CDS RESEARCH REPORT

LED & SMME DEVELOPMENT

Water demand of the Free State Province: 2005–2020

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Water demand of the Free State Province:
2005–2020

By

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It should be emphasised that this report is compiled from secondary data and that no primary research was conducted. Full recognition must therefore be given to the original researchers.

Prof. M.F. Viljoen
Research Leader

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ABREVIATIONS AND ACRONYMS

ADWF	**Average Daily Weather Flow**
ADWD	**Average Daily Water Demand**
BHS	**Basic Household Sanitation**
CBPWP	**Community Based Public Works Programme**
CMA	**Catchment Management Agency or Area**
CMIP	**Consolidated Municipal Infrastructure Programme.**
CMS	**Catchment Management Strategy**
COD	**Chemical Oxygen Demand**
CS	**Communal Supply**
CSU	**Communal Supply Upgrade**
CWSS	**Community Water Supply and Sanitation**
CWN	**Complete Water Network**
DM	**District Municipality**
DWAF	**Department of Water Affairs and Forestry**
ES	**Equitable Share**
FBW	**Free Basic Water**
FOS	**First Order Strategy**
FS	**Free State**
GWS	**Government Water Scheme**
IDP	**Integrated Development Plan**
ISRDP	**Integrated Sustainable Rural Development Programme**
L/c/d	**Litres per capita per day**
L/h/d	**Litres per household per day**
LED	**Local Economic Development**
LM	**Local Municipality**
m^3	**Cubic metre**
M	**Million**
Ml	**Million litres**
MSP	**Municipal Service Partnerships**
NER	**National Electricity Regulator**
PDDWF	**Peak Daily Dry Weather Flow**

PDWWF	**Peak Daily Wet Weather Flow**
PSU	**Provincial Support Unit**
SSDWD	**Sustained Summer Daily Water Demand**
STW	**Sewage Treatment Works**
UAW	**Unaccounted for Water**
WC/WDM	**Water Conservation / Water Demand Management**
WSA	**Water Services Authority**
WSOS	**Water Services Operating Subsidy**
WSP	**Water Services Provider**
WSSP	**Water Services Sector Plan**
WTW	**Water Treatment Works**
WMA	**Water Management Area**
WUA	**Water User Association**

CHAPTER 1 INTRODUCTION

1.1 PROBLEM STATEMENT AND MOTIVATION

Uncertainty exists about the future demand for surface water in the Free State Province for different scenarios, economic sectors and geographical areas. The crucial role that water plays in the process of development makes it necessary to timeously determine water needs. Comparing the needs of different economic sectors and geographical areas for different scenarios with the water supply situation is necessary to proactively develop the water resources and water supply infrastructure and thus circumvent the inefficient integrated economic development of the province due to insufficient water provision.

1.2 OBJECTIVE OF REPORT

The objective of the report is to present information on present and anticipated future water demand for different sectors and geographical areas within the Free State Province utilising secondary (already available) data and information. Data are presented in the report for four different geographical, institutional and/or sector classifications, namely (i) Water Management Areas and User Groups, (ii) District Municipalities, (iii) Water Boards and (iv) Government Water Schemes. Each of these classifications presents a different perspective by focussing on different areas, institutions and/or water users. This approach should give a more complete picture of the water demand situation in the Free State Province.

1.3 OUTLINE OF THE REPORT

Besides the introductory chapter, Chapter 1, the report consists of seven chapters. Chapter 2 outlines the methodology and Chapter 3, the study area. Water demand is presented per Water Management Area (WMA) (also referred to as Catchment Management Area (CMA) in this report) in Chapter 4, per District Municipality in Chapter 5, per Water Board in Chapter 6, and per Government Water Scheme in Chapter 7. Chapter 8 contains the summary and conclusions.

CHAPTER 2 METHODOLOGY

The research was conducted as a desktop based study and included the following activities:

2.1 RETRIEVAL OF INFORMATION

Relevant information on water usage and demand projections were obtained by approaching the following institutions:

- The National and Free State Offices of the Department of Water Affairs and Forestry
- The relevant Water Boards, namely, Bloem Water, Sedibeng Water and Rand Water
- The relevant District Municipalities, namely Lejweleputswa, Motheo, Northern Free State, Thabo Mofutsanyane and Xhariep
- A number of local municipalities
- A number of water services agencies

2.2 ANALYSIS OF INFORMATION

Information obtained was studied, analysed and processed (when necessary), to get it into the format needed for this report. This included discussions with officials and experts who provided the base information.

2.3 COMPILE TABLES AND FIGURES

Besides tables and figures provided on request by the Department of Water Affairs and Forestry and obtained from Water Service Development Plans (WSDPs), other tables were compiled from data obtained from other sources. Assumptions on which predictions are based are specified where necessary.

2.4 VERIFICATION

Interpretation of data and information were verified by consulting with personnel of water service institutions.

2.5 COMPILING REPORT

The last challenge was to compile the information and findings in this report.

CHAPTER 3 STUDY AREA

To place the discussion in subsequent chapters in perspective the study area is briefly outlined by presenting relevant maps and discussions. From an overview of the Free State Province the presentation shifts to water management areas, district municipalities, water boards and government water schemes.

3.1 FREE STATE PROVINCE

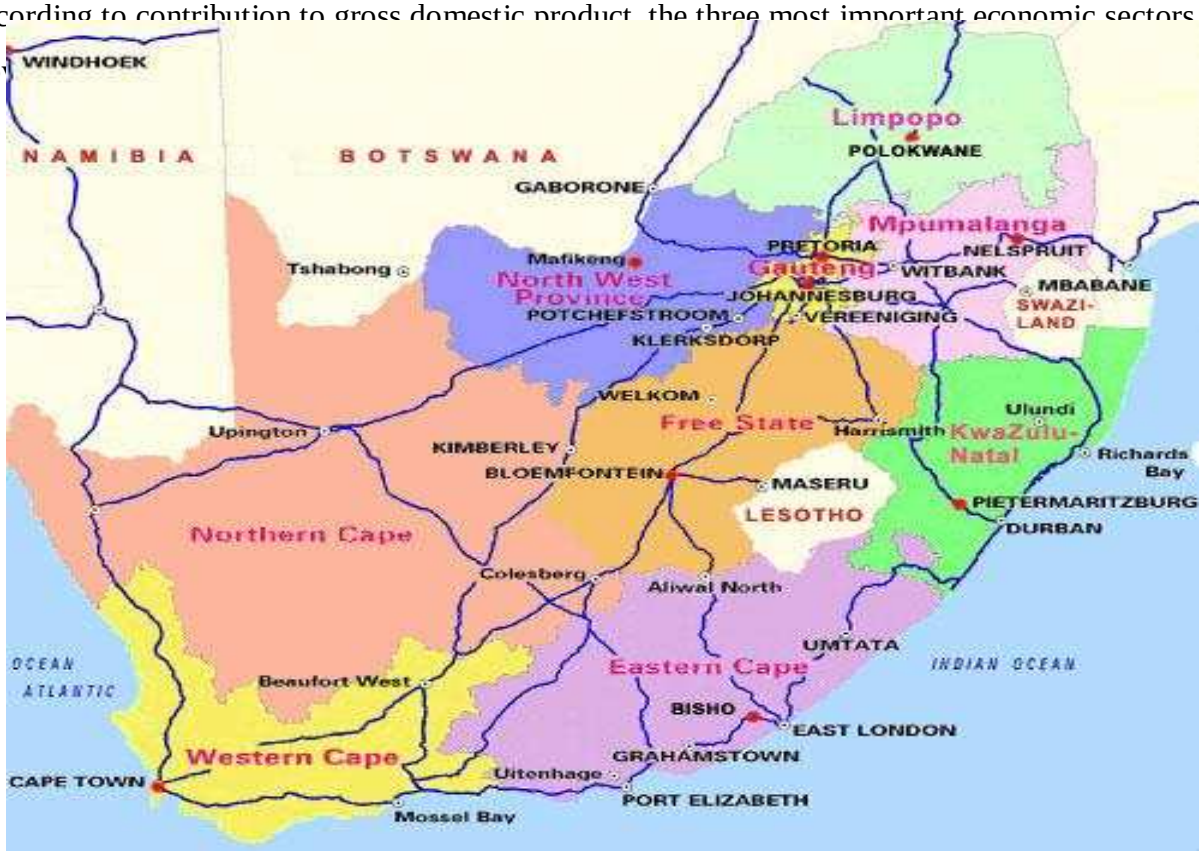
The study area for this research is the Free State Province. Map 3.1 shows the location of the province relative to other provinces and Lesotho. According to the Provincial Overview (www.gov.za/province/overview/2004) "the Free State lies in the heart of South Africa, with the Kingdom of Lesotho nestling in the hollow of its bean-like shape. Between the Vaal River in the north and the Orange River in the south, this immense rolling prairie, chequered with farmlands and dotted with windmills, stretches as far as the eye can see. Bloemfontein is the capital of the province. The city has a well-established judicial, institutional and administrative infrastructure.

The road network density of the province is the third highest in the country. The N1 national road, which is the artery between Gauteng and the Western and Eastern Cape, passes through the middle of the Free State.

Important towns include Welkom, the heart of the goldfields and one of the few completely pre-planned cities in the world; Odendaalsrus, another goldmining town; Sasolburg, which owes its existence to the petrol-from-coal installation established there; Kroonstad, an important agricultural, administrative and educational centre; Parys on the banks of the Vaal River; Phuthaditjhaba, well-known for the beautiful handcrafted items produced by the local people, and Bethlehem, gateway to the Eastern Highlands of the Free State.

