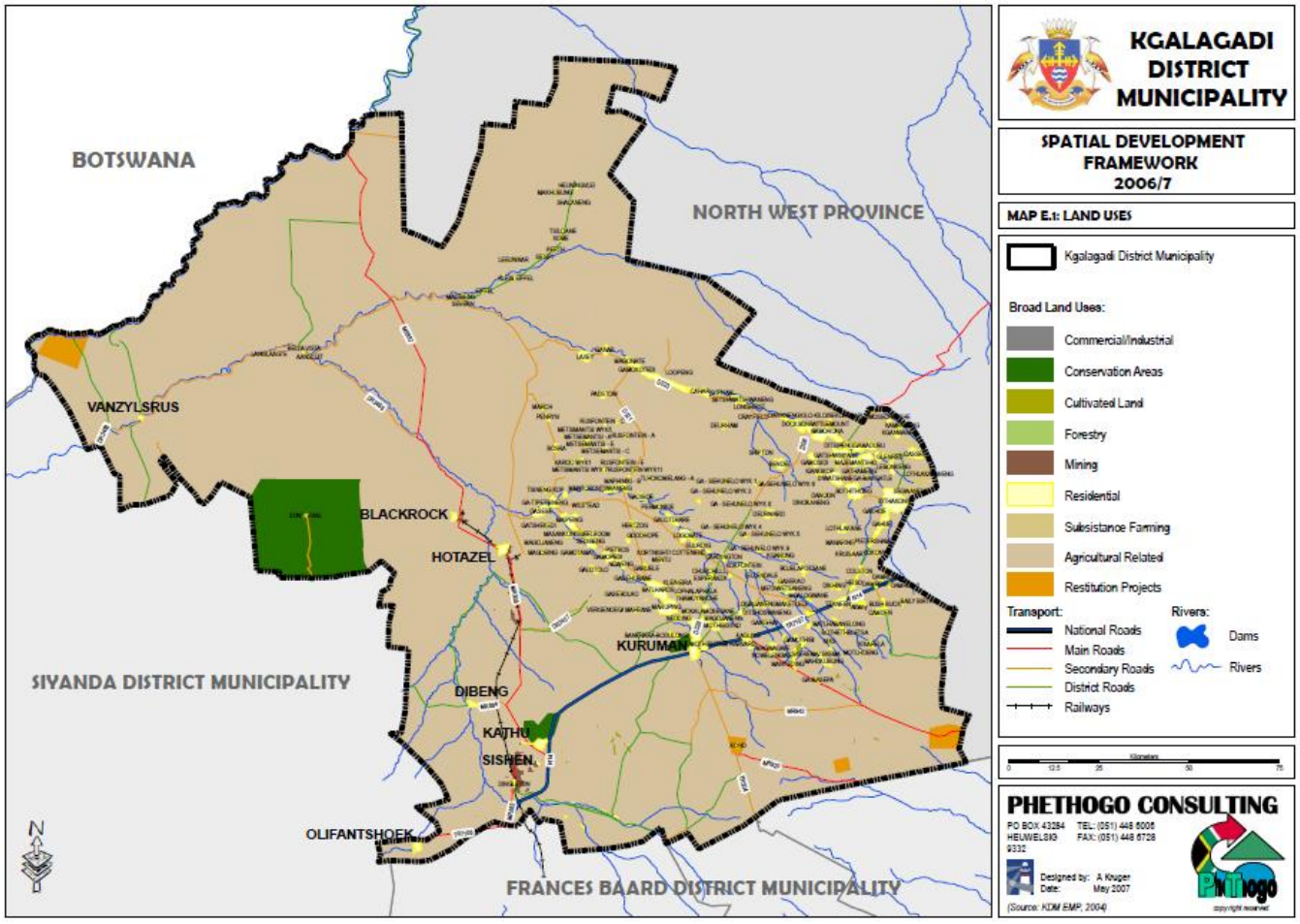

FIGURE 7: LOCATION OF RESIDENTIAL AREAS IN JTG DM

3.5.1.2 Distribution of residential areas

Kathu

- Kathu was planned and developed only a few decades ago.
- The town has a circular form with the residential areas surrounding the CBD.
- The town has single residential houses in a round form as a whole, and can be divided into a number of residential cells with closed vehicular movement.
- Over the past decade higher density group housing units have taken root throughout the town.

Sesheng

- Sesheng is located to the west of Kathu and was planned to serve as a high density residential area for mine workers, without families of any social structure
- The area furthest to the west consists of group housing units that belongs to the mine with small pockets of houses to the west
- Larger residential housing component of Sesheng is located nearer to Kathu in the form of single residential houses. This area to the east of Sesheng is the fastest growing residential area outside of Kathu

Dibeng

- Started off as a small settlement on the banks of the Gamagara river which provided water for the small-holdings that run the full length of town
- Consists of only single residential houses, but can be split into a low density area to the west and higher density and less formal houses to the east

Dingleton

- Developed in a linear form all along the one side of what used to be the main road between Upington and Kuruman
- Elongated shape in the form of a rectangle running north-south
- Consists almost completely of low density single residential houses
- The town is surrounded by large mine activities and the resettlement of Dingleton residents is highly likely because of possible expansions of mining activities. This will have a huge impact on the residential areas of Kathu and Dibeng and detail planning for the future is part of this SDF.

3.5.1.3 Business sectors

- Kathu, Dibeng and Dingleton are considered the central business sectors for the municipality.
- The residential businesses are largely found in Kathu and not so much in Dibeng, Dingleton or Sesheng.
- The informal business sector is a part of any town and usually moves to the areas with the most potential clients and that is usually the CBD or Taxi ranks. The largest informal sector in Gamagara can be found in Kathu, with smaller sectors in the other towns.

3.5.1.4 Formal Industries

- The Sishen mine is the largest formal industry in the Gamagara area and forms the largest employment industry.
- The formal industrial area of Kathu is the largest of the three towns.
- Dibeng has some industrial sites located to the west of the town.
- Dingleton has no formal industrial area.

3.5.1.5 Service Industry

- Kathu has a few small service industries located within the formal industrial area.
- Dibeng has very few service industry sites and most are found scattered throughout the area or in the CBD.
- Dingleton is the least developed with no service industry sites.

3.5.1.6 Education

Educational facilities are scattered throughout the towns in Gamagara and every town has one or two schools.

3.5.1.7 Religion

Religious sites (churches) are also found scattered throughout the towns within the municipal area of Gamagara.

3.5.1.8 Sport and recreation

- Kathu has a wide variety of sport grounds and other recreational facilities. The town depends on the sport grounds of the training college, and Sesheng also depend on the grounds of the mine, both to the northeast of each. Kathu also features a golf course to the north of town and a nature reserve to the north and northwest (Kathu Forest).
- Dibeng is the only town that does not have a wide variety of sport grounds and other recreation facilities.
- The recreation club and sport facilities of Dingleton are situated in the northern half of town.

3.5.1.9 Other open spaces

Throughout the towns several public open spaces have been planned either for parks, or to accommodate stormwater and other undevelopable land parcels. However, not all of these sites are currently developed and only a few are developed into parks and recreational areas. In Kathu most of the open spaces fall within the Kathu Forest.

3.5.1.10 Cemeteries

Every town has its own cemeteries

3.5.1.11 Rural development

The largest area of Gamagara is covered by rural land uses and utilised only for extensive grazing, game farming and mining. All other privately owned land is used for cattle and goat farming or game farming.

3.5.1.12 Main routes

The main routes include the tar road between Olifantshoek and Kuruman that passes directly east of Kathu, and the road between Kathu and Dibeng in a northwesterly direction from Kathu. However, there is no direct road between Kathu and Dingleton.

3.5.2 Spatial analysis (Spatial development framework – 2002)

Kathu

- The SDF indicated that the area directly south of Kathu must be utilized for the development of Medium density residential houses.
- The Kameeldoring area was identified for the development of the CBD, sport and other community functions.
- The area to the west of the Dibeng road, south of the road to Sesheng and the mine was also identified for the development of a CBD.
- The industrial area was indicated to develop in a northerly and southerly direction - This must still take place.

Sesheng

Development in a southeasterly direction was proposed and this planning has already taken place since 2002

Dibeng

The SDF indicated that residential development was required in an eastern and northeastern direction. The last planning was done in 2002.

Future development of a sport ground in an eastern direction was also proposed and future sport grounds were also planned northeast of this area.

Dingleton

There are currently plans to resettle the residents of Dingleton due to encroachment through expansion of the Sishen mine, and therefore any future developments for this town are on hold.

3.5.3 Vacant land for development

Kathu

Kathu is surrounded by vacant land owned by Kumba and Council. Only the portion of land between the industrial area and the road to the mine and Sesheng is owned by Council. This area has been partially developed since the SDF of 2002. Within Kathu the most of the vacant erven have already been planned for future utilization, where possible.

A very large portion of Sesheng belongs to Kumba which could result in conflicting views between Kumba and the municipality on development of these portions. All land to the north, east and southeast of Extension 5 belongs to Council and is available for planning.

Dibeng

Most of the land to the west and east of town belongs to Council. The property south of the main road to Kathu and north of the last houses is privately owned and therefore can only be considered for future development in consultation with the landowner(s).

Dingleton

The main road to the west acts as a barrier with privately owned land on the other side of the road, and the railway line and mine forms a barrier to the east. Available land is thus limited to the area to the north and to the south.

3.5.4 Spatial trends

Kathu

Current trends include the establishment of businesses in the CBD and along the major roads within town, and the development group housing complexes and smaller secure housing units (The housing development trend and planning since 2002 is all in line with the integration strategy of Council).

Dibeng

Some residential development has taken place since the first SDF of 2002, although the area has a mostly rural character with residential plots much larger than those of Dingleton or Kathu.

Dingleton

During the last two years very little spatial development occurred in Dingleton because of the proposed resettlement of the town.

3.5.5 Development constraints and opportunities

3.5.5.1 Constraints

Kathu

- The location of the Sishen mine to the south of Kathu and Sesheng is a development barrier for the town in a southern direction.
- The existing powerline that crosses between Sesheng and Kathu acts as a soft development barrier. The servitude area surrounding the powerline must be taken into consideration when planning future erven in this area.

Dibeng

- The location of the Gamagara River and its flood plain in the central parts of Dibeng poses a constraint to the development of the land parcels located in and around this area. This area also has a relatively high potential for agricultural development that must be considered as a valid land use and natural resource.
- The area directly to the east of the Gamagara River has a limestone reef that poses a constraint for residential development.
- Local storm water furrows to the northeast of Dibeng must be taken into consideration when detail planning of that area is done.

Dingleton

The Sishen mine has indicated that the future expansion of the mining area will result in the town falling within a 500m buffer area. This necessitates a total relocation of the town and its residents to another location, such as Kathu, Olifantshoek, Postmasburg, Dibeng and/or Kuruman.

3.5.5.2 Opportunities

Kathu

- The area between Kathu and Sesheng has a relatively flat topography with little or no storm water problems, making it ideal for the extension of Kathu and Sesheng.
- The Kathu Forest containing the internationally recognised Camelthorn trees holds tourism potential for the residents and Council.

Dibeng

- Dibeng 1, a large farm, belongs to Council and gives Dibeng ample direction for future development in both a western and eastern direction.
- The Gamagara River provides support for agricultural and tourism.

Dingleton

At this stage there are no development opportunities for the residents or Council due to the uncertainty of the future of the town.

3.5.6 Land use needs

During the analysis phase of the IDP the residents of each of the town expressed their needs and desires. Fourteen priority issues for the next five years were identified, these issues are:

1. To ensure that all residents have access to good quality drinking water.
2. Sewerage and Sanitation.
3. Electricity/Floodlights.
4. Provide Housing/Erven and upgrades where required.
5. Basic health services/Ambulances.
6. Improve the condition of Roads/Streets.
7. Provide Sports and youth facilities.
8. Environmental Issues: Refuse removal (tree planting) Agricultural projects, Poor state of natural environment in residential areas, Trees for residential areas not public places.
9. Provide adequate education and education facilities.
10. Provide day care centre/old age and disabled centres.
11. LED projects: Lack of job opportunities (unemployment)
12. Safety and Security: Police station (The safety of people is jeopardized due to high crime rate).
13. Public toilets: Lack of public sanitation facilities in Sesheng
14. Public transport: Insufficient public transport.

3.5.7 Cross-reference for the Gamagara SDF

TABLE 4: LIST OF FIGURES PRESENTED IN THE GAMAGARA LOCAL MUNICIAPLITY SDF

3.6 John Taolo Gaetsewe District Municipality: Synopsis of the Review Integrated Development Plan 2010-2011 Financial Year

3.6.1 Introduction

The Reviewed Integrated Development Plan is a product of the strategic Integrated Development Planning process in this Municipality. It is a principal strategic planning instrument which is reviewed on an annual basis. It was developed in terms of the Municipal Systems Act and its regulations. It is a legislative requirement with legal status, superseding all other plans that guide development in this Municipality. This is the 5th and final revision for the 2010/11 planning cycle.

For the next 3-years the Municipality has to consider the 5 key performance areas (KPA) for local government as directed in the 5-Year Strategic Agenda for Local Government:

- KPA1: Basic Service Delivery and Infrastructure Investment;
- KPA2: Local Economic Development;
- KPA3: Financial Viability and Financial Management;
- KPA4: Good Governance and Community Participation and
- KPA5: Municipal Transformation and Institutional Development.

However, for the 2010/11 cycle the Municipal Turn-around Strategy has added an additional dimension to the planning, strategy and project formulation processes. Focus will also be placed on core powers and functions in accordance with Schedule 4 and 5 of the Constitution. The IDP has also been aligned with the District Growth and Development Strategy (DGDS). The IDP of the District Management Area (DMA), which can be seen as a "local municipality" in terms of planning purposes, is also reflected in this Document.

3.6.2 Development priorities and challenges

3.6.2.1 Achievements

- Growth in access to electricity as a primary source of energy in the district: Access to electricity has increased to 90% in the district, which amounts to a growth of 31,8% over the period 2001-2007.
- Access to water: Despite challenges such as vast distances, huge service delivery backlogs and almost total dependency on grants and subsidies in rural areas like Moshaweng Local Municipality rural access to water from a point outside the yard increased from 64,3% to 76,4%.

3.6.2.2 Challenges

- The population size of the district is steadily declining, and Gamagara is the only local municipality that has shown any population gains.
- Inequity of population demographics: service delivery and employment equity, racial and disability population demographics.
- Energy: Fill the 10% gap that remains in the use of electricity as a source of lighting.
- Need for housing: growth in the percentage of informal settlements from 5,1 to 7,6% of the population is especially concerning.
- Waste management: majority of the population throughout the district dispose of their waste in their own refuse dumps. The following data was derived from the census in 2001 and 2007 and demonstrates the increased percentage of households that now have their waste disposed of in refuse dumps: John Taolo

Gaetsewe (2001: 68.9% and 2007: 64.6%), Moshaweng (2001: 84.1% and 2007: 89.7%), Ga-Segonyana (2001: 70% and 2007: 72.9%) with only Gamagara receiving weekly refuse removals (2001: 86.9% and 2007: 94.9%).

- Relatively low population levels: 27,6% of the population has no formal education, 67,4% has some school education, and only 1,83% of the population has some tertiary education.
- High levels of unemployment and poverty: A total of 75% of the district's population has no recordable income. If the non-economically active part of the population is excluded from the calculation, the unemployment rate is 44,79%.
- The huge discrepancies between income levels: Only 1,29% of the district's population earns more than R6,400 per month.

3.6.2.3 Organisational challenges:

The district municipality has a number of key vacancies in its staff positions. However, it is still felt that the current macro structure of the Municipality adequately meets the demands and structure of the IDP and SDBIPs. Despite this, there over the municipality's ability to continue as a result of financial instability and the great losses that have been experienced. A number of points are outlined in the IDP explaining the financial situation.

3.6.2.4 Long-term priorities:

There are qualitative and quantitative elements with regard to access to water:

- Quantitatively: the current backlog; and
- Qualitatively: piped water inside dwellings must be supplied to all households.

The following remain development challenges must be addressed by focus-areas for the district's management through the formulation of IDP strategies:

- Eradication of all bucket latrines;
- Increasing access to high quality sanitation facilities, at least ensuring toilet facilities with adequate vitalization;
- Address the 11% backlog where members of the community still do not have access to any acceptable standard of sanitation.

3.6.3 Description of the area

The John Taolo Gaetsewe area is located in the Northern Cape Province, and borders on Botswana. It consists of three local municipalities, Ga-Segonyana, Gamagara, and Moshaweng Municipalities and one district management area. Before March 2006 the area was a cross-border municipal area which straddles the Northern Cape Province and the North West Province. However, after re-demarcating the provincial borders the total John Taolo Gaetsewe area is situated in the Northern Cape Province.

The District Management Area (DMA) functions as a fourth local municipality for the area but due to the absence of a local municipality it is managed by the John Taolo Gaetsewe District Municipality. However, this area will be transferred to the jurisdiction of the Moshaweng Local Municipality from the date of the 2011 local government elections.

The north-eastern region is comprised principally of high-density rural and peri-urban areas while the western and southern areas are sparsely populated and consist mainly of commercial farms and mining activities. The area has a population of approximately 187 111 persons, the majority of which reside in the Moshaweng municipal area. The district consists of 186 settlements, the majority being in the Moshaweng municipal area. The main towns and villages within the district borders are Kuruman, Kathu, Deben, Dingleton, Olifantshoek, Van Zylsrus, Bothitong, Churchill, Manyeding, Laxey, Batlharos, Mothibistad, Hotazel and Heuningvlei. The main economic activity is mining, followed by agriculture, tourism and retail.

The John Taolo Gaetsewe District Municipality is classified as semi-arid (east) to arid (west) where means potential evaporation exceeds mean annual precipitation. The annual rainfall is between 200 mm in the west and 500 mm in the east. Vegetation-wise the majority of the area falls within the Griqualand West Centre of Endemism which makes it an area of global conservation significance. A number of species are Red Data Book (endangered) and protected plant species.

3.6.4 Overview of the Spatial Development Framework

The John Taolo Gaetsewe District comprises of 186 towns and settlements of which the majority (80%) are villages in the Moshaweng Municipality. John Taolo Gaetsewe is the second smallest district in the Northern Cape, occupying only 6% of the Province. The largest area within John Taolo Gaetsewe is the District Management Area (DMA) which covers 10 000 km^2.

Moshaweng covers the next largest area of 9 477 km^2. Prior to 2006 the Moshaweng Municipality was a cross-boundary municipality within both the Northern Cape and North Western Province.

The boundaries of the John Taolo Gaetsewe District Municipality were redrawn in 2006 to include the North West Province part of Moshaweng and to include Olifantshoek and it surrounding areas into the Gamagara Municipality.

The John Taolo Gaetsewe Municipal Area is characterised by a mixture of land uses of which agriculture and mining is dominant. The residential areas vary from the relatively large town of Kuruman to small scattered rural communities.

3.6.5 Population statistics

2001 Census:

- The John Taolo Gaetsewe District Municipality population size was found to be 191 538
- 47.52 % Males and 52.48 % Females
- 87.5 % of the population is made up of the African population group
- 94.8% of the total population makes up the historically disadvantaged population (African, Coloured and Indian Population Groups). It is also these groups that require the most assistance from the municipality and where the largest challenges lie.

2007 Community Survey:

- The population size of the district is steadily declining, and Gamagara is the only local municipality that has shown any population gains.

3.6.5.1 Nodes and Centres

Specialisation nodes are areas where specific products or services are available and these nodes will tend to specialize on capitalising on these region-specific products. A range of specialisation nodes have been identified in terms of the products the region offer. The three main nodes within which specialisation can occur include agriculture, mining and tourism. It has been proposed that development be encouraged in each of these sectors not as competition, but in support of regional opportunity for growth and development.

3.6.5.2 Commercial agricultural zones

These zones are the larger agricultural land units that accommodate a diversity of agricultural production for the commercial market. A commercial agricultural zone constituting a large portion of the John Taolo Gaetsewe District accommodates a variety of mixed farming.

All currently cultivated and grazing land must be protected from urban development and future extension guided by in-depth analysis taking into account soil potential, carrying capacity, type of agriculture, availability of water, etc. Areas of specialisation where viable will be focused on in the future, such as:

- Creation of agricultural growth through value-added supplementary agricultural practices, such as small scale processing industries, abattoirs, etc.
- More intensive farming activities like feeding paddocks, chicken farming, maize mills and tunnels for vegetable cultivation. This will have the added benefit of creating employment opportunities

3.6.5.3 Irrigation zones

There is no irrigation zone for the John Taolo Gaetsewe District.

3.6.5.4 Tourism

- The majority of the existing tourism facilities are concentrated in the Ga-Segonyana Local Municipality (specifically in and around Kuruman) and within the District Management Area.
- A total of 31 of the identified facilities are located within Ga-Segonyana and 28 in the District Management Area.
- The number of tourism facilities within Gamagara Local Municipality (mainly located in and around Kathu) is 14.
- There are two facilities which are located outside but immediately adjacent to John Taolo Gaetsewe District municipality boundaries.
- The absence of existing tourism facilities within Moshaweng Local Municipality is very notable.
- As far as the spatial distribution of the various types of accommodation facilities are concerned, the following conclusions can be made:
    - The majority of guest houses within the area (23 of the 26 in the district) are located in Ga-Segonyana and Gamagara Local Municipality areas.
    - The majority of the hunting farms/lodges (12 of the 22 within the district) are located in the District Management Area.
    - All the facilities classified as guest farms are located in the District Management Area.
    - Camping and caravan facilities, self catering facilities and hotels/motels are mainly concentrated within Ga-Segonyana Local Municipality.

3.6.6 Cross-reference for the JTGDM IDP Review

TABLE 5: LIST OF TABLES AND FIGURES IN THE SUMMARY REPORT

3.7 Key findings

John Taolo Gaetsewe District Municipality can be characterised as a predominantly mining driven economy, with some agriculture, predominantly in the form of cattle farming. The district is struggling with a great lack of infrastructure, technical capacity and can largely be classified as rural. Therefore, the IDPs and SDFs for the local municipalities tend to focus on this lack of infrastructure and basic services.

The area is also plagued with issues such as land degradation because of the harsh environment and is exacerbated by overgrazing. While this is acknowledged as a serious problem that requires urgent attention, it would appear that the needs of the people in terms of infrastructure and services are the focus with natural environmental areas only receiving attention in areas when and where they can be accommodated.

3.8 Information Gaps

The literature clearly highlights the challenges and constraints of the district and local municipalities. However, there appears to be a lack of initiative and innovation in the types of development improvements in the area. Some additional types of development could be focused on renewable energy, and development of 'eco-friendly' housing and strengthening of local business (other than the mining industry which dominates the district), while other strategies could focus on effective agricultural and grazing methods, and water usage, taking into account the impacts of climate change and land degradation.