The Free State is the third-largest province in South Africa. However, it has the second-smallest population and the second-lowest population density." The total population of the province was 2.7-million in 2001, of which 2.38-million were Africans, 239 000 were White, 83 000 Coloured and 4 000 Indian (Municipal Demarcation Board, 2001).

According to contribution to gross domestic product, the three most important economic sectors of the prov



Map 3.1: South Africa Provinces

3.2 WATER MANAGEMENT AREAS (WMAs)

Map 3.2 shows the boundaries of the WMAs of the Free State Province. Four WMAs are relevant namely Upper Vaal, Middle Vaal, Lower Vaal and Upper Orange. Each of these is divided into sub-areas which forms the basis of the water requirements predictions. Sub-areas of Upper Vaal are Wilge, Upstream of Vaal Dam-portion and Downstream of Vaal Dam-portion. Middle Vaal consists of Rhenoster-Vals, Middle Vaal-portion and Sand-Vet. The sub-area of Lower Vaal is indicated as Vaal downstream of Bloemhof-portion. Relevant sub-areas of Upper Orange are Caledon RSA, Kraai-portion, Riet/Modder-portion and Vanderkloof-portion.

3.3 DISTRICT MUNICIPALITIES

The Free State Province is demarcated into five district municipalities, each of which consists of a number of local municipalities. The Districts Municipalities are Northern Free State, Lejweleputswa, Thabo Mofutsanyane, Motheo and Xhariep as shown in Map 3.3.

Table 3.1 gives the names of the local municipalities of each district municipality and Table 3.2 gives comparable statistical data for the district municipalities for 2001 with regard to population, labour force, employment, sanitation and water provision. For the province as a whole, Africans made up 88% of the population, the unemployment rate was 25.5%, agriculture provided 17.5% of all jobs, flush toilets were the most common sanitation system (44.7%) and inside yard taps the dominant system of water provision to households (47.7%).

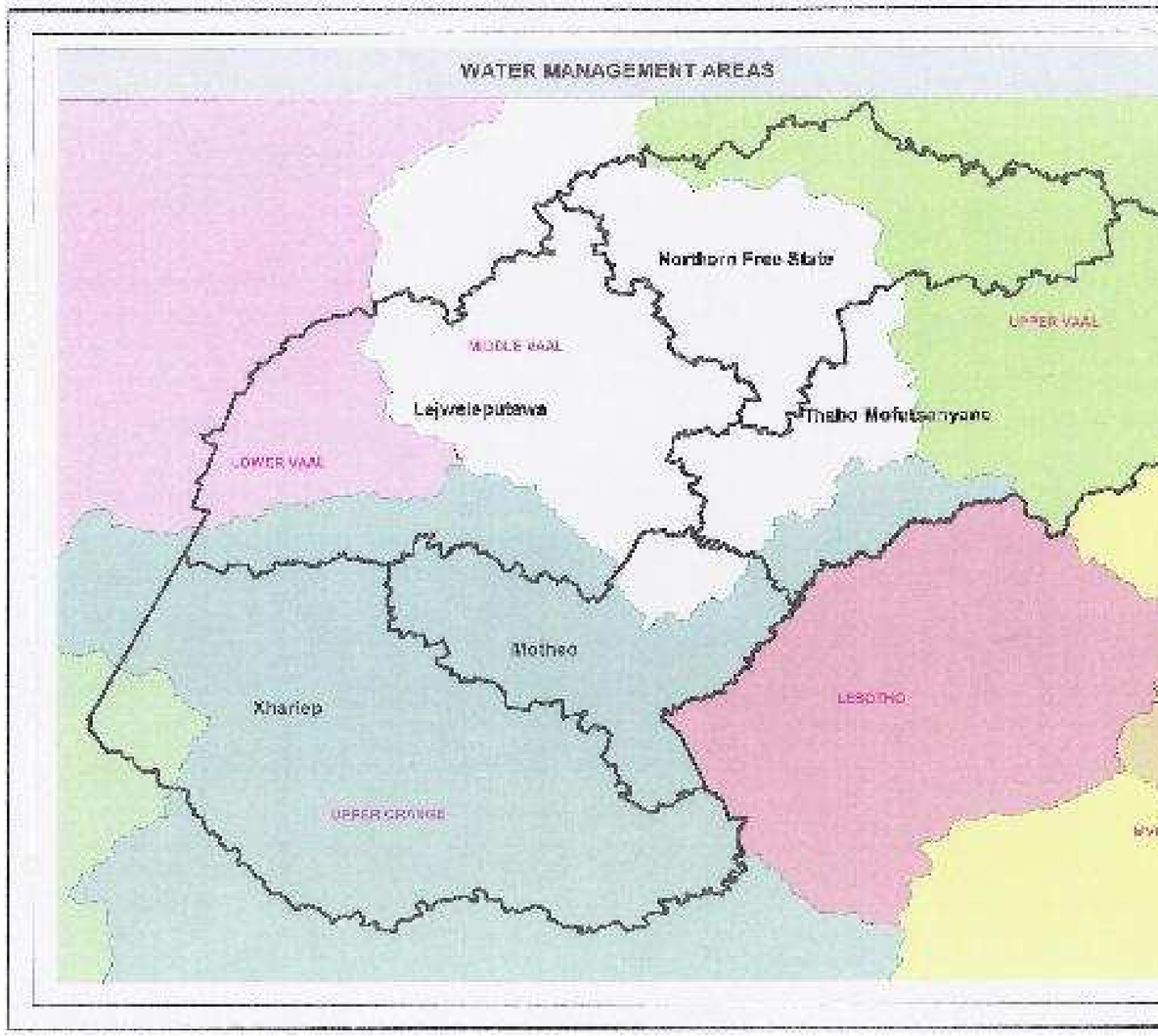
Table 3.1 District and local municipalities in the Free State Province

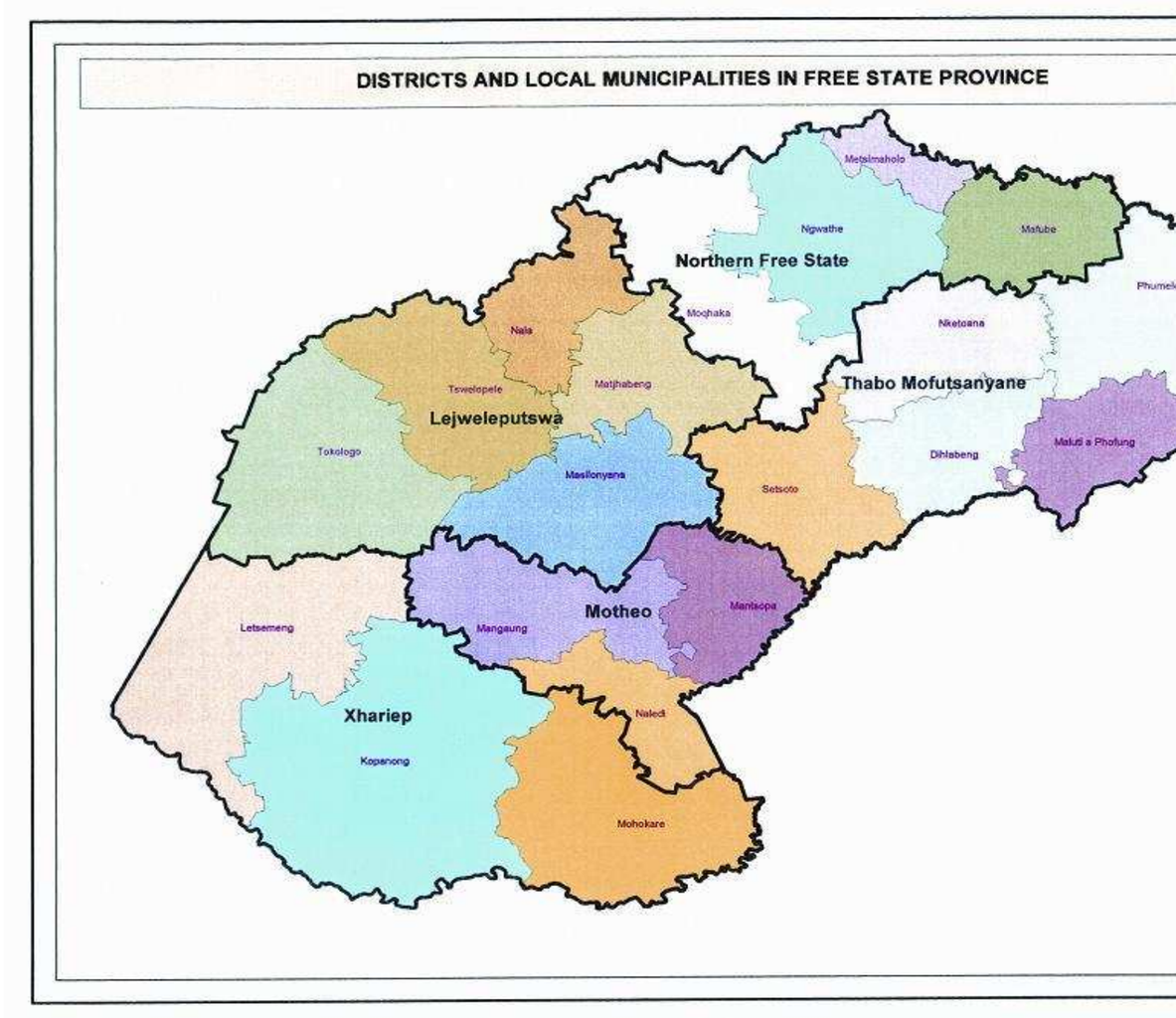
District municipalities					
	Northern Free State	**Lejwele-putswa**	**Thabo Mofutsanyane**	**Motheo**	**Xhariep**
Local Municipalities	**Moqhaka**	**Masiloyana**	**Setsoto**	**Naledi**	**Letsemeng**
	Ngwathe	**Tokologo**	**Dihlabeng**	**Mangaung**	**Kopanong**
	Metsimaholo	**Tswelopele**	**Nketoana**	**Mantsopa**	**Mohokare**
	Mafube	**Matjhabeng**	**Maluti a Phofung**		
		Nala	**Phumelela**		

TABLE 3.2: Comparable statistical data of district municipalities, 2001

		XHARIEP	MONTHEO	LEJWELEPUTSWA	MOFUTSANYANE
POPULATION	African	100940	608116	586646	690840
	Coloured	21892	35331	13189	3604
	Indian	55	1341	536	1288
	White	12361	83475	56642	30206
Total population		**135248**	**728263**	**657013**	**725938**
LABOUR FORCE	Employed	31473	175555	148441	129943
	Unemployed	17143	115484	120545	119054
	Not Economically Active	35905	191997	166977	198911
Total Labour Force		**84521**	**483036**	**435963**	**447908**
EMPLOYMENT	Agricultural/Forestry/Fishing	12481	12530	26116	32897
	Community/Social/Personal	4593	45609	19798	24009
	Construction	835	8091	4081	4896
	Electricity/Gas/Water	226	1319	766	861
	Financial/Insurance/Real Estate/Business	751	14637	6055	5963
	Manufacturing	648	17425	6078	12324
	Mining/Quarrying	918	825	35158	497
	Other	3	12	11	9
	Private Households	6260	23750	20628	18822
	Transport/Storage/Communication	470	8934	4018	4191
	Undetermined	1934	16595	10840	9666
	Wholesale/Retail	2344	25822	15890	15815
Total Employment		**31463**	**175549**	**149439**	**129950**
SANITATION	Flush toilet	24761	95946	84641	49123
	Flush septic tank	714	3960	2411	2852
	Chemical toilet	107	2268	675	2621
	VIP	1547	23883	2076	14256
	Pit latrine	2561	23070	21007	61179
	Bucket latrine	2958	36911	55077	35609
	None	6229	20321	18583	17411
Total sanitation		**38877**	**206359**	**184470**	**183051**
WATER	Dwelling	9437	50416	40647	31529
	Inside Yard	21916	92811	89981	79534
	Community Stand	3504	29281	22005	35715
	Community Stand over 200m	2757	25200	23731	24911
	Borehole	392	631	1575	1408
	Spring	28	74	25	960
	Rain Tank	62	127	171	605
	Dam/Pool/Stagnant Water	125	194	421	866
	River/Stream	52	97	69	385
	Water Vendor	21	371	563	237
	Other	585	7156	5281	6900
Total water		**38879**	**206358**	**184469**	**183050**

Source: Demarcation Board,2001


WATER MANAGEMENT AREAS
Northern Free State
MIDDLE VAAL
UPPER VAAL
Lejweleputswa
Thabo Mofutsanyane
LOWER VAAL
Motheo
Xhariep
LESOTHO
UPPER ORANGE


DISTRICTS AND LOCAL MUNICIPALITIES IN FREE STATE PROVINCE
Metsimaholo
Ngwathe
Mafube
Northern Free State
Moqhaka
Nala
Tswelopele
Matjhabeng
Lejweleputswa
Tokologo
Masilonyana
Nketoana
Thabo Mofutsanyane
Setsoto
Dihlabeng
Maluti a Phofung
Letsemeng
Mangaung
Motheo
Mantsopa
Xhariep
Kopanong
Naledi
Mohokare

3.4 WATER BOARDS

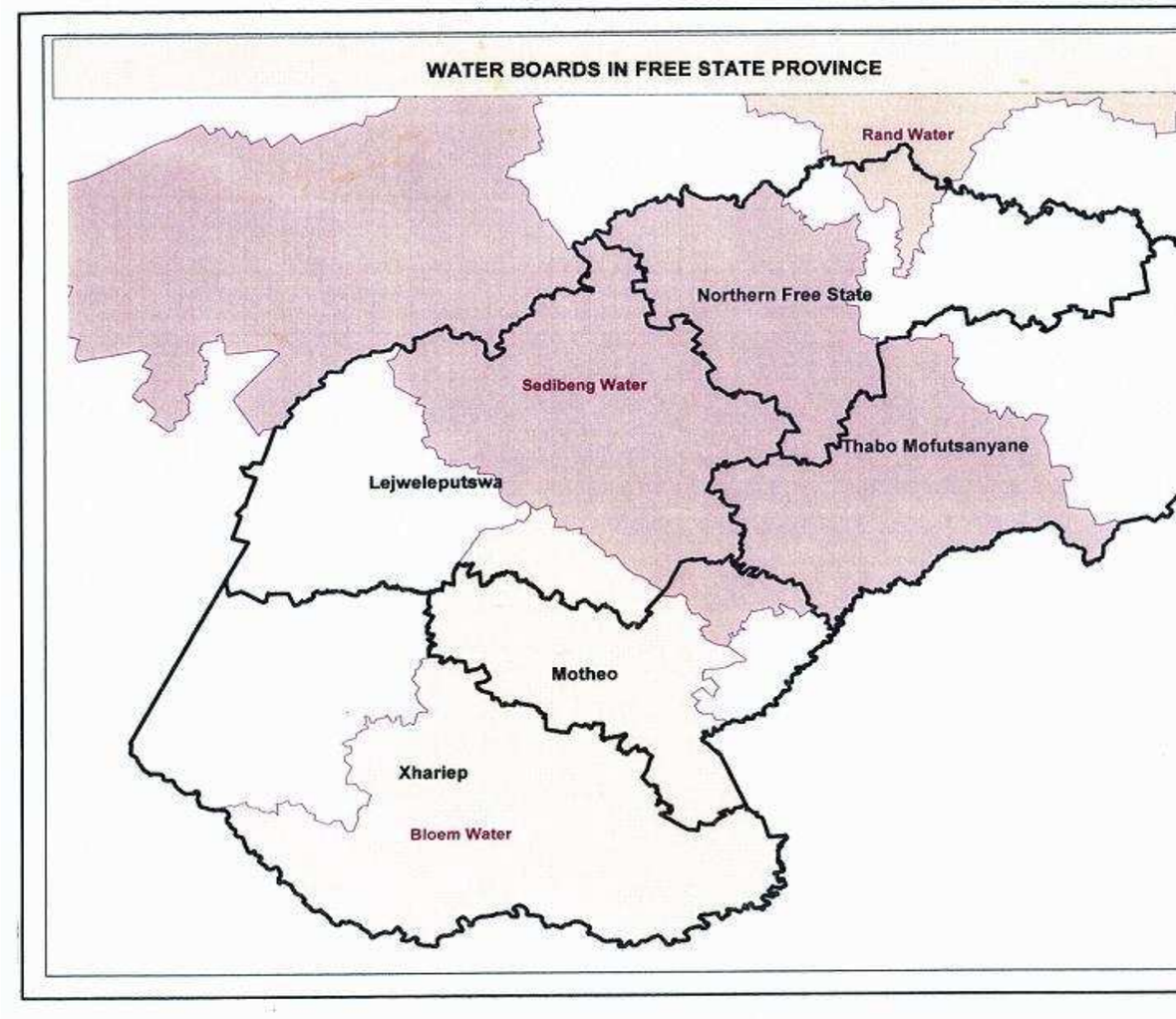
Three water boards serve the Free State Province. They are Bloem Water, Sedibeng Water and Rand Water. The boundaries of these boards are indicated on Map 3.4. From the map it is clear that there are portions of the Free State Province not served by them and also that the boundaries of the water boards do not coincide with boundaries of the districts.