4 PROVINCIAL DOCUMENTS AND STUDIES

4.1 Northern Cape State of Environment Report: Atmosphere and Climate Change Specialist Report (2004)

4.1.1 Introduction

The atmosphere consists of nitrogen, oxygen and other gases, in a layer that envelopes the earth and is important as a planetary life-support system. Anything that disturbs the normal chemical balance of the atmosphere can be considered pollution. Pollution can be caused by natural phenomena, like forest fires, and is also caused by anthropogenic (man-made) activities, such as the burning of fossil fuels.

Activities in the Northern Province which have been identified activities impacting on atmospheric quality and climate changes include:

- Asbestos;
- Renewable energy sources;
- Climate change;
- Air quality; and
- The management of air resources.

4.1.2 Asbestos

Asbestos is the collective mineralogical term given to a group of six different fibrous minerals (amosite, chrysotile, crocidolite, and the fibrous varieties of tremolite, actinolite and anthophyllite) that occur naturally in the environment. Asbestos fibres enter the air from the breakdown of natural deposits or man-made asbestos products. Fibres may remain suspended in the air for a long time, and can be carried a fair distance by the wind before settling. Asbestos fibres are not able to move through soil, are not broken down to other compounds, and will remain virtually unchanged over long periods of time. Environmental exposure is still a concern as fibres from unrehabilitated mine dumps can become airborne and may be inhaled by humans. The concentration of asbestos in ambient air is not known, as no monitoring is currently undertaken. In addition, very little is known about the impact of asbestos (prevalence of asbestosis and mesothelioma) in the Northern Cape. The Provincial Department of Health does not keep any statistics on these diseases, other than those from occupational exposure.

There are currently no operational asbestos mines in the Northern Cape, and therefore no occupational exposure. However, asbestos is still perceived as an important issue because of the many unrehabilitated mine dumps that still have the potential to pollute the environment and cause asbestosis or mesothelioma. The public also still has access to some of these dumps, and some individuals recover the asbestos for resale further increasing the potential hazard.

Secondary impacts of asbestos pollution are likely to occur in the Northern Cape, considering the use of materials contaminated with asbestos for a variety of purposes, including school playgrounds and sports fields, roads and buildings.

An indicator, ‘Rehabilitation of asbestos mines’ is used to measure the number and location of un-rehabilitated asbestos mine dump sites in the Northern Cape. This was done by recording the government’s response to issues of asbestos raised by stakeholders, because there is no existing state data in this regard. This indicator monitors the mitigation methods currently in place for the impacts of the previously high demand for asbestos.

By May 2001, approximately R50 million was spent on the rehabilitation of 53 derelict and/or ownerless asbestos mines in the Northern Cape, Limpopo and Mpumalanga. It is expected that another R150 million would be required to rehabilitate the remaining 68 derelict and/or ownerless asbestos mines. Although the rehabilitation of these mines will remain a priority for years to come, attention is also being focused on the rehabilitation of derelict and/or ownerless coalmines and gold residue deposits.

4.1.3 Renewable energy

Broadly defined, renewable energy sources are those sources of energy arising from natural processes, and are regularly replenished. The sun is the primary renewable energy source. Solar energy can be utilised directly as heat or light, as well as a secondary form of energy through its interaction with the natural environment. Other forms of renewable energy include wind energy, hydropower, ocean-generated energy and bio-energy. Wind-power potential is generally good along the coast with mean annual speeds greater than $4ms^{-1}$, compared to moderate wind speeds of 3-4 ms-1 in the interior of the Province, and less than 3 ms^{-1} in the interior of South Africa.

South Africa generally classified as a dry country with little perennial hydropower potential. Most areas in South Africa, however, average more than 2 500 hours of sunshine per year, with average daily solar radiation levels ranging from 4.5-6.5 kWh/m^2, which is relatively high. The area of the Northern Cape that borders on the Orange River and Namibia boasts the highest solar radiation intensity anywhere in southern Africa. Solar energy is therefore likely to be the most viable alternative energy source for the Northern Cape.

4.1.4 Climate change

South Africa's contribution to GHG emissions is relatively small on a global scale. However, on a per capita basis it is well above global averages and those of other middle income developing countries. The energy sector in South Africa is a major source of GHG because of the heavy reliance on coal for electricity generation, the Sasol oil-from-coal process, and the scarcity of renewable energy resources such as hydro- and wind energy.

Evidence of biological impacts of climate change across the world is accumulating. In the Northern Cape, findings from one study strongly suggest that the range of *Aloe dichotoma* has begun to respond to climate-induced stress, indicating that biodiversity in the region may be under threat from climate change.

Climate change may result in an increase in natural disasters, thus necessitating the need for disaster management. The National Disaster Management Centre was established in 1999 by the Department of Provincial and Local Government (DPLG) and has since been constituted to promote an integrated and co-ordinated system of disaster management. This does not include information on climate change per se but will provide information on disasters such as floods that may provide an indication of climate change.

Measures of annual temperature and precipitation deviations in the area relative to a baseline period (1961-1990) indicate the state of climate change. Overall the measurements show a trend of increased level of greenhouse gases which may lead to an increased surface temperature in the Northern Cape. Some of the temperature trends were significant, especially in the northern regions of the Province. This will indirectly impact on human health as the distribution of diseases may expand as a result of the warmer climate.

4.1.5 Air quality

Air pollutants such as sulphur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), particulate matter (PM), lead (Pb) and ozone (O_3) are considered to be 'classic' air pollutants because they are emitted in large quantities in most countries and they have adverse effects on human health and crops. The main health effects associated with these compounds are related to the respiratory system, except for CO, which affects the central nervous system.

There are no major industries in the Province emitting NO_2 or SO_2, except for a few open kiln brickworks. Only 0.6% of Northern Cape households use coal as domestic fuel and therefore, SO_2 concentrations are not foreseen as an air pollutant risk. However, 18% of households use paraffin, indicating that indoor NO_2 concentrations could be a potential health risk. The main anthropogenic sources of ambient particulate matter or pollution 'hot spots', in the Northern Cape are the mining industry and the scheduled processes. The Sishen Mine near Kathu is the biggest source of iron ore in South Africa, and Zinc and lead are mined at Aggeneys.

The use of pesticides for crop spraying is another aspect that could have an impact on air quality in certain areas of the Northern Cape. The use of pesticides in the production of food is expanding in South Africa despite an international trend to promote pesticide reduction. A few thousand farms, each about 25 hectares, are usually sprayed on a two-weekly basis during the months May to June and September to October. Quantification of exposure in order to determine the impacts of crop spraying is not possible as no monitoring is done.

Currently there is no coordinated air pollution monitoring network in the Northern Cape. Existing monitoring is fragmented as it is mainly done by industries and results are therefore not readily available.

Particulate matter was used as the indicator for air quality in the Northern Cape because of the general lack of industrial processes in the Province. It was found that mining is the main activity resulting in a reduction in air quality, with pollution sources such as iron ore, manganese, diamond, nickel and copper mines from both surface and underground mines. In surface mining, the actual mining excavation process leads to dispersion of particulate matter by wind; and with regard to underground mining, mine tailings (waste products) are stored above ground and are therefore easily dispersed by wind. Impacts associated with particulate matter include adverse health effects (depending on chemical composition and particle size), nuisance effects, damage of materials and reduction in visibility.

Almost no information on particulate matter concentrations in the Northern Cape could be found. The only information that was found includes concentrations of fallout dust from the Sishen iron ore mine near Kathu.

4.1.6 Resource management

According to the Municipal Demarcation Board (2003), the air pollution management function is poorly performed by Northern Cape Municipalities. This is likely to be the case throughout the Province, and may be the reason why 'Effectiveness of resource management' was raised as an issue in the State of the Environment report. This indicator provides evidence of the state of air quality management in the Northern Cape and can be measured in two different ways: manpower capacity for air pollution management within the Province, and the number of municipal Integrated Development Plans (IDPs) that show air pollution management plans or a dedicated budget for developing an air pollution management plan.

The need for effective resource management is driven by the presence of mining and industry in the Northern Cape and not industry. Therefore the task of air quality management in the industrial sector is not considered a major one.

For the second measurement of this indicator, the Karoo and Frances Baard District Municipalities are the only District Municipalities rendering an air pollution function in the Province. However, in the case of the Karoo District Municipality, there is neither budgetary provision for this function in the 2002 / 2003 financial year, nor a staff complement allocated to perform the function. Furthermore, no Environmental Management Plan is in place. The Frances Baard District Municipality indicated that the budget for air pollution formed part of another budget item. It does, however, have a staff complement of 4 people responsible for air pollution control. No Environmental Management Plan addressing air quality is in place, but one is in the process of being formalised. The Siyanda District Municipality does have an Environmental Management Plan in place while the Namakwa and Kgalagadi District Municipalities are currently in the process of a plan.

4.1.7 Use of renewable energy

The renewable energy use in the Northern Cape is measured using percentage household solar energy use as a proxy indicator. The impacts of global climate change are likely to present a driving force that will result in the increased use of renewable energy. This change could be influenced by the cost of non-renewable sources such as electricity and paraffin, and the availability of sources such as coal. The use of renewable energy will impact positively on the environment (by reducing greenhouse gases), the economy and ultimately on quality of life.

Houses and buildings in South Africa are seldom designed for energy efficiency. The energy characteristics of low-cost housing are particularly bad, resulting in high levels of energy consumption for space heating in winter. Research has shown that low-cost housing could be made 'energy smart' through the utilisation of elementary 'solar passive building design' practice, potentially resulting in significant energy savings. The heating of water, mainly derived from electricity, accounts for a third to half of the energy consumption in the average household. Switching from electrical to solar water-heating can have significant economic and environmental benefits. Economic benefits for homeowners include reduced energy bills, while benefits for the country include reduced GHG emission.

Solar energy use currently contributes a very small portion of the total energy supply in the Northern Cape - 18% households are still using paraffin for cooking, while 15.3% and 28.6% are using wood for cooking and heating

respectively. This situation is similar for all Provinces. The Northern Cape has, however, the highest solar energy use for lighting (1.0%) when compared to other Provinces in the country.

4.1.8 Applicable legislation, commitments and controls

4.1.8.1 International

United Nations Framework Convention on Climate Change (UNFCCC)

Montreal Protocol on Substances that Deplete the Ozone Layer

4.1.8.2 National

Constitution of the Republic of South Africa, Act 108 of 1996, Section 24 (a) of the Constitution

Atmospheric Pollution Prevention Act, Act 45 of 1965

White Paper on Renewable Energy

National Environmental Management: Air Quality Bill

4.1.8.3 Provincial

Northern Cape Provincial Asbestos Forum

TABLE 6: LIST OF TABLES AND FIGURES PRESENTED IN THE ATMOSPHERE AND CLIMATE CHANGE SPECIALIST REPORT

4.2 Northern Cape State of Environment Report: Biodiversity Specialist Report (2004)

4.2.1 Introduction

The United Nations Convention on Biological Diversity defines biodiversity as:

> *"the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems, and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems"*

The importance of biodiversity for the survival of all life on earth is largely unrecognised. On the genetic level, biodiversity underpins the development of cultivated food crop varieties and animal breeds, and is vital for the adaption of wild populations to changing environmental conditions. Many South Africans' livelihoods are dependent on direct use of species including the gathering, harvesting or hunting of animals and plants for food, medicine, shelter, fuel and fibre. Ecosystem services such as the maintenance of soil fertility, climate regulation

and natural pest control, as well as intangible benefits such as aesthetic and cultural values, all support human activity and sustain human.