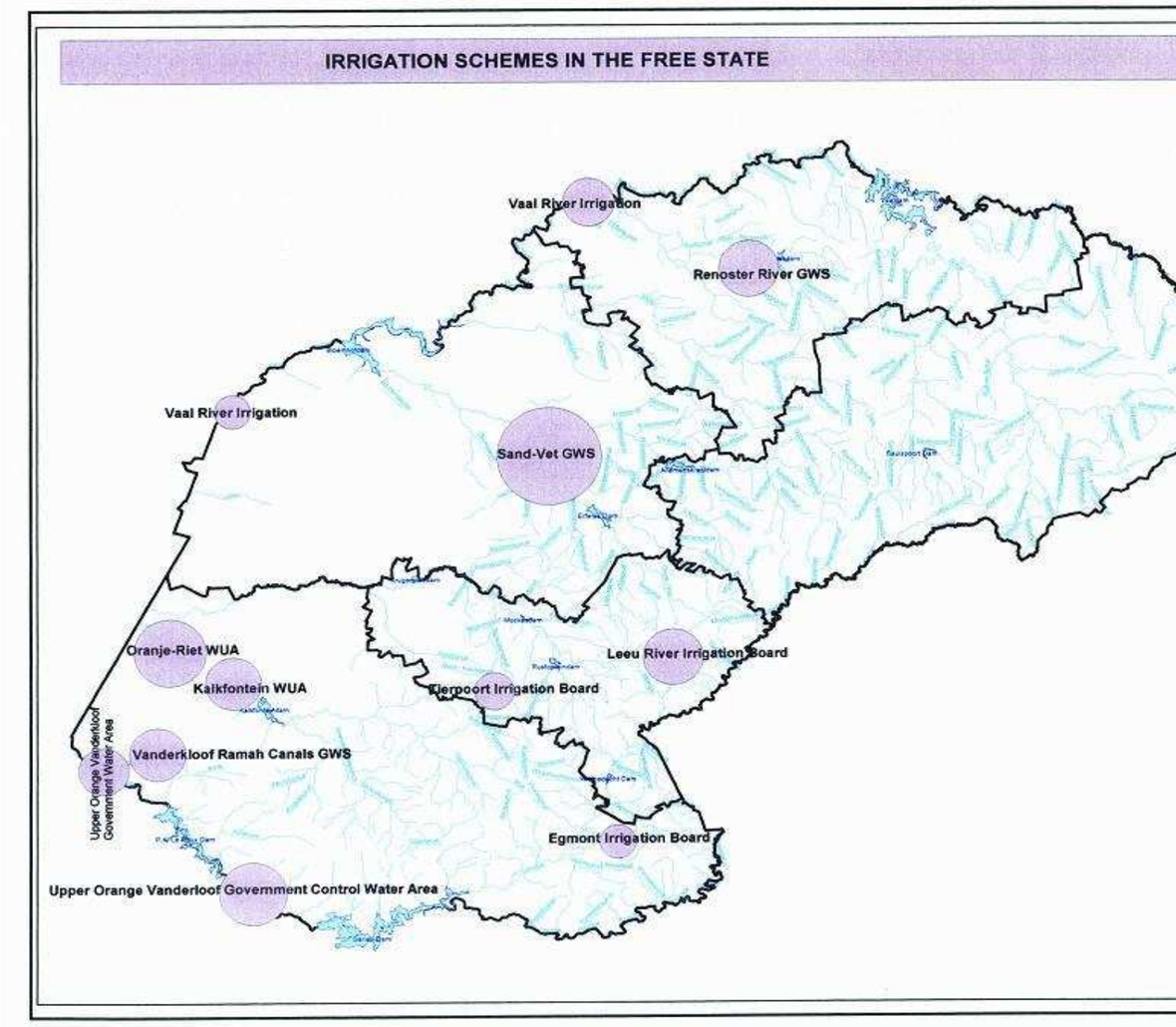
According to the Water Services Bill (1997):

"The primary activity of a water board is to provide water services to other water services institutions within its service area. Other activities of a water board may include, management services, training and other support services to water services authorities. A water board may also set and enforce conditions, including tariffs. It can also limit or discontinue water services, establish advisory forums and committees of the board. In performing its activities, a water board must aim to provide efficient, reliable and sustainable water services, in keeping with national and provincial policies and goals and with due regard for health and environmental considerations. Additionally, activities of water boards must be conducted in a manner that ensures they remain financially viable."

3.5 GOVERNMENT WATER SCHEMES (GWSs)

Map 3.5 shows the location of the different Government Water Schemes (GWSs) in the Free State. The Sand-Vet GWS is located within the Lejweleputswa District Municipality and the Renoster River (Koppies Dam) GWS in the Northern Free State District Municipality. The Leeu River and Tierpoort Irrigation Boards are located in Motheo District Municipality while the rest, Egmont Irrigation Board, Orange-Riet and Kalkfontein Water User Associations (WUAs) as well as Vanderkloof Ramah Canals GWS are located in Xhariep District Municipality.


WATER BOARDS IN FREE STATE PROVINCE
Rand Water
Northern Free State
Sedibeng Water
Thabo Mofutsanyane
Lejweleputswa
Motheo
Xhariep
Bloem Water


IRRIGATION SCHEMES IN THE FREE STATE
Vaal River Irrigation
Renoster River GWS
Vaal River Irrigation
Sand-Vet GWS
Oranje-Riet WUA
Kalkfontein WUA
Leeu River Irrigation Board
Bloemfontein Irrigation Board
Vanderkloof Ramah Canals GWS
Upper Orange Vanderkloof Government Water Area
Egmont Irrigation Board
Upper Orange Vanderloof Government Control Water Area

CHAPTER 4 WATER DEMAND PER WATER MANAGEMENT AREA

Tables 4.1 to 4.4 give the water requirement per sector per CMA and sub-area in the Free State Province in million m^3 per annum for 2000 and for two scenarios in 2025. Table 4.1 is a summary for the province for 2000 and the two scenarios in 2025. Table 4.2 presents detail per sub-catchments areas for 2000 while Table 4.3 reflects the detail base scenario for 2025 and Table 4.4 the detail high scenario for 2025.

Table 4.1: WATER REQUIREMENTS AS PER ISP-REPORTS PER WATER MANAGEMENT AREA AND PER SECTOR IN MILLION CUBIC METRE PER ANNUM FOR 2000 TO 2025 FOR THE FREE STATE PROVINCE

YEAR 2000	Irrigation	Urban	Rural	Mining and Bulk industrial	Power Generation	Total local requirement
Upper Vaal	53	52	19	74	41	238
Middle Vaal	134	67	22	62	0	286
Lower Vaal	6	2	4	0	0	12
Upper Orange	411	94	24	2	0	532
Total	605	215	69	138	41	1068
TOTAL	631	215	69	138	41	1094
YEAR 2025 BASE SCENARIO						
Upper Vaal	53	56	15	74	43	240
Middle Vaal	134	65	20	62	0	281
Lower Vaal	6	1	3	0	0	10
Upper Orange	422	111	14	2	0	549
TOTAL	615	233	52	138	43	1081
YEAR 2025 HIGH SCENARIO						
Upper Vaal	53	80	15	74	43	265
Middle Vaal	134	91	20	62	0	306
Lower Vaal	6	1	3	0	0	10
Upper Orange	422	122	14	2	0	560
TOTAL	615	294	52	138	43	1142

Source: Department of Water Affairs and Forestry, National Office, 2004

4.1 APPROACH AND ASSUMPTIONS

With regard to determining the future water requirements the following approach followed by the Department of Water Affairs and Forestry as formulated in the National Water Resources Strategy summary (August 2002) is relevant:

"There are many factors which influence the requirements for water in the country. These include climate, nature of the economy (ie. irrigated agriculture, industrialisation) and standards of living. Population growth and economic growth, which also relates to socio-economic standards, are therefore regarded as the primary determinants with respect to future water requirements.

Changes in national policies since 1994, together with the influence of global economic trends, have stimulated migration to certain areas while declines in population have been experienced in others. Specifically evident are the strong urbanisation trend and the negative impacts of HIV/AIDS.

Based on a range of scenarios for population and economic growth, initial estimates of possible future water requirements were made for the period until the year 2025. Additionally, provision was made for known and probable future developments in irrigation, mining and other bulk uses. Where possible estimates were also made of the water required for poverty eradication strategies, which will depend on the specific requirements of local and regional development strategies. From this, it is evident that sufficient resources are available to meet all priority requirements for water for the next 25 years, provided they are well-managed.

Given the trends in the urbanisation and economic growth, the main challenge will be to ensure that water is available where it is needed. A base scenario, built on the high scenario of population growth and more equitable distribution of wealth leading to higher average levels of water services, was selected for estimating the most likely future water requirements. A possible upper scenario of future water requirements is also given, based on the assumption of high population growth and high standard of services (socio-economic development); together with a strong increase in the economic requirements for water, where the public and business use of water would increase in direct proportion to the gross domestic product. The purpose of the upper scenario is to serve as a conservative indicator in order to prevent the occurrence of possible unexpected water shortages."

TABLE 4.3 : WATER REQUIREMENTS AS PER ISP-REPORTS PER CATCHMENT MANAGEMENT AREA AND PER SEC
ANNUM FOR 2025 BASE SCENARIO

	Sub area	Irrigation	Urban	Rural	Mining and bulk industrial	Power generatio n
UPPER VAAL	Wilge	18	25	13	0	0
	Upstream of Vaal Dam portion	15	1	1	0	0
	Downstream of Vaal Dam portion	20	29	1	74	43
TOTAL		**53**	**56**	**15**	**74**	**43**
MIDDLE VAAL	Rhenoster-Vals	26	19	8	0	0
	Middle Vaal-portion	8	7	2	24	0
	Sand-Vet	100	39	10	38	0
TOTAL		**134**	**65**	**20**	**62**	**0**
LOWER VAAL	Vaal downstream of Bloemhof portion	6	1	3	0	0
TOTAL		**6**	**1**	**3**	**0**	**0**
UPPER ORANJE WITHOUT LESOTHO' S SUB AREAS	Caledon RSA	88	6	10	0	0
	Kraai-portion	44	1	0	0	0
	Riet/Modder-portion	239	103	4	2	0
	Vanderkloof-portion	50	1	1	0	0
TOTAL		**422**	**111**	**14**	**2**	**0**
Source: Department of Water Affairs and Forestry, Bloemfontein Regional Office, 2004						

TABLE 4.4: WATER REQUIREMENTS AS PER ISP-REPORTS PER CATCHMENT MANAGEMENT AREA AND PER SECT
ANNUM FOR 2025 HIGH SCENARIO

	Sub area	Irrigation	Urban	Rural	Mining and bulk industrial	Power generatio n	T re
UPPER VAAL	Wilge	18	47	13	0	0	
	Upstream of Vaal Dam portion	15	2	1	0	0	
	Downstream of Vaal Dam portion	20	32	1	74	43	
TOTAL		**53**	**80**	**15**	**74**	**43**	
MIDDLE VAAL	Rhenoster-Vals	26	31	8	0	0	
	Middle Vaal-portion	8	8	2	24	0	
	Sand-Vet	100	52	10	38	0	
TOTAL		**134**	**91**	**20**	**62**	**0**	
LOWER VAAL	Vaal downstream of Bloemhof portion	6	1	3	0	0	
TOTAL		**6**	**1**	**3**	**0**	**0**	
UPPER ORANJE WITHOUT LESOTHO' S SUB AREAS	Caledon RSA	88	8	10	0	0	
	Kraai-portion	44	1	0	0	0	
	Riet/Modder-portion	239	112	4	2	0	
	Vanderkloof-portion	50	1	1	0	0	
TOTAL		**422**	**122**	**14**	**2**	**0**	

Source: Department of Water Affairs and forestry, Bloemfontein Regional Office, 2004

4.2 TABLE ASSUMPTIONS

In interpreting the data in Tables 4.1 to 4.4 the following should be noted:

(i) Urban and rural requirements include the component of Reserve for basic human needs at 25 litre/c/d.

(ii) Mining and bulk industrial users indicate water uses which are not part of urban systems.

(iii) Water for power generation indicates water that is used for thermal power generation only. (Water for hydropower, which represents a small portion of power generation in South Africa, is generally available for other uses as well.)

(iv) The water requirements for 3 000 ha of irrigation earmarked to resource poor farmers in the Upper Orange that is part of the Free State (26-million m^3 per annum) is included in the value given in the highlighted row for 2000. (Kraai sub-catchment)

(v) The water requirements for 4 000 ha of irrigation earmarked to resource poor farmers in the Lower Orange (40-million m^3 per annum) and 4 000 ha earmarked to resource poor farmers in the Fish-Tsitsikama Water Management Area (38-million m^3 per annum) are included in the highlighted row of the transfers out column for 2000. Transfer out thus refers to releases for uses from river sections lower down. Arrows on Maps 4.1 to 4.4 shows the origin and destination of transfers in and out of the water management areas in the Free State Province.

4.3 INTERPRETATIONS

From Table 4.1 the following can be seen:

The total water requirement of the Free State was 1 068-million m^3 in 2000 excluding 26-million m^3 for the Kraai sub-catchment in Upper Orange with the largest user of water the irrigation sector with 605-million m^3 (56.6%) followed by urban (20.1%) and mining and bulk industrial (12.9%). Water requirements in the Upper Orange were the largest with 532-million m^3 per annum followed by the Middle Vaal with 286-million m^3 and the Upper Vaal with 238-million m^3 per annum.

Moving to the scenarios of 2025 the total requirement for the province increased to 1 081-million m^3 per annum for the base scenario and 1 142-million m^3 per annum for the high scenario. In both the Upper Vaal and Upper Orange increases are predicted for both scenarios; for the Upper Vaal from

238- to 240- and 265-million m^3 per annum and in the Upper Orange From 532- to 549- and 560-million m^3 per annum. In the Middle Vaal a decrease is predicted for the base scenario and a increase (from 286- to 306-million m^3 per annum) for the high scenarios.

Looking at sectoral changes, no changes are predicted for mining and bulk industrial and there is an insignificant increase for power generation from 41- to 42-million m^3 per annum for both 2025 scenarios[1]. Significant changes are predicted for rural and urban areas. In rural a decrease is predicted in all WMAs between 2000 and 2025, but which stays the same for both the base and high scenarios. The decrease is from 69- to 52-million m^3 per annum or 24.6 %. In urban areas except for Lower Vaal and Middle Vaal (base case) significant increases are predicted. In total between 2000 and 2025 the base scenario increases from 215- to 233-million m^3 per annum and for the high scenario up to 294-million m^3 per annum; an increase of 36.7% above the 2000 situation.

Irrigation water use should stay the same in all WMAs except for Upper Orange where an increase of 11 million m^3 per annum is predicted for both future scenarios.

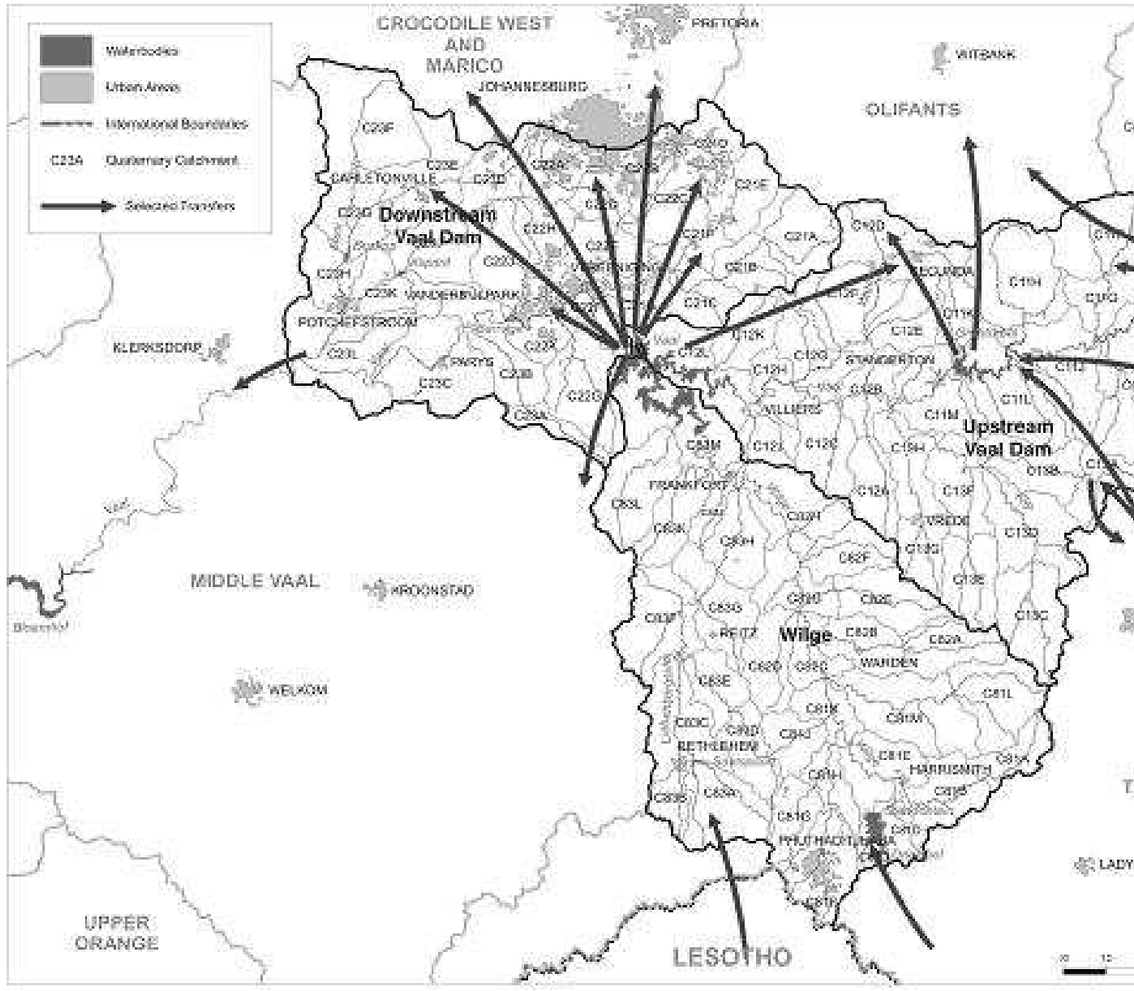
Tables 4.2 to 4.4 provide information regarding water requirements per sub-catchment area and can be consulted for more detail on expected changes that will occur over time. For instance the following may be noted with regard to the 2000 situation:

- In the Upper Vaal the largest user was mining and bulk industrial with 74-million m^3 per annum followed by irrigation and urban with 53- and 52-million m^3 per annum respectively. This is the only WMA in which water for power generation is indicated, namely as 41-million m^3 per annum.
- In Middle Vaal irrigation is the largest user followed by urban and mining-and-bulk industrial; respectively 134.7- and 62-million m^3 per annum.
- Water requirement in the Lower Vaal is 12-million m^3 per annum with irrigation and rural the main users with 6- and 4-million m^3 per annum respectively.
- Irrigation dominates in Upper Orange and uses more than 77% of the total water in this WMA. Water requirements in the Riet/Modder – portion are by far the largest.

[1] No water is indicated for afforestation in the Free State Province for 2000 to 2025.