Despite its low population densities, there are many challenges facing biodiversity management and conservation in the Northern Cape. The state of biodiversity within the Northern Cape Province is described in this report by seven indicators:

- Distribution and extent of vegetation types in the Northern Cape;
- Distribution and extent of protected areas in the Northern Cape;
- Name, distribution and number of selected indicator species per taxonomic group;
- Distribution and extent of alien invasive species;
- Trade in flora and fauna;
- Number of tourists visiting the Northern Cape; and
- Budgetary allocation to biodiversity management.

4.2.2 Habitat change

The loss, transformation and degradation of natural habitat are the most important causal mechanisms of biodiversity loss in the region. Conversion of natural habitat types by cultivation, grazing, urban developments, afforestation, mining, dams, industry and alien plant invasions has resulted in ecosystem degradation and species loss, resulting in significant proportions of South Africa's flora and fauna being threatened with extinction. The primary land use within the Province is stock and game farming and therefore threats to the majority of vegetation types are usually in the form of overgrazing. While mining activities and cultivated land also contribute towards land transformation and degradation. The primary change in land use within the Orange River Nama Karoo vegetation type is to cultivated land. Approximately 16.5% of South Africa's land cover is transformed and a further 10% degraded. The Northern Cape emerged as the third most degraded province in South Africa, after the Limpopo Province and KwaZulu-Natal in terms of severity and rate of degradation, because the degradation is localised.

4.2.3 Conservation of biodiversity

South Africa is a country rich in biodiversity, characterised by seven biomes, five of which are found in the Northern Cape. These are the Savanna, Nama Karoo, Succulent Karoo, Grassland and Fynbos Biomes. Additionally, of the 18 Centres of Endemism within South Africa, 8 can be found within the Northern Cape.

Current trends in conservation of biodiversity indicate that a landscape or regional approach to conservation is more effective than designing conservation efforts around protecting individual species. However, this approach is only effective if the designated protected areas (such as parks) are located in areas that contribute to the representation of the local/regional biodiversity. Within South Africa the existing protected area system poorly represents biodiversity patterns and processes with as many as 50 of South Africa's 68 vegetation types less than 10% conserved.

The Kgalagadi Transfrontier Park (the portion in South Africa) and the Richtersveld National Park are the largest parks within the Northern Cape, while the provincial reserve, Witsand Nature Reserve is the smallest.

4.2.4 Species diversity

South Africa is recognised as the third most biologically diverse country in the world, containing between 250 000 and 1 000 000 species. However, between 14% and 37% of plant, bird, reptile, amphibian, mammal and butterfly species are listed as threatened in the South African Red Data Books. Over the past three decades, the decline and extinction of species, and its causes, has emerged as a major environmental issue. Some species are known to play a more significant role within the environment than others. The loss of these Keystone Species has a particularly disruptive effect on ecosystem goods and services. However the impact of the decline of species on the provision of ecosystem services is a complex relationship and is difficult to measure.

4.2.5 Alien invasive species

Invading alien organisms pose the second largest threat to biodiversity after direct habitat destruction, through the following mechanisms:

- displacement by direct competition;
- reduction of structural diversity;
- disruption of the prevailing vegetation dynamics;
- impacts on fire regimes due to increases in biomass;
- alteration of local hydrology; and
- modification of nutrient cycling

Approximately 10 million hectares within South Africa have been invaded by alien species. With all seven of the biomes invaded to varying extents. It is also estimated that 1900 of South Africa's 3435 Red Data Book species are threatened directly or indirectly by alien invading plants. At current rates of expansion the area of extent of alien invasive species could double in the next fifteen years.

The following five alien invasive species are the most widely distributed within the Northern Cape:

- Atriplex lindleyi (Sponge-fruit saltbush);
- nummularia (Old-man saltbush);
- Nicotiana glauca (Wild tobacco);
- Opuntia ficus-indica (Sweet prickly pear); and
- Prosopis glandulosa var. torreyana/velutina (Honey mesquite).

Prosopis glandulosa var. torreyana/velutina is classified as very widespread-abundant, *Nicotiana glauca* and *Opuntia ficus-indica* as very widespread-common*, Atriplex lindleyi* as widespread-abundant and *A. nummularia* as widespread-common. In addition, the Conservation of Agricultural Resources Act (Act 43 of 1983) categorises these species as follows: *Nicotiana glauca* and *Opuntia ficus-indica* as category 1; *Prosopis glandulosa var. torreyana/velutina* and *Atriplex nummularia* as category 2; and *Atriplex lindleyi* as category 3. Category 1 refers to prohibited weeds that must be controlled in all situations; category 2 refers to plants with commerceal value that may be planted in demarcated areas subject to a permit, provided steps are taken to control spread; and category 3 refers to ornamental plants that may no longer be planted or traded, but may remain in place provided a permit is obtained and steps are taken to control spread.

Many invasive alien species are well established, and cause substantial damage. However there may be others that are in the early stages of invasion. Management programmes must target both these groups of alien species in order to maintain control of spread and to pre-empt emerging problems.

4.2.6 Resource value and use

Biodiversity provides a variety of environmental services, including the regulation of the gaseous composition of the atmosphere, protection of coastal zones, regulation of the hydrological cycle and climate, generation and conservation of fertile soils, dispersal and breakdown of wastes, pollination of many crops, and absorption of pollutants. Over and above this, millions of rural South Africans depend upon biological resources for day to day survival in the form of natural capital as a buffer to poverty.

The sustainable use of biological resources is undermined by two key issues: the extent to which natural resources are undervalued and therefore disregarded and the decline in availability of resources.

Although the primary goal of preserving biodiversity is for the inherent value of biological resources and the goods and services they provide, the economic contribution of biodiversity should not be overlooked. The value of the tourism industry provides an economic and social imperative to conserve biodiversity as it is directly in line with national priorities in terms of its potential to stimulate economic growth and create jobs.

Tracking tourist numbers and destinations indicates the potential tourism value of particular sites in the Northern Cape and of the value of the tourism sector to the economy in general. In addition, tracking trends is useful for determining the development of appropriate mechanisms to respond to either increases or decreases in tourist numbers and their potential impacts on biodiversity within the Province. A general decline was noted in 2003 in the prime tourist season which can be attributed to the poor flower season in Namaqualand, indicating the value of the flora as a tourist attraction in the region.

Both legal and illegal trade in flora and fauna exists within the Northern Cape. Legal trade is described by the number of permits issued and illegal trade by the number of prosecutions handed down. The trade in flora and fauna demonstrates not only the value of natural resources but also some of the difficulties encountered when striving to practice sustainable use.

In general the number of exports since 1998/99 increased to approximately 18 000 animals in 2002/3, demonstrating the increasing value of this resource. In addition, the number of permits issued for the trade and collection for research purposes of endangered and protected plant species for the period 2000 to 2003 were 25 and 55 respectively (note this number does not include illegal trade).

4.2.7 Resource management

Following the Rio Earth Summit and democratisation biodiversity is no longer viewed as an issue confined to conservation and wildlife proponents. Its importance to farmers, to indigenous people and their livelihoods, to human rights, political dispensations and global trade issues, is now well recognised.

The management and protection of biodiversity in the Northern Cape experiences serious constraints because of insufficient skills, expertise and funding, legal fragmentation, inadequate integration of biodiversity considerations into sectoral and land use plans, and weak political commitment.

The budgetary allocation to biodiversity management provides some indication of the level of commitment to biodiversity management and conservation, the capacity to perform the required duties effectively. The annual budgetary allocation for biodiversity management outside of provincial protected areas is approximately R5 million, within provincial protected areas it is R5.3 million and for scientific services it is R1.9 million. The budget for biodiversity management outside of protected areas is subdivided into law enforcement, landowner extension and environmental education.

Another method of assessing the effectiveness of budgetary allocation is to examine the allocated budget per hectare for the three categories described above (outside protected areas, within protected areas and scientific services). The effectiveness of management outside of protected areas may be severely hampered by the lack of financial resources. The allocation of 5 cents per hectare for scientific research and 14 cents per hectare for biodiversity management outside of provincial protected areas does not seem sufficient for the successful management of the Northern Cape's biological resource base.

4.2.8 Applicable legislation, commitments and controls

4.2.8.1 International

Convention on Biological Diversity Convention relative to the Preservation of Fauna and Flora in their Natural State

International Plant Protection Convention

International Convention for the Protection of New Varieties of Plants

Convention on International Trade in Endangered Species of Wild Fauna and Flora

Convention on the Conservation of Migratory Species of Wild Animals

Convention on Wetlands of International Importance Especially as Waterfowl Habitat

Convention Concerning the Protection of the World Cultural and Natural Heritage

SADC Policy and Strategy for Environment and Sustainable Development Protocol on Wildlife Conservation and Law Enforcement

Succulent Karoo Ecosystem Programme (SKEP) BIOTA Southern Africa

4.2.8.2 National

National Environmental Management Act (NEMA), Act 107 of 1998

National Environmental Management: Biodiversity Act, Act 10 of 2004

National Environmental Management: Protected Areas Act, Act 57 of 2003

Biodiversity Strategy and Action Plan

Conservation of Agricultural Resources Act (CARA), Act 43 of 1983

National Water Act, Act 36 of 1998

Bioregional Approach to South Africa's Protected Areas

Working for Water

Working for Wetlands

4.2.8.3 Provincial

Northern Cape Tourism Act, Act 5 of 1998

Northern Cape Nature & Environmental Conservation Ordinance 19 of 1974

TABLE 7: LIST OF TABLES AND FIGURES PRESENTED IN THE BIODIVERSITY SPECIALIST REPORT

4.3 Northern Cape State of Environment Report: Human Settlements Specialist Report (2004)

4.3.1 Introduction

The history of human settlements in South Africa has been influenced largely by the Apartheid policies of the late 20th Century. Apartheid caused disproportional differences between former 'white' and 'black' areas, with the 'white' areas receiving services, good infrastructure and sufficient formal housing, while the former 'black' or 'coloured' areas were generally poorly serviced, lack sufficient infrastructure and a lack of formal housing.

South African human settlements have experienced accelerated changes, particularly in urban areas, and large-scale movement of people from rural areas, suburbanisation and peripheral growth particularly in peri-urban and informal settlements. In the 10 years since 1994, much progress has been made in increasing services and infrastructure to these former 'black' or 'coloured' areas, however much still remains to be done. It is this distribution of services, infrastructure and housing that is measured in this report.

Human settlements are also places of both natural and cultural heritage, and therefore cultural heritage issues are also addressed in this Human Settlements report. Natural heritage is addressed in the Biodiversity specialist report.

4.3.2 Infrastructure and Services

There is a direct link between the provision of infrastructure, income growth and human development. Infrastructure has multiple links to poverty reduction, and when infrastructure and service delivery are incorporated it can also improve health and education.

New settlements in the urban centres of South Africa are built at a point which is the furthest from city centres on land at the urban periphery. This peripheral area is neither urban nor rural but experiences increasingly less provision for basic services such as water, sanitation and refuse removal because municipalities are reluctant to support the installation of basic services to these areas.

Low-income settlements are often characterised by poor quality housing, open drains, no sanitation and uncollected waste. The assumption is that these are 'degraded' living environments. However, it has been found that the consumption patterns of the more affluent sectors of society are responsible for most of the natural resource degradation and not these low income areas. In South Africa, the more affluent sectors of the population are predominantly located in sprawling, low-density suburbs, with large carbon footprints that can be traced internationally.

It is widely acknowledged in South Africa that the greatest backlog in infrastructure and service delivery is in the rural areas. South Africa has to make significant and accelerated progress in service and infrastructure delivery to clear these backlogs and meet national and international targets such as the Millennium Development Goals.

The existence of transport infrastructure allows the daily economic and other activities of the Province to be undertaken in an efficient manner. Although the location of transport infrastructure is important, it is an individual's access to transport that is considered in this indicator. In a province such as the Northern Cape where unemployment is high, individuals have little or no access to transport infrastructure and are therefore less likely to extricate themselves from their situation by conducting various informal economic activities. This indicator therefore presents the Northern Cape statistics on the mode of travel for work or school. This indicator is an impact indicator as it addresses the impact of transport infrastructure on the population, in conjunction with the economic situation of the population.

The largest percentage of population were categorised as individuals not working and not attending school, individuals who worked at home and as live-in domestic workers and those who did not make use of any form of transport to travel to work or school. In addition, a third of the population either travels to work on foot or resides at their place of work. Outside of these categories, the most common mode of travel is by Car as a driver (4.15%) followed by Car as a passenger (3.98%) and Bus (3.16%). Motorcycle (0.15%) and Train (0.08%) are the least commonly used modes of travel.

4.3.3 Service Delivery

Although a large percentage of households in the Northern Cape have access to basic water services, there has been a decline in the percentage of households with coverage from 1996 to 2001. This is more likely due to an increase in the number of un-serviced households in the Province, rather than a decline in actual service delivery. However, a third of households in the Province still lack these two services.

4.3.3.1 Delivery of water services

Supply of reticulated water can reduces the amount of time a household spends collecting water, and prevents the spread of water-borne illnesses such as cholera and dysentery. At present, South Africa exploits almost 50% of its conventional water resources, with some regions experiencing severe water shortages, and in others the demand for water has exceeded the available supply. The underlying cause of water scarcity can sometimes be attributed to government's failure to ensure that available water is supplied efficiently and equitably.

Based on the data for water service levels in the Northern Cape in 1996 and 2001 the number of households with access to basic water services at the RDP level has increased from approximately 192 000 to more than 200 000. However, the number of households with access to basic water services that are not at the RDP level has also increased from 24 000 to 41 000. This increase in households with access to basic water services that are not at the RDP level represents a service delivery backlog.

4.3.3.2 Delivery of sanitation services

A lack of basic sanitation services can lead to numerous public health problems, outbreaks of disease and death. A demographic and health survey conducted in 1998 found that household child mortality rates were twice as high in households without piped water, and this rate was four times higher in households without flush sanitation. A review of household sanitation services in the Northern Cape indicates that the number of households with access to basic levels of sanitation increased from 1996 to 2001. The sanitation services backlog has been reduced from 100 000 households (46.8%) in 1996 to 80 000 households (33.44%) in 2001. In general 66.56% of households have access to basic sanitation services at RDP levels or higher while, approximately 30 000 households have no sanitation infrastructure.

4.3.3.3 Delivery of waste removal services

The third basic service discussed is refuse removal. This state indicator displays information on the delivery of basic refuse removal services4 to households in the Northern Cape. Figure 4 shows household access to municipal refuse removal services in the Northern Cape. It indicates that the overall number of households with access to refuse removal services increased from 134 000 in 1996 to 153 000 in 2001. However, it should be noted that this represents an increase of less than 1% in the number of households with access to municipal refuse removal services. The effectiveness of refuse removal service within an area, will impact on the presence or absence of disease vectors such as rodents.

4.3.4 Housing Type

By examining the dominant 'Housing type' in the Northern Cape a rough indication of the quality of life and living conditions can be determined:

- District Municipalities: two thirds formal housing.
- Frances Baard Municipality: informal housing has decreased from 22% in 1996 to 16% in 2001.
- Kgalagadi District Municipality: Traditional housing (reed mat houses and corbelled houses) are most common; more than one fifth of houses are traditional in nature.

There are no statistics on the predominant types of traditional housing in the Province. However, traditional housing such as reed mat houses and corbelled houses are still in use.

4.3.5 Demographics

Research has shown that the main cause of impoverishment is the loss of employment by the head of the household, resulting in a loss or decline of wages. In addition to changing family structure through births or

deaths, declining small-scale agriculture, retrenchment and declining wages for labour workers all have impacts on household incomes and thus human settlements in South Africa.

Rural poverty in South Africa differs from other developing countries because income generated and food consumed from agriculture is a small component of household resources, migration is circulatory with households having both a rural and urban base, and rural society is affected by the social and health problems of the urban areas. As a result of discriminatory planning, spatial isolation and underdevelopment of townships and homelands, poor households have limited access to productive resources such as land and capital, which has hindered their exploitation of economic opportunities.

Women and children are most vulnerable to poverty, with a great number of these demographic groups playing the role of head of the household, especially in rural areas. It is estimated that between 57% and 75% of children are living in varying degrees of poverty, and that women tend to have less access to resources than men.

4.3.6 Health

Human health is considered an important aspect of human settlements. Health issues in the Northern Cape relate to specific diseases determined by human settlement characteristics or the environment. Tuberculosis, asbestosis and HIV/AIDS are three of the main concerns for the Province. Health issues are not addressed through any indicators in this specific report. However, they are considered in both the Atmosphere and Climate specialist report and the Driving forces section of the comprehensive web-based 2004 Northern Cape State of the Environment Report.

4.3.7 Heritage

The conservation of heritage resources is of vital importance in any society, if only for the benefit of future generations. In the Northern Cape, the presence of several economic activities threatens the conservation and preservation of several heritage resources that can never be regained once lost. The various categories for conservation of heritage include national heritage sites, protected areas, heritage objects, structures over 60 years old, burial grounds and graves, fossils, rock art, archaeology, historical shipwrecks and living heritage. Several proposed World Heritage Sites such as the Kimberley Mine and Associated Early Industries, the /Xam Khomani Heartland, the Richtersveld and the Wonderwerk Cave are also found in the Northern Cape. These unique heritage sites in the Northern Cape, if adequately protected and developed have the potential to contribute to the Province's economy through the tourism industry.

4.3.8 Unemployment

Unemployment is defined as the percentage of the economically active population that is currently unemployed. These are individuals who want to work and are not unemployed by choice, and are actively taking steps to find or start some form of work. In the Northern Cape over 14% of the population is unemployed by this definition, and 45% of the population is classified as 'economically inactive'. This leaves the burden of income generation on 40% of the population within the working age group of 15 to 65. Issues such as job retention and job creation are therefore of vital importance in a Province where the number of working people is so low.

The main sectors of employment include the 'Agriculture, hunting, forestry and fishing sector' followed by the 'Community, social and personal services', 'Wholesale and retail trade', 'Private households' and 'Mining and quarrying' sectors.

4.3.9 Change in population size and distribution

The size and distribution of a population indicates the potential human resources available. Understanding and measuring these indicators can provide pointers to the scale and nature of development needs within the Northern Cape. At the same time, population data can give some indication of the functioning of the economy as a whole.

4.3.9.1 Change in population size

The total population of South Africa increased from approximately 40.5 million people in 1996 to 44.8 million in 2001. During the same time period, the population for the Northern Cape decreased from approximately 840 000 to approximately 822 000 people. The Northern Cape was the only province to display a negative growth from

1996 to 2001. It constituted 2.1% of the national population in 1996, which decreased to only 1.8% by 2001. No reasons are provided for this decrease in the literature, although it is likely that many people leave the Northern Cape in search of employment in other provinces.

4.3.9.2 Change in population distribution

The Northern Cape has the highest proportion of land area in South Africa (29.7%) and yet it also has the smallest population. The population density of the Province is therefore significantly lower than the rest of South Africa (2.3 people per km^2), and very few places in the Northern Cape have a population density higher than 430 people per km^2. Despite the low population density, the 1996 Census suggested that 71.7% of the Northern Cape population was urbanised. This was the third highest level of urbanisation in the country at the time. Urbanisation is a complex process of change affecting both people and places. Urbanisation has an ongoing impact on the natural environment, through the resources used, and the pollutants and waste generated. Therefore, the density of a population and the distribution of people within a province will have environmental implications.

4.3.10 Funding provided to the Provincial Heritage Resource Agency (PHRA)

The responsibility for management of provincial heritage resources was devolved to provincial level in April 2002. In May 2003 a PHRA Council was established, but not the actual PHRA. It was hoped that the South African Heritage Resources Agency (SAHRA) would assist with the management of provincial heritage matters until a PHRA was established. This only occurred in March 2004, and unfortunately there was no management or regulation of heritage resources in the Northern Cape until this time. In addition, permits could not be issued and prevention of site destruction could not take place. Subsequently, a PHRA Permits Committee was established to manage and process applications in respect of the built environment, namely structures more than 60 years old. No provincial funding has been allocated for the PHRA for the 2004/2005 financial year.

4.3.11 Proportion of known heritage sites with protected area status

Since the Northern Cape PHRA is not yet staffed and funded, sites that were previously afforded protection under old legislation, and those sites proposed for protection under the current legislation were examined. Of the 31 sites and features illustrated in this report, 27 have been proposed as Provincial Heritage Sites and 3 have been proposed as World Heritage Sites. There are no Local Heritage Sites proposed. Of the 31 sites and features, 24 sites and features currently have no management or are inadequately managed. This situation is undesirable and should be rectified as soon as the PHRA is established. The confidence levels of these data are medium. The distribution of known heritage sites is a reflection of where archaeologists have conducted research, and is therefore not necessarily an accurate reflection of the distribution of heritage sites, or the types of heritage present in the Province.

4.3.12 Applicable legislation, commitments and controls

4.3.12.1 International

United Nations Office of the High Commissioner for Human Rights

New Partnership for Africa's Development (NEPAD)

United Nations Millennium Declaration

Southern African Development Community (SADC)

World Heritage Convention

4.3.12.2 National

National Heritage Resources Act 25 of 1999

Municipal Systems Act 32 of 2000

Housing Act 107 of 1997

Strategic Framework for Water Services

Water Services Act 108 of 1997

White Paper on Population Policy (1998)

Reconstruction and Development Programme

4.3.12.3 Provincial

Integrated Development Planning

TABLE 8: LIST OF TABLES AND FIGURES PRESENTED IN THE HUMAN SETTLEMENTS SPECIALIST REPORT

4.4 Northern Cape State of Environment Report: Land Specialist Report (2004)

4.4.1 Introduction

4.4.1.1 Local Activities

- A large portion of the Orange River catchment area falls within the Northern Cape, which provides for a healthy agricultural industry, including vineyards but predominant stock and game farming.
- Mining is the prime income generator and the Province is regarded as the diamond centre of South Africa, with Kimberley as its capital.
- Food and processing industry is slowly growing with in the local and export markets.
- There are several national parks and conservation areas including the Kgalagadi Transfrontier Park South Africa (which includes the Gemsbok National Park in Botswana).
- The last remaining San (Bushman) people live in the Kalahari area of the Northern Cape.
- The area along the Orange and Vaal rivers, are rich in San rock engravings.

4.4.1.2 Geology & Climate

- Vast arid plains with haphazard rocky outcrops.

- The western coastal region is dominated by succulent shrubs, and the interior of the Province has a mixture of low shrubs and grasses.
- Wind and sheet erosion is extensive with salinisation affecting the majority of the Province.
- Bush encroachment and changes in species composition are the most serious problems affecting the land.
- Alien plant invasions is also severe in many parts, with species like the *Prosopsis* species consuming more than 200 million m^3 of water per year, considerably reducing the amount of groundwater available for farmers and rural communities.