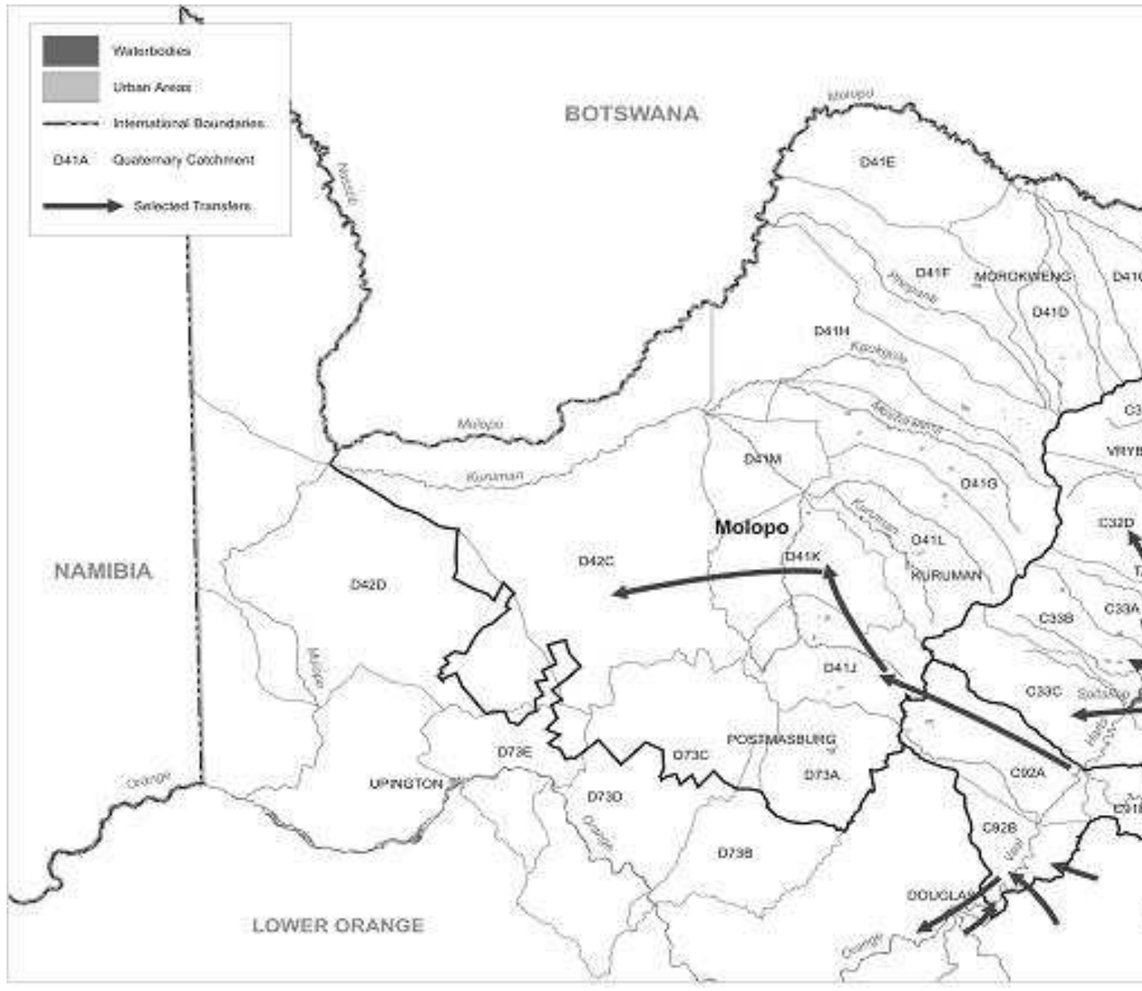
Comparing the information in Table 4.2 with that in Tables 4.3 and 4.4 will indicate what changes are expected to occur until 2025 under the base and high scenarios on sub-catchment level, within and between the different sectors.

MAP 4.1: UPPER VAAL

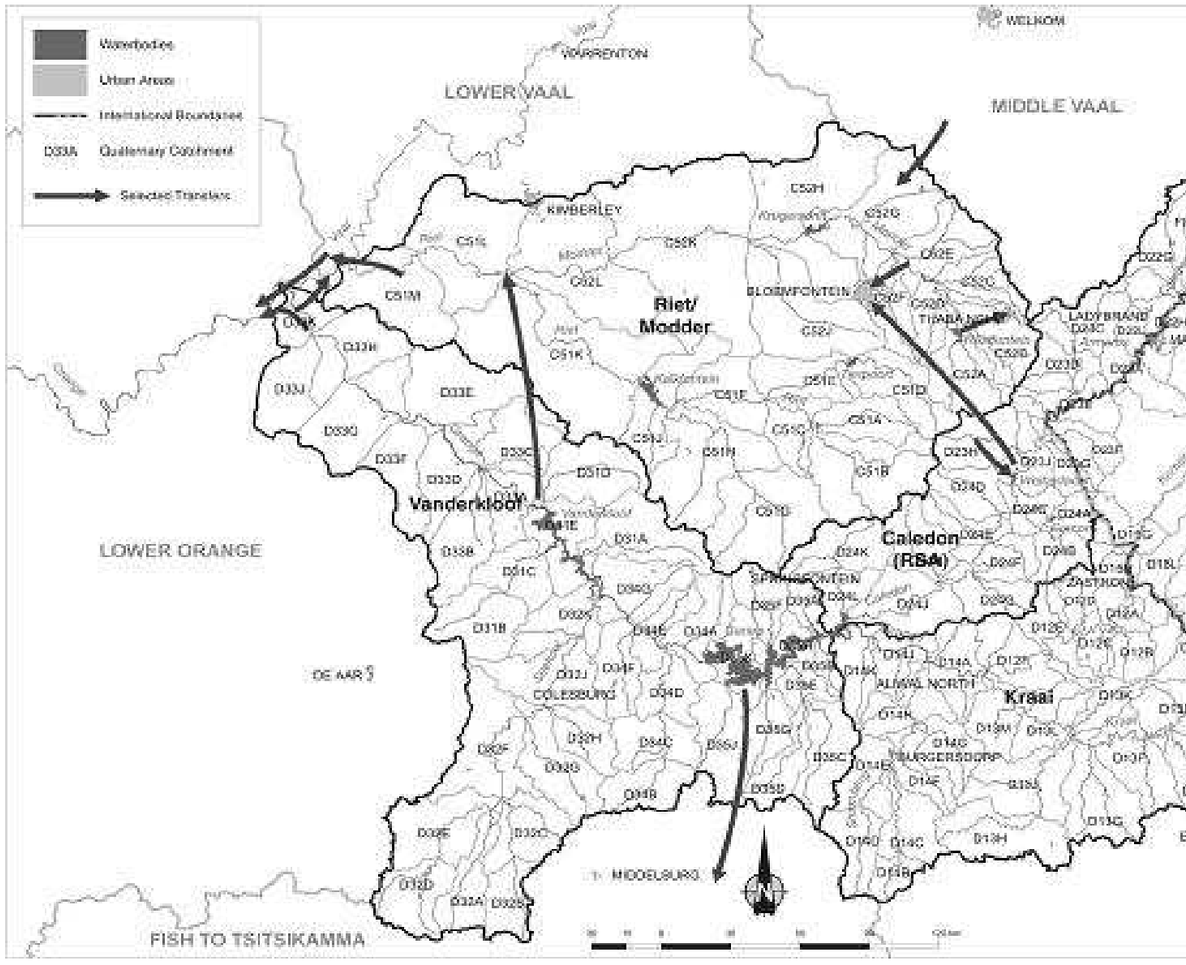


MAP 4.2: MIDDLE VAAL

MAP 4.3: LOWER VAAL



MAP 4.4: UPPER ORANGE

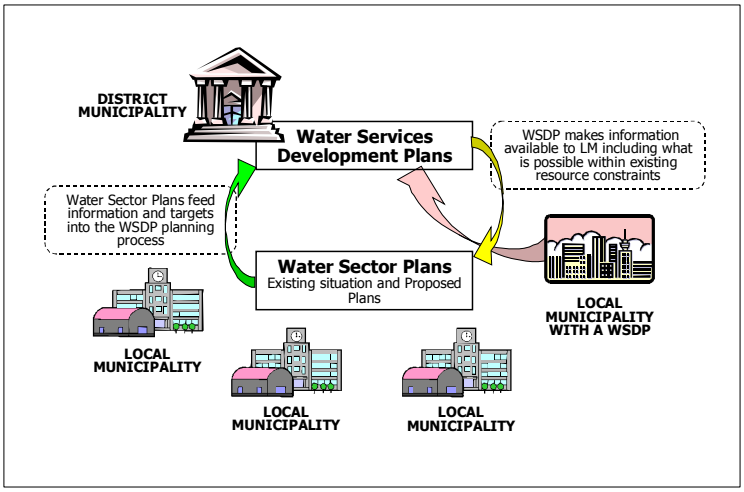


CHAPTER 5 WATER DEMAND PER DISTRICT MUNICIPALITY[2]

This chapter is compiled from information in Water Service Development Plans (WSDPs) of district municipalities. The WSDPs cover the period 2002 to 2010 and focus on service provision to address the backlogs with regard to water and sanitation provision. WSDPs contain detailed information at local municipality level and should be consulted for information leading to the excerpt, included in this chapter.

To put the information per district municipality into perspective, some background information from the WSDPs is first presented. It should be noted that the way in which the information per district municipality is presented differs due to differences between the WSDPs. The WSDP for Xhariep district municipality was not available and Xhariep is thus not included in the chapter.

5.1 DISTRICT MUNICIPALITIES AND WATER SERVICE DEVELOPMENT PLANS (WSDPs)[3]



The Municipal Structures Act (No 33 of 2000) states that Metropolitan Municipalities (Category A) and District Municipalities (Category C) are responsible for potable water, domestic sewer and waste water systems. In terms of the Water Services Act, this implies the Water Services Authority (WSA) function; therefore Metros and District Municipalities must prepare a WSDP. The Municipal Structures Act also makes provision for Local Municipalities (Category B) to be authorized to perform the WSA function. Those Local Municipalities that are authorized as WSAs

WSDP OUTPUTS TO BE PROVIDED WITHIN WSDP PROCESS

- *Analysis and evaluation of existing IDP Outputs*
- *Completion of Preparation Guide Tables*
- *Free Basic Water Strategy*
- *WSA (Water Service Authority) and Water Service Provider (WSP) institutional arrangements*
- *Transfer Issues (if applicable)*
- *Local Municipality's Water Sector Plans*
- *Targets, strategies and alternative strategies to meet service delivery requirements*
- *Representative WSDP Task Team*
- *Capacity building to key officials regarding water services development planning*

[2] This chapter is compiled verbatim (except for minor editorial changes) from the Water Service Development Plans (WSDPs) of district municipalities.

[3] Compiled from the WSDP of Motheo District Municipality.

must also prepare a WSDP. The District Municipality, and those Local Municipalities that are a WSA, need to prepare a WSDP; in the case of Local Municipalities (who are not WSAs) they are still required to prepare a Water Sector Plan. Water Sector Plans were prepared for all the Local Municipalities within the area of jurisdiction of the District Municipality.

The District Municipality has Water Services Authority status and according to the Water Services Act, Act 108 of 1997 (Section 13) is required to prepare a Water Services Development Plan (WSDP). As the WSDP is a legislative requirement, it has legal status. Whilst the WSDP is a legal requirement, the real value of preparing a WSDP lies in the need to plan for water and sanitation services whereby key targets are set for a five-year period:

- The WSDP is a mechanism towards addressing water services priorities, needs and requirements within the LM area of jurisdiction and represents the Council's commitment to its constituency in terms of water services.
- The WSDP also links closely to the IDP Process. Likewise, the IDP priorities that have impact upon water and sanitation need to be addressed in the WSDP.

Local Municipalities that are not Water Services Authorities (WSAs) need to prepare a Water Sector Plan as part of the Integrated Development Planning (IDP) Process. A Water Sector Plan is not a WSDP. Only a WSA needs to prepare a WSDP. A Water Sector Plan - the water and sanitation component of a Local Municipality IDP is a summary of water and sanitation sectoral issues, priorities and requirements. It is also part of the sectoral planning requirements of the *Integration Phase* of the IDP Process. There are two main purposes for preparing a Water Sector Plan:

- to ensure that water and sanitation requirements arising from local development priorities are integrated within the IDP, and
- to communicate these requirements to the District Municipality so that they can be included in the District's WSDP (and IDP).

The District Municipality may request further information from a Local Municipality for the District WSDP. This is particularly the case if the Local Municipality is also a water services provider (WSP). The additional information the District Municipality requests can also be included in the Water Sector

Plan. It is important that Local Municipalities do not duplicate data collection and planning processes that are undertaken at the district level.

Targets for water and sanitation for the entire district are part of the WSDP planning process and therefore local municipalities must be part of this process. Part of this participation is communicating local water and sanitation priorities and proposed projects as well as the implications on water and sanitation of other local development priorities and projects.

WATER SECTOR PLAN OUTPUTS

- *A summary of the existing water and sanitation situation*
- *Water and sanitation priorities within the IDP*
- *IDP objectives and strategies that impact on water and sanitation requirements*
- *Water and sanitation projects with targets and timeframes*
- *Water and sanitation components of other local development projects*

The WSDP of a District Municipality represents water and sanitation plans and targets for the entire district area. It therefore incorporates the water and sanitation targets and requirements of every Local Municipality within the district area. The Water Sector Plan feeds into the WSDP to ensure that all local priorities and requirements are taken into account. The linkages between a Water Sector Plan and a WSDP also represent co-operative governance between District and Local Municipalities.

The WSDP Process for a District Municipality requires participation of Local Municipalities and thus the process itself facilitates integration of water services issues between the District and Local Municipalities. In addition, the Water Services Act requires that the WSDP of a WSA must address water services information (both status quo and future targets) for the entire municipal area. In the case of a District Municipality, this includes all the Local Municipalities within the District Municipality area. The following table explains the most prominent differences between a WSDP and a Water Sector Plan:

WSDP	WATER SECTOR PLAN
A WSDP is a legal requirement of WSA in terms of the Water Services Act.	A Water Sector Plan is part of a Local Municipality's IDP Process.
A WSDP is a comprehensive sectoral plan that addresses all	A Water Sector Plan summarizes local priorities that impact upon water and sanitation requirements and associated

components related to water and sanitation, including social, economic, financial, technical, institutional and environmental issues.	projects.
Metro and District Municipalities develop a WSDP with input from Local Municipalities and other water services institutions within the Metro/ District area.	Local municipalities, who are not WSAs, with input from local stakeholders, develop a Water Sector Plan.
A WSDP represents water and sanitation planning for the entire district area.	A Water Sector Plan feeds water and sanitation priorities and requirements into the Local Municipality IDP and into the district WSDP.

5.2 SCENARIO SETTING APPROACH

5.2.1 NATIONAL TARGETS

Free Basic Water

In February 2001, the Department Water Affairs and Forestry announced that National Government had approved a policy of providing Free Basic Water to all households especially targeting poor households. The basic level of water supply was set at 25 liters per person per day in accordance with the World Health Organisation's standards. This adds up to approximately 6 000 liters per household per month for a household of more or less eight people. Local authorities, however, have the discretion to increase this volume (e.g. to take waterborne sanitation into account) or to provide less than the fixed volume (e.g. in water stressed areas or in areas with high water costs). The Department of Water Affairs and Forestry set July 2001 as the date for implementing Free Basic Water policies by the various local government structures. Some local authorities were not in a position to comply by the due date; nevertheless it was required that these authorities prepare a "first order strategy" (which included data gathering, a financial evaluation, tariff policies and scenario settings) to kickstart the preliminary phase of a Free Basic Water implementation. The Water Services Act Regulation, *"NORMS AND STANDARDS IN RESPECT OF TARIFFS FOR WATER SERVICES IN TERMS OF SECTION 10(1) OF THE WATER SERVICES ACT"*, supports the implementation of a Free Basic

Water Policy, but more importantly states that July **2003** is the target date by which all local authorities should have implemented a Free Basic Water Policy.

Individual Site Metering

Implementing a Free Basic Water Policy will be futile if proper individual site metering is not in place. Therefore the provision of water meters to all unmetered individual sites as well as to new water reticulation extensions is regarded as a high priority. Proper individual metering will surely also contribute to a more accurate water balance. According to Water Services Act Regulation, *"COMPULSORY NATIONAL STANDARDS AND MEASURES TO CONSERVE WATER"*, all Water Services Authorities (WSAs) **must within two years after promulgation of the Regulations**, fit a suitable water volume measuring or controlling device (e.g. water meters) to all existing consumer units. In relation to the afore-mentioned, all new consumer unit connections made after the commencement of the Regulations should also be fitted with a suitable water volume measuring or controlling device. The regulations were promulgated in July 2001, which implies that the target date for provision of water volume measuring or controlling devices to unmetered consumer units was **July 2003**, the same target date as that for the Free Basic Water Policy implementation.

Basic Household Sanitation

In September 2001, the national government produced a White Paper on basic household sanitation. According to the White Paper, the minimum acceptable basic level sanitation system, is a system appropriate for disposing of human excreta, household waste water and refuse, which is acceptable, affordable, safe and hygienic and that does not pose a threat to the environment. By now, all the local authorities are aware of the fact that the night soil removal system (the so-called bucket system) is below RDP standards and needs to be upgraded to comply with the minimum basic level of sanitation provision. The Department of Water Affairs and Forestry identified the "Dry On Site" sanitation system as a suitable candidate for complying with minimum basic level standards as prescribed in the White Paper. The target date for eradication of the sanitation backlog as set by the White Paper is **March 2010**.

Bucket Eradication

In August 2002 the Department of Water Affairs and Forestry announced that the eradication of the bucket system should be complete by the end of 2007. This target is only achievable if WSAs install "Dry On Site" sanitation instead of full waterborne systems.

5.2.2 SCENARIO SELECTION APPROACH

IDP targets for water and sanitation provision have a bearing on the targets set in the WSDPs and need to be evaluated accordingly. The IDP identifies one to five-year projects for the various local municipalities, as listed in relevant sections of WSDPs. These can be regarded as the targets for water and sanitation provision.

It is significant to point out that these targets were set as prescribed by the IDP Guide Pack 2001 for the next five financial years. It is, however, important to point out that with the funds available at present it will not be possible to meet the IDP targets within the following five years. To overcome this, and keeping the original vision in mind it was necessary to formulate alternative measures to meet the national targets.

A critical part of fulfilling a developmental role in terms of water services is to ensure the provision of basic water and sanitation services, improved service delivery and higher levels of service, as well as implementing Free Basic Water policies.

Water services development planning aims at both socio-economic development as well as the point at which municipalities are able to address their water services delivery challenges themselves.

The provision of water services, and the management of water resources are integrally linked, and thus, when planning water services, municipalities need to ensure that the use of water resources complies with the requirements of the National Water Act. Water Services Authorities therefore need to ensure that water resources are used in a way that takes the following into account:

- Meeting basic human needs

- Promoting equitable access to water
- Redressing the results of past racial and gender discrimination
- Promoting the efficient, sustainable and beneficial use of water
- Facilitating social and economic development
- Providing for growing demand for water use
- Protecting water resources
- Reducing and preventing pollution and degradation of water resources

National targets play a significant role in the selection of appropriate scenarios (ie. immediate full level of service – example: metered house connections and full waterborne sewerage for all; or progressive provision by starting with basic services – example: communal water supply within RDP standards and VIP sanitation services, which could be upgraded to a waterborne system at a later stage). Three selection approaches were formulated in order to make strategic decisions about progressively achieving efficient, affordable, economical and sustainable water services. These scenarios will be tabled for each district municipality after which a discussion of the water balance situation for each option will be presented.