4.4.2 Land Degradation

Land degradation is defined as "reduction or loss in the productive capacity of the land, generally occurring in arid, semi-arid and dry sub-humid areas". This loss of productive capacity results from land uses or from a combination of processes arising from human activities, and habitation patterns such as agricultural mismanagement, overgrazing, fuel-wood consumption, industry and urbanisation are the dominant contributors to land degradation, although natural disasters could also lead to degradation. Overgrazing, mining and alien invasive species are the main contributors to the loss of vegetation cover, soil erosion and ultimately land degradation in the Northern Cape:

- Overgrazing is one of the main causes of land degradation in the Northern Cape. 2% of the land is used for crop farming with the aid of irrigation systems to ensure healthy growth of the crop. The majority of the Province is used for stock farming including cattle, sheep or goat farming and mining. Only 3.98% is reserved for conservation.
- Mining has also resulted in serious negative environmental consequences in cases where it has been conducted without recognition of the need to mitigate negative impacts.
- The Northern Cape is also one of the worst affected areas in terms of bush encroachment which implies that large areas of grazing land are lost, species diversity is reduced and habitats are transformed.

Land degradation an important issue to rural communities and farmers that depend on the land for their livelihood.

The land degradation indicator is based on three indices that were developed in an effort to resolve South Africa's problems of land degradation. The study was undertaken by the National Botanical Institute (NBI) as the first step in the formulation of the National Action Programme (NAP). The NAP is a requirement of South Africa's ratification of the United Nations Convention to Combat Desertification. A total of 367 magisterial districts were evaluated and a Soil degradation Index (SDI) and Veld degradation Index (VDI) for South Africa were developed. The SDI and VDI together form the Combined degradation Index (CDI). The first component of the NBI study comprised an assessment of soil degradation in the magisterial districts. Soil degradation was divided into erosive forms such as water and wind erosion, and non-erosive forms such as acidification and salinisation.

The second component concerned veld degradation and six main types of veld degradation were identified including:

- Loss of cover;
- Change in species composition;
- Bush encroachment;
- Alien plant invasions;
- Deforestation; and
- A general category of "Other".

The land degradation indicator therefore measures the percentage of each magisterial district of the Northern Cape that falls into the different land degradation classes. Some of the findings included:

- 30% of the Northern Cape was found to be moderately degraded whilst less than half of the Province is categorised by "light" degradation.
- 24.2% of the Province is "extremely" degraded.

Results from the NBI investigation concluded that the Northern Cape is one of the least degraded provinces in South Africa. However, veld degradation was found to be serious, with the third highest provincial veld degradation indices in South Africa. It was found that change in species composition and bush encroachment was the most common problem. Gordonia and Fraserburg had the highest veld degradation index values.

It was also noted that veld degradation has decreased to an extent in the Province resulting from an increase in good management practices, government sponsored schemes and bush clearing. Agricultural extension services, farmer study groups, drought subsidies and strict application of agricultural legislation have also assisted in reducing degradation in the Northern Cape. However, issues still to be resolved include insufficient access to land, poor infrastructure, and lack of education, finance and government support.

4.4.3 Desertification

The United Nations Convention to Combat Desertification in Countries Experiencing Serious Drought and/or Desertification, particularly in Africa defines desertification as: *"land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities."*

These areas of the world are referred to as 'affected drylands' which are classified into aridity classes by calculating the ratio of mean annual precipitation (MAP) to potential evapo-transpiration (PET).

Desertification arises from various factors such as climatic variation and human activities. The continuation of poor land management practices causes degraded land to coalesce and become desertified. In South Africa the main desertification problems lie across large parts of the Northern Cape, which is sensitive because it is an arid province.

Desertification is strongly linked to poverty and food security as a result of the social and economic importance of natural resources and agriculture to people living in poverty. The majority of the population in the Northern Cape live below the poverty line, and therefore have no choice but to over-exploit the land for their survival.

The extent of affected drylands in the Northern Cape is depicted as area and percentage of the Province that falls into each aridity zone:

- 93% of the Northern Cape can be classified as affected drylands;
- 7.4% of the Province having a MAP: PET ratio below the limit for areas that are defined as affected drylands.

This suggests that most of land in the Northern Cape is potentially susceptible to desertification and should be managed to prevent land degradation from increasing, and to protect land resources from desertification.

4.4.4 Soil Salinisation

Salinisation can occur in a number of ways. In areas where rainfall is five to ten times less than the potential evaporation, salts derived from rock weathering, bio-cycling, evaporation and atmospheric deposition may accumulate in sub- and bottomland soils. Under higher rainfall regimes and poor or impeded soil drainage conditions, lateral leaching of dissolved solids in the groundwater along slopes may also result in bottomlands being slightly enriched in salts. This also suggests that salinisation results in areas where irrigated agriculture is practised.

Soil salinisation is caused by poor drainage and it can be treated by implementing drainage measures in affected areas. Sodicity is an extreme state of salinisation characterised by a low soluble salt content and a high exchangeable sodium percentage (usually ESP > 15). This solidic state results in a reversed osmotic pressure during water uptake by plant roots which adversely affect the growth of non-salt tolerant plants.

Soil salinity and sodicity leads to a loss in crop production and may affect the long term agricultural potential of land. 63.12 % of the Northern Cape can be classified as saline. This could be due to naturally occurring salts in water which has accumulated in the soil, natural soil or geological processes (e.g. rock weathering) or it could be induced by certain agricultural practices.

4.4.5 Land use and land cover

It is necessary to understand the different land uses in order to effectively combat soil erosion, overgrazing, loss of vegetation cover and desertification.

The predominant land use activities within the Northern Cape are mining and sheep, goat, cattle and game farming. Mining is slowly decreasing in the Province and retrenched workers often purchase livestock to earn a living (contributing to land degradation). In the past mining caused considerable conflict in the Northern Cape related to controversial granting of permits to small mining enterprises on Canteen Koppie, and diamond smuggling activities.

Land use is an important factor contributing to the condition of the land because land use impacts on land cover, which in turn affects the condition of the land. The land cover can therefore be used as an indicator to provide information on the current state of land cover in the Province:

- Most of the Province is dominated by vast open areas of natural vegetation with 69.7% of the total area covered by the savannah and azonal biomes (Mucina and Rutherford, 2006.
- A further 14.2% of the Northern Cape is dominated by thicket vegetation and bushlands. The plant communities are essentially indigenous species, growing under natural or semi-natural conditions. Self-seeded exotic species can also be found along riparian zones.
- A total of 0.7% of the Province is classified as degraded whilst 0.2% is dongas and sheet erosion areas.
- 12% of the land cover in the Province is unimproved grasslands characterised by less than 10% tree and/or shrub canopy cover, with greater than 0.1% of total vegetation cover. The plant communities are largely indigenous species growing under natural or semi-natural conditions which are dominated by grass-like, non-woody, rooted herbaceous plants. Urbanisation in the Province is relatively low (0.1%).

4.4.6 Land reform

In the past the commercial farmers were given access to the land by granting them access to grazing land, through leases or sale of the land. Today the land is almost entirely privately owned, however the land reform process is currently in progress in the Northern Cape and consists of land restitution, redistribution and tenure reform.

Land restitution involves returning land which was lost due to racially discriminatory laws, or through the provision of monetary compensation. Land redistribution enables disadvantaged people to buy land. The Northern Cape recently launched the Land Redistribution for Agricultural Development (LRAD) programme which is designed to reduce rural poverty. The LRAD programme targets previously disadvantaged people in rural areas to improve their standard of living by enabling them to manage their own farms effectively.

Land tenure reform aims to bring all people occupying land under one system of landholding. There are a number of issues relating to land tenure and access to land which pose a major obstacle to the development and management of land.

4.4.7 Applicable legislation, commitments and controls

4.4.7.1 International

United Nations Convention to Combat Desertification

United Nations Convention on Biological Diversity

United Nations Convention on International Trade in Endangered Species of Wild Fauna and Flora

4.4.7.2 National

National Environmental Management Act (Act 107 of 1998)

Conservation of Agricultural Resources Act (Act 43 of 1983)

National Environmental Management: Biodiversity Act (Act 10 of 2004)

National Environmental Management: Protected Areas Act (Act 57 of 2003)

National Forests Act (Act 84 of 1998)

Restitution of Land Rights Act (Act 22 of 1994)

4.4.7.3 Provincial

Land Care South Africa

TABLE 9: LIST OF TABLES AND FIGURES PRESENTED IN THE LAND SPECIALIST REPORT

4.5 Northern Cape State of the Environment Report: Freshwater Specialist Report (2004)

4.5.1 Introduction

The Northern Cape is characterised as an arid to semi-arid region with low summer rainfall, and a strip of winter rainfall along the coast. The area experiences cold and frost in winter with extremely high temperatures in summer. The high evaporation potential, coupled with the variability in rainfall results in periodic episodes of severe and prolonged drought.

Algae growth and eutrophication of the little water that is available is caused by numerous domestic and industrial land use activities. This eutrophication results in impaired water quality and renders the resource unfit for use. In instances when this water is utilised it results in reduced crop yield or damage to irrigation equipment. Therefore the conservation and management of water resources in this region are of utmost importance. Until such time as Catchment Management Agencies are set in place, the Northern Cape Regional Office of the Department of Water Affairs and Forestry (DWAF)(currently the Department of Water Affairs) is responsible for managing water resources.

The management of water resources in South Africa takes place within catchments which are called Water Management Areas (WMAs). Of the 19 WMAs in South Africa, the WMAs represented within the Northern Cape provincial boundaries include:

- Lower Vaal WMA: Molopo sub-WMA

- Upper Orange WMA: Vanderkloof sub-WMA
- Lower Orange WMA: Orange sub-WMA
- Orange Tributaries sub-WMA
- Orange Coastal sub-WMA
- Olifants/Doring WMA: Knersvlakte sub-WMA
- Doring sub-WMA

The Orange River provides a significant resource to the Province and is used for industrial, agricultural, recreational and domestic purposes. While most of the Province is unsuitable for dry land cropping, the Orange River Valley, especially at Upington, Keimoes and Kakamas, is extensively cultivated as a grape and fruit growing country. The Vaalharts Irrigation Scheme near Warrenton produces wheat, fruit, peanuts, maize and cotton.

Five key water resource indicators have been selected to report on the current state of freshwater resources in the Province. These indicators describe the quality of freshwater within WMAs in terms of its nutrient levels and toxicity, groundwater resource quality, and current demands on resources and the ability of these water systems to supply the volumes of water required. An assessment and interpretation of these indicators provides valuable information to assess the key issues identified.

4.5.2 Freshwater quality

The preservation of quality surface and groundwater is a significant issue in the Northern Cape. Potable water is required to sustain the needs of a growing urban population and ecosystems require a certain quality of water in order to function.

Major water quality problems stem from sewage pollution, the use of fertilisers and pesticides, industrial wastes, mining and soil erosion. Land disturbances from agricultural practices lead to soil erosion and siltation of rivers. Industrial wastes, hazardous wastes and abandoned industrial sites result in leaching hazardous metals such as lead, chromium, zinc and iron into water courses and groundwater. Mining causes acid mine drainage, heavy metal pollution and soil erosion. All of these negative impacts result in increased pH, and contributes to algal growth and leads to eutrophication of water courses and a heightened risk to human health if ingested.

The Surface Water Toxicity indicator provides an indication of the potential harm that contaminated water may have on both human heath and ecosystems. Routine water quality monitoring takes place along all of the major rivers in South Africa as well as in localised hot-spot areas. Exceedances of pH means that water is either too acid or too alkaline and can have detrimental effects on riverine ecosystems and foliage. The adverse effects of pH however result from solubilisation of toxic heavy metals and not the level of pH itself. High exceedances of pH against industrial use guidelines are experienced in the Vanderkloof sub-WMA, Lower Orange WMA and Molopo sub-WMA. Water samples from the Vanderkloof, Lower Orange and Molopo areas indicate exceedances of irrigation guidelines over 35% of the time for levels of electrical conductivity (EC) and Total Dissolved Salts (TDS). High levels of EC and TDS indicate increasing levels of salts, accumulation of salts in the soil, resulting in reduced yields of crops that are sensitive to soil salinity. TDS levels in the Lower Orange WMA and Molopo sub-WMAs also exceed domestic use guidelines over 20% of the time. TDS affects the taste of water, and water with high TDS does not slake thirst.

The measurement of chloride concentrations is of particular importance as it accelerates the corrosion of equipment and shortens the lifespan of equipment and structures. Twenty-eight percent of samples exceed industrial use guidelines for chloride levels in this area. These occurrences are most likely because of irrigation return flows, sewage effluent discharges and various industrial processes.

The indicator 'Surface water nutrients' measures the ratio of total inorganic nitrogen to orthophosphate (TIN:PO_4) together with the absolute orthophosphate concentration in a body of water. When measured over time, this indicator shows the decline or improvement of water per water management area. A decrease in the TIN:PO_4 ratio implies a deterioration of the resource while an increase implies improvement. Absolute orthophosphate levels increase when conditions are impacted and decrease when there is an improvement.

All of the sub-WMAs have shown decreased TIN:PO4 ratios between 1998 and 2001 and 2001 and 2003 suggesting water quality deterioration, with the exception of the Orange sub-WMA which showed a slight

improvement in nutrient levels between 2001 and 2003. Orthophosphate concentrations indicate a similar trend of deterioration with only the Vanderkloof sub-WMA showing a slight improvement between 2001 and 2003.

Water is saline over large areas of the Province, especially within the Kalahari and Karoo, where the salt content tends to be so high that the water is regarded as unacceptable for human consumption. In the Sak River at De Kruis/Williston (Lower Orange WMA), TDS levels are considered to be poor or not acceptable in terms of human health.

The indicator 'Groundwater nutrients' is used to measure groundwater quality in the form of total nitrate and nitrites (mg/l NOx-N). A recent groundwater survey of the Lower Orange Catchment Management Area showed that nitrates are the contaminant of most concern since they are highly soluble and do not bind to soils, and therefore easily migration into groundwater.

The median concentration for all groundwater regions in the Province show that groundwater nutrients have declined since 1998 and have remained at a constant level from 2001 to 2003. Of all 13 groundwater regions in the Province, 11 have groundwater NOx levels below the 6mg/l target water quality range or threshold. The highest concentration of groundwater nutrients are experienced in the Western Highveld groundwater region with a median of 15.1mg/l in 2003, while the Eastern Upper Karoo region experienced elevated levels between 1998 and 2001 above the threshold value, with a small decline in nutrient levels between 2001 and 2003. Another significant decline in groundwater nutrients occurred in the Bushmanland Pan Belt where Nutrient levels declined in 2003 from an average of 10.01 mg/l to 5.76 in 2003, making this water suitable for domestic consumption.

4.5.3 Freshwater ecosystem integrity

Good quality water and adequate water flow are required to sustain the growth of specific riverine ecosystems. Aquatic habitat integrity and water quality are major determinants of the biological communities in a system. If habitat is lost or degraded for any number of reasons, the biological integrity of the system will be adversely affected. Thus, habitat availability and diversity are important in supporting diverse biological communities and provides an indication of the current ecological integrity of an ecosystem.

4.5.4 Resource value

Water resources are valued because of their contribution to sustaining life and livelihoods, their scarcity in many regions of the world. Water resources are scarce in many parts of the Northern Cape and therefore the value of water resources increases with water scarcity. In the Northern Cape, water resources are valued because of their scarcity and because of the potential threats to water quality from agricultural and industrial activities.

4.5.5 Resource use

There is a high demand for quality water from a variety of sectors including urban and rural populations, industries, mines and agriculture. These demands must be managed against the volumes of water which are available for use so that a sustainable supply is available for present and future needs. As determined by the National Water Resource Strategy (NWRS) the ecological reserve is an important consideration when determining water available for use to ensure the availability of water for ecological functions.

Abstraction of surface and groundwater varies within the Province and between sectors. The abstraction of water resources in the Orange sub-WMA is used primarily for irrigation while the majority of water abstracted in the Molopo sub-WMA is used for consumption in the urban sector. Surface water resources are the primary water source in the Vanderkloof sub-WMA, yet groundwater resources are more abundant than surface waters in the Lower Orange WMA and the nersvlakte and Molopo sub-WMAs.

The indicator used to measure freshwater demand and availability is made up of two components: measurement of sectoral requirements (demands per sector) in the sub-WMAs situated within the Province, and the measurement of water availability per sub-WMA. A comparison of total requirements with total resource availability presents an indication of the water scarcity in each sub-WMA and provides an indication of the need for adjusted supply and demand management policy.

Water sectors which are included in the first component of this indicator include: urban, rural, irrigation, afforestation, mining and bulk industrial, power generation and transfers out. The irrigated agriculture sector has

the highest demand for water utilising 1129 million cubic metres per annum (mm^3/a). The greatest volume of water required for the irrigated agriculture sector is in the Orange sub-WMA where there is intensive cultivation of fruit trees and grape vines. Compared to the irrigated agriculture sector, the mining and bulk industrial sector requires the least volumes of water. Significant transfers of water take place out of the Vanderkloof sub-WMA into the Fish to Tsitsikamma WMA. Some of the Vanderkloof is also released along the river for use in the Lower Orange WMA.

Requirements amount to 3957 million m3/annum and availability is totalled as 4483 million m_3/annum. However, the Doring, Knersvlakte, Coastal Orange, Orange and Molopo sub-WMAs have more or less equal amounts of water required and available, making these areas vulnerable to drought. Only the Vanderkloof sub-WMA has more water available than required, even after significant transfers of water out of the area. The Orange Tributaries sub-WMA has less available than required, mainly from the high demands of the irrigated agricultural sector, and urban and rural uses.

4.5.6 Water resource management

Effective water resource management is essential for the Northern Cape and an integrated approach to water resource management is required to reconciliation interventions and other aspects of the NWRS. Water resource management involves controlling flow, minimising usage, prevention of pollution, and monitoring and evaluation. The four WMAs within the provincial border are responsible for management of resources in these WMAs resting with other provinces, and therefore conflict over water resources arise. Apart from these national conflicts, the Northern Cape faces greater challenges in managing the lower Orange River with Namibia and South Africa sharing a 600km stretch of the river. This shared resource requires an integrated approach towards water resource management so that future water requirements may be sustained.

The Effectiveness of Resource Management indicator is a response indicator which evaluates the effectiveness of water resource management in the Northern Cape. The institutional framework is one of the most important aspects of water resource management because it determines the effectiveness of policy implementation. The indicator is qualitative and descriptive and consists of seven questions covering important aspects of water resource management. By answering these questions the standard for future SoE reporting on water resource management in the Province is determined.

The establishment of CMAs in both the Lower Orange and Lower Vaal WMAs is underway and yet there is still some time before these will be operational in the Province. Various water forums are active in the Province and provide local water resource management. However, there is inadequate integration between water service planning and water resource monitoring. One of the greatest challenges for the Northern Cape is the trans-boundary management of the lower portion of the Orange River. A co-ordinated response in partnership with Namibia is the only solution to managing the demands of development.

4.5.7 Applicable legislation, commitments and controls

4.5.7.1 International

Convention on Wetlands of International Importance Especially as Waterfowl

Habitat (Ramsar Convention)

United Nations Convention on the Law of Non-Navigational Uses of

International Watercourses (UNCSW)

Revised Protocol on Shared Watercourse Systems in the SADC Region

Permanent Water Commission on the Orange (Gariep) River

4.5.7.2 National

National Environmental Management Act, Act 107 of 1998

National Water Act, Act 36 of 1998

Water Services Act, Act 108 of 1997

National Water Resource Strategy

Conservation of Agricultural Resources Act, Act 43 of 1983

Environment Conservation Act, Act 73 of 1989

Draft Operational Policy: Using water for recreational purposes

4.5.7.3 Provincial

Regional water resource monitoring and management

Lower Orange River Management Study (LORMS)

TABLE 10: LIST OF TABLES AND FIGURES PRESENTED IN THE FRESHWATER SPECIALIST REPORT

4.6 Key findings

The State of Environment Report is a Provincial document and therefore there is a lack of information focused specifically for the John Taolo Gaetsewe District Municipality. However, the specialist studies do highlight a number of issues pertinent to the area. These include:

- Insufficient skills, expertise and funding, legal fragmentation, inadequate integration of environmental considerations into sectoral and land use plans, and weak political commitment.
- There is a lack of water resources, and those that are present are prone to contamination through various mediums.
- Overgrazing, desertification and salinisation pose a great threat to large portions of the Northern Cape.
- There is a need for environmental management plans within various sectors, including water resource management and invasive alien management.
- Many towns/settlements are struggling with issues such as infrastructure and service delivery.
- Education desperately needs to be improved.

- Large numbers of the population are currently unemployed and receive no income, adding to poverty.
- There is little economic development outside of mining.
- Although, the Northern Cape has the potential to exploit renewable energy resources not much development has taken place in this regard.

4.7 Information Gaps

As mentioned above, the State of Environment Report is a Provincial document and therefore there is a lack of information focused specifically for the John Taolo Gaetsewe District Municipality. However, some of the information reflects what is found in the local planning documents, e.g. IDP and SDF.

In addition the atmospheric and climate specialist report failed to provide an indication on the extent of the asbestos pollution, with regard to the health of miners and individuals living within the mining towns.

The literature also highlighted that there is a lack of Environmental Management Plans for the area.

While the specialist reports highlighted a variety of issues for the Northern Cape, it does not appear as though these concepts are being filtered into local level development plans and strategies, and therefore many opportunities are being lost. This is mainly because of the focus on brown agenda issues for the district as a whole.

5 OTHER SOURCES OF INFORMATION

5.1 Kathu Forest declared a protected woodland (2009)

The Kathu forest in the John Taolo Gaetsewe magisterial district of the Northern Cape has been declared a protected woodland in terms of section 12(1)(c) of the National Forests Act, 1998 (Act No. 84 of 1998) by the Minister of Agriculture, Forestry and Fisheries, Ms Tina Joemat-Peterson.

The woodland of exceptionally large camel thorn trees (*Acacia erioloba*) is approximately 4000 hectares in extent, and is one of only two such woodlands in the world. It was originally recognised for its uniqueness in 1920 when it was proclaimed a state forest. However, it was de-proclaimed as a state forest in 1956 to allow for the development of the town of Kathu. The glory of the Kathu Forest was once again restored when it was registered as a national heritage site in 1995. With such a long and rich history of human utilisation dating back to 800 000 years ago, it contains billions of artefacts and has been described as one of the richest archaeological sites in the world.

Threats to the forest are not new, and in recent times concerns have been raised about harvesting these protected trees for the fuel-wood market. In addition, there are a number of threats to the Kathu forest's ecological integrity and the potential loss of biodiversity. The main threats are the current development and expansion of the town which includes a controversial up-market housing development to the north of the town, and new and expanding mines. The lowering of the water table by groundwater abstraction is also a concern as insufficient water resources could lead to the death of the trees.

The Kathu Forest will now receive protection via be National Forests Act, 1998 (Act No. 84 of 1998), which states that no person may cut, disturb, damage or destroy any protected tree, or posses, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree. Over and above this, sections of the forest will be zoned as follows:

- Zone 1 Primary Kathu conservation zone: Hiking trails and limited vehicle tracks that do not require removal of trees.
- Zone 2 Low impact eco-tourism zone: Trails, tracks, picnic sites and bush camps.
- Zone 3 Eco-estate buffer zone: Low density housing development that retains the natural character of the area. No introduction of alien plant species will be permitted and/or will be subject to an agreed off-set agreement for the conservation and management of the Kathu protected woodland and adjoining areas.