5.3 MOTHEO DISTRICT MUNICIPALITY[4]

Option A

The following key issues are applicable in the selection of this option:

Water Provision

- Existing communal supply remains unchanged
- Unmetered erven remain unchanged
- Communal supply to all unserviced stands
- Upgrading of bulk services if necessary

[4] Compiled from WSDP of Motheo District Municipality

Sanitation Provision

- Backlogs, dwellers and squatters are addressed
- VIPs provided
- Farmland – VIPs provided
- Bulk services remain unchanged as a result of the provision of VIPs as a sanitation option
- Upgrading of bulk services if required

Option B

The following key issues are applicable in the selection of this option:

Water Provision

- Communal supply to all unserviced stands
- Upgrading of communal supply to formal urban stands to individual metered connections with yard taps
- Provision of meters to all unmetered formal urban stands
- Upgrading of bulk services if necessary

Sanitation Provision

- Replacement of buckets with dry on-site sanitation
- Provision of dry on-site sanitation to all unserviced stands
- Upgrading of bulk sanitation services if necessary

Option C

The following key issues are applicable in the selection of this option:

Water Provision

- The same as Option B except for the additional upgrading of bulk services to meet the demand of the full waterborne sanitation systems including:
  - extension/upgrading of WTW
  - increase reservoir storage capacity
  - upgrading of pump stations
  - upgrading distribution networks

Sanitation Provision

- Provision of a waterborne sanitation system to all unserviced and substandard (below RDP) formal stands
- Rural areas (farmland) – VIPs provided
- Upgrading of all bulk services to comply with the demand of the full waterborne sanitation systems

5.3.1 WATER BALANCE FOR OPTION A

In view of the proposed water and sanitation related developments documented in the Motheo WSDP report the expected average water demand and sewerage generated was calculated and portrayed in the following three tables. Percentages shown under the "Trend" column to the right of these tables are an indication of what is expected within each community over five years. Where no figures are shown, it implies that no significant change is expected to take place over this period. A negative figure is an indication of a decrease in sewerage generated.

Table 5.1: Expected Residential Average Daily Water Demands

Local Municipality	Community	RESIDENTIAL : AVERAGE DAILY WATER DEMAND [ADWD]					TREND
		2002/2003	2003/2004	2004/2005	2005/2006	2006/2007	
		Ml/day	Ml/day	Ml/day	Ml/day	Ml/day	
MANGAUNG	**Bloemfontein**	75.294	75.294	75.405	75.488	75.603	**0.41%**
	Botshabelo	16.509	16.509	16.509	16.509	16.509	
	Thaba Nchu	8.987	9.298	9.384	9.418	9.622	**7.06%**
Subtotal		**100.789**	**101.101**	**101.298**	**101.415**	**101.734**	**0.94%**
MANTSOPA	**Ladybrand**	3.426	3.462	3.495	3.527	3.559	**3.88%**
	Hobhouse	0.453	0.453	0.453	0.453	0.468	**3.27%**

	Thaba Patchoa	0.157	0.157	0.157	0.157	0.157	
	Tweespruit	0.940	0.978	1.016	1.056	1.056	**12.34%**
	Excelsior	0.469	0.513	0.558	0.602	0.647	**37.89%**
Subtotal		**5.445**	**5.563**	**5.678**	**5.795**	**5.887**	**8.11%**
NALEDI	**Wepener**	1.734	1.734	1.734	1.734	1.734	
	Dewetsdorp	1.243	1.243	1.243	1.243	1.243	
	Vanstadensrus	0.084	0.093	0.093	0.093	0.093	**10.29%**
Subtotal		**3.062**	**3.070**	**3.070**	**3.070**	**3.070**	**0.28%**
TOTAL		**109.296**	**109.734**	**110.046**	**110.280**	**110.691**	**1.28%**

Table 5.2: Expected Residential Daily Dry Weather Flows

Local Municipality	**Community**	**RESIDENTIAL : AVERAGE DAILY DRY WEATHER FLOW [ADDWF]**					**TREND**
		2002/2003	**2003/2004**	**2004/2005**	**2005/2006**	**2006/2007**	
		Ml/day	Ml/day	Ml/day	Ml/day	Ml/day	
MANGAUNG	**Bloemfontein**	42.789	42.777	42.775	42.775	42.775	**-0.03%**
	Botshabelo	1.930	1.667	1.649	1.597	1.559	**-19.25%**
	Thaba Nchu	2.059	2.059	2.059	2.059	2.059	
Subtotal		**46.778**	**46.502**	**46.483**	**46.430**	**46.392**	**-0.82%**
MANTSOPA	**Ladybrand**	1.747	1.710	1.670	1.642	1.642	**-5.99%**
	Hobhouse	0.117	0.099	0.081	0.063	0.045	**-61.23%**
	Thaba Patchoa	0.086	0.086	0.086	0.086	0.086	
	Tweespruit	0.371	0.343	0.312	0.277	0.275	**-25.78%**

	Excelsior	0.089	0.062	0.031			**-100.00%**
Subtotal		**2.409**	**2.301**	**2.180**	**2.068**	**2.049**	**-14.96%**
NALEDI	**Wepener**	0.953	0.948	0.948	0.948	0.948	**-0.57%**
	Dewetsdorp	0.635	0.628	0.628	0.628	0.628	**-1.10%**
	Vanstadensrus	0.025	0.023	0.020	0.018	0.018	**-28.43%**
Subtotal		**1.613**	**1.599**	**1.595**	**1.594**	**1.594**	**-1.21%**
TOTAL		**50.800**	**50.402**	**50.258**	**50.092**	**50.035**	**-1.51%**

Table 5.3: Expected Residential Chemical Oxygen Demand

Local Municipality	**Community**	**RESIDENTIAL : CHEMICAL OXYGEN DEMAND [COD]**					**TREND**
		2002/2003	**2003/2004**	**2004/2005**	**2005/2006**	**2006/2007**	
		kg/day	kg/day	kg/day	kg/day	kg/day	
MANGAUNG	**Bloemfontein**	29196	29159	29150	29150	29150	**-0.16%**
	Botshabelo	2641	1762	1704	1529	1403	**-46.89%**
	Thaba Nchu	1801	1801	1801	1801	1801	
Subtotal		**33639**	**32722**	**32656**	**32481**	**32354**	**-3.82%**
MANTSOPA	**Ladybrand**	1560	1438	1305	1211	1211	**-22.35%**
	Hobhouse	277	218	158	98	40	**-85.75%**
	Thaba Patchoa	76	76	76	76	76	
	Tweespruit	509	418	313	196	190	**-62.61%**
	Excelsior	296	207	102			**-100.00%**
Subtotal		**2718**	**2357**	**1954**	**1580**	**1516**	**-44.20%**
NALEDI	**Wepener**	751	733	733	733	733	**-2.42%**
	Dewetsdorp	520	497	497	497	497	**-4.48%**
	Vanstadensrus	39	32	21	16	16	**-60.21%**
Subtotal		**1311**	**1262**	**1252**	**1246**	**1246**	**-4.97%**
TOTAL		**37667**	**36341**	**35862**	**35307**	**35117**	**-6.77%**

In summary of the aforegoing three tables, the expected average water demand and sewerage flows in year 5 (2006/2007) are indicated in the table below.

Table 5.4: Bulk Services Realities : Year 5 Average Water Demand And Flow
[Metered Connections & VIP Provision To Backlog]

Local Municipality	Community	Raw Water Abstraction [ADWD]	Water Treatment Works [ADWD]	Treated Water Supply [ADWD]	Storage Capacity [48 HOURS]	Sewage Treatment Works	
						Hydraulic Load [ADDWF]	Organic Load [COD]
		Ml/day	Ml/day	Ml/day	Ml	Ml/day	kg/day
MANGAUNG	**Bloemfontein**	103.86	103.86	103.86	207.71	42.77	29150
	Botshabelo	16.51	16.51	16.51	33.02	1.56	1403
	Thaba Nchu	9.62	9.62	9.62	19.24	2.06	1801
Subtotal		**129.99**	**129.99**	**129.99**	**259.97**	**46.39**	**32354**
MANTSOPA	**Ladybrand**	3.56	3.56	3.56	7.12	1.64	1211
	Hobhouse	0.47	0.47	0.47	0.94	0.05	40
	Thaba Patchoa	0.16	0.16	0.16	0.31	0.09	76
	Tweespruit	1.06	1.06	1.06	2.11	0.28	190
	Excelsior	0.65	0.65	0.65	1.29	0.00	0
Subtotal		**5.89**	**5.89**	**5.89**	**11.77**	**2.05**	**1516**
NALEDI	**Wepener**	1.73	1.73	1.73	3.47	0.95	733
	Dewetsdorp	1.24	1.24	1.24	2.49	0.63	497
	Vanstadensrus	0.09	0.09	0.09	0.19	0.02	16
Subtotal		**3.07**	**3.07**	**3.07**	**6.14**	**1.59**	**1246**
TOTAL		**138.94**	**138.94**	**138.94**	**277.88**	**50.03**	**35117**

Based on the figures indicated in the afore-mentioned table, as well as the known design capacities of the various supply and treatment components, the respective available capacities based on average conditions are indicated in the table below. A negative figure implies that the specific component capacity is exceeded by the value provided between brackets.

Table 5.5: Bulk Services Realities : Year