The protection status will provide additional protection for protected species occurring within the forest, such as the camel thorn trees, by extended protection from any form of cutting, damaging and destruction from all quarters. It is also hoped that the protection status of the forest will preserve the uniqueness of the area and heritage. This should in turn, attract more tourists to the district and boost the economy of the town.

5.2 Kumba Iron Ore: Sustainable Development Report Review (2009)

This report covers the Sishen and Thabazimbi Mines, the construction of Kolomela Mine, exploration activities, the corporate office and the Saldanha port. Each of the following topics are addressed with regard to the above mentioned:

- Employee safety, occupational health, HIV and Aids;
- Mining Charter commitments;
- Social and community development; and
- Environmental Management.

5.2.1 Environmental legal compliance

Kumba is guided by the South African Legislation and ISO 14001 certified. In addition, during the 2008 and 2009 analysis it was found that operations are compliant with regard to social and community development. Kumba

strives to be a proactive company. However its main challenge is its failure to meet the commitments outlined in the Social and Labour Plans.

5.2.2 Stakeholder engagement

Kumba projects boost economy through engagement of select projects with host communities, local and provincial government, and neighbouring companies. This includes stakeholder engagement to guide the following:

- Stakeholder engagement policy
- Government relations policy
- Mine community engagement plans
- Anglo American Stakeholder Engagement Plan
- Anglo American socio-economic assessment toolbox

Stakeholder engagement also plays a major role in the implementation of strategic priorities.

The main stakeholders include: tribal chiefs, local councillors, district and local mayors, regulators at local provincial and national level, local community forums, government minister, provincial premiers, communities, Members of Executive Councils (MECs), local municipalities, Non-governmental Organisations (NGOs) and environmental focus groups.

6 ENVIRONMENTAL LEGISLATION

6.1 The Legal Overview of Environmental Management Framework

The legal origin of an EMF is embedded in Section 24 (2) and (3) of the National Environmental Management Act, 1998 (NEMA) (as amended) which states that the Minister, and every MEC with the concurrence of the Minister, may compile information and maps that specify the attributes of the environment in particular geographical areas, including the sensitivity, extent, interrelationship and significance of such attributes which must be taken into account by every competent authority.

In terms of section 24(4)(b)(vi) of NEMA, procedures for the investigation, assessment and communication of the potential consequences or impacts of activities (commonly known as Environmental Impact Assessments) must include, where applicable, with respect to every application for an environmental authorisation consideration of environmental attributes identified in the compilation of information and maps as contemplated in subsection 24(3).

In addition to the abovementioned provisions of NEMA, Chapter 8, part 1 of the so-called EIA Regulations (Regulations published in terms of chapter 5 of the National Environmental Management Act, 1998) provides further information on the scope and status of an EMF.

The regulations specify that information and maps compiled in terms of section 24(3) of NEMA can be used as environmental management frameworks in the consideration in terms of section 24 (4)(b)(vi) of NEMA of applications for environmental authorisations in or affecting the geographical areas to which those frameworks apply. They also provide specific regulatory requirements pertaining to the development of an EMF specifying that either the Minister or MEC with the concurrence of the Minister may initiate an EMF for an area. For this purpose, the Minister or MEC must compile a draft environmental management framework and subject it to a public participation process (by making the draft available for public inspection at a convenient place; and inviting potential interested and affected parties by way of advertisements in newspapers circulating in the area and in any other appropriate way to inspect the draft and submit representations, objections and comments in connection with the draft to that person or organ of state). The draft EMF should then be reviewed in the light of any representations, objections and comments received.

In terms of the regulations, the Minister or MEC may adopt, with or without amendments, an EMF. When an EMF has been adopted, notice must be given in the Government Gazette or the official Gazette of the relevant province of (a) the adoption of the environmental management framework; and (b) the place where the environmental management framework is available for public scrutiny.

Finally, the regulations prescribe that an EMF which has been adopted must be taken into account in the consideration of applications for environmental authorisation in or affecting the geographical area to which the framework applies. An EMF should therefore be regarded as a supportive instrument to assist environmental impact assessment and related decision making processes in the John Taolo Gaetsewe District Municipality area.

6.2 The National Environmental Management: Protected Areas Act

Section 51 of the Act states that the Minister or the MEC may by notice in the Gazette restrict or regulate activities in a protected environment under the jurisdiction of the Minister or the MEC development that may be inappropriate for the area given the purpose for which the area was declared and (b) the carrying out of other activities that may impede such purpose.

In terms of section 9 of NEM:PAA, the system of protected areas in South Africa consists of the following kinds of protected areas special nature reserves, national parks, nature reserves (including wilderness areas) and protected environments; world heritage sites; marine protected areas; specially protected forest areas, forest nature reserves and forest wilderness areas declared in terms of the National Forests Act, 1998 (Act No. 84 of 1998); and mountain catchment areas declared in terms of the Mountain Catchment Areas Act, 1970 (Act No. 63 of 1970).

6.3 The National Environmental Management: Biodiversity Act

In this context, biodiversity management should be integrated in the EMF and management of the John Taolo Gaetsewe District Municipality must ensure that biodiversity is effectively managed and conserved and that there is sustainable use of indigenous biological resources in the John Taolo Gaetsewe District Municipality.

The main legal provisions pertaining to the management of biodiversity of South Africa are embedded in the National Environmental Management Biodiversity Act, 2004 (NEM:BA).

In terms of the abovementioned Act, the State is the trustee of biological diversity and in this context it must manage, conserve and sustain South Africa's biodiversity and its components and genetic resources through the effective implementation of the NEM:BA.

The main relevant provisions of the NEM:BA for the management, conservation and sustainable use of biodiversity is stated in terms of section 9(1) of the Act, the Minister may, by notice in the Gazette issue norms and standards for the achievement of any of the objectives of this Act. Such norms and standards may apply nationwide, in a specific area only; or to a specific category of biodiversity only. Different norms and standards may be issued for different areas or different categories of biodiversity.

NEM:BA sets out various management instruments in the context of biodiversity planning and monitoring, including the national biodiversity framework, bioregions and bioregional plans, and biodiversity management plans.

6.4 Mineral and Petroleum Resources Development Act

This Act is the central mining legislation and regulates the equitable access to, and sustainable development of, the nation's minerals and petroleum resources and provides for environmental protection and rehabilitation in cases of mine-closure. The Act is administered by the Department of Mineral Resources, and has a strong focus on sustainable development.

6.5 Conservation and Agricultural Resources Act

The Conservation of Agricultural Resources Act, 1983 (Act No 43 of 1983) (CARA) and the regulations made under CARA are designed to provide for control over the utilisation of the natural agricultural resources of the country in order to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants.

CARA is administered by the Department of Agriculture. The ambit of the Act is however limited as land situated within an "urban area" does not fall within the ambit of the Act, except in so far as the Act relates to weeds and invader plants. Urban areas are defined as those areas that formed part of a municipal area prior to the designation of 'wall-to-wall' municipalities in 1994.

With regards to weeds and invader species, CARA regulations on the Combating of Declared Weeds and Invader Plants were published in GN R1048 of 25 May 1984.

6.6 Other applicable legislation

The National Heritage Resources Act (Act No of 1999) requirements for heritage resource identification and protection in the John Taolo Gaetsewe District Municipality.

The National Water Act (Act 36 of 1998) and the Water Services Act (Act No 108 of 1997) which provides legislative water management requirements in South Africa and which will be applicable on the John Taolo Gaetsewe District Municipality.

6.7 Environmental regulation in terms of Chapter 5 of the National Environmental Management Act

In addition to the provisions of NEMA, Chapter 8, part 1, of GN R. 385 provides further information on the scope and status of an EMF.

Sub-regulation 69 of GNR 385 specifies that information and maps compiled in terms of section 24(3) of NEMA can be used as environmental management frameworks in the consideration in terms of section 24 (4)(i) of NEMA of applications for environmental authorisations in or affecting the geographical areas to which those frameworks apply.

Sub-regulation 70 also provides specific regulatory requirements pertaining to the development of an EMF specifying that either the Minister or MEC with the concurrence of the Minister may initiate an EMF for an area. For this purpose, the Minister or MEC must compile a draft environmental management framework and subject it to a public participation process (by making the draft available for public inspection at a convenient place; and inviting potential interested and affected parties by way of advertisements in newspapers circulating in the area and in any other appropriate way to inspect the draft and submit representations, objections and comments in connection with the draft to that person or organ of state). The draft EMF should then be reviewed in the light of any representations, objections and comments received.

Sub-regulation 72 is also very relevant as it regulates the adoption process of an EMF. In terms of sub-regulation 72 (1), the Minister or MEC may adopt, with or without amendments, an EMF. When an EMF has been adopted, notice must be given in the Government Gazette or the official Gazette of the relevant province of (a) the adoption of the environmental management framework; and (b) the place where the environmental management framework is available for public scrutiny.

7 CONCLUSION AND WAY FORWARD

SSI Environmental has assessed and summarised the most important studies and legislative requirements for the development of the John Taolo Gaetsewe District Municipality EMF. In the summary the shortcomings of the studies have been highlighted in the literature review as well as relevant information and key findings.

John Taolo Gaetsewe District Municipality can be characterised as a predominantly mining driven economy, with some agriculture, predominantly in the form of cattle farming. The district is struggling with a great lack of infrastructure, technical capacity and can largely be classified as rural. The area is also plagued with issues such as land degradation because of the harsh environment, which is exacerbated by overgrazing. While this is acknowledged as a serious problem that requires urgent attention, it would appear that the needs of the people in terms of infrastructure and services are the focus with natural environmental areas only receiving attention in areas when and where they can be accommodated. Therefore, the IDPs and SDFs for the local municipalities tend to focus on this lack of infrastructure and basic services.

The State of Environment Report is a Provincial document and therefore there is a lack of information focused specifically for the John Taolo Gaetsewe District Municipality. However, some of the information could be found in the local planning documents, e.g IDP and SDF. The main issues that were highlighted include:

- Insufficient skills, expertise and funding, legal fragmentation, inadequate integration of environmental considerations into sectoral and land use plans, and weak political commitment.
- There is a lack of water resources, and those that are present are prone to contamination through various mediums.
- Overgrazing, desertification and salinisation pose a great threat to large portions of the Northern Cape.
- There is a need for environmental management plans within various sectors, including water resource management and invasive alien management.
- Many towns/settlements are struggling with issues such as infrastructure and service delivery (with only the larger mining towns (such as Kuruman) thriving.
- Education desperately needs to be improved.
- Large numbers of the population are currently unemployed and receive no income, adding to poverty.
- There is little economic development outside of mining.
- Although the Northern Cape has the potential to exploit renewable energy resources not much development has taken place in this regard.
- The lack of Environmental Management Plans for the area.

The literature clearly highlights the challenges and constraints of the district and local municipalities. However, there appears to be a lack of initiative and innovation in the types of development improvements in the area. It does not appear as though findings of specialist reports are being filtered into local level development plans and strategies, and therefore many opportunities are being lost. Some additional types of development could be focused on renewable energy, and development of ‘eco-friendly’ housing and strengthening of local business (other than the mining industry which dominates the district). While other strategies could focus on effective agricultural and grazing methods, and water usage, taking into account the impacts of climate change and land degradation.

Following on from, and building on the foundation of, this Literature Review the EMF project will progress to a more in-depth investigation of the various environmental and social characteristics of the JTGDM. The Literature Review will therefore inform the compilation of a Status Quo Report. The findings of Status Quo Report will ultimately represent a current ‘snapshot’ of the JTGDM environment which can be compared to a more idealistic Desired State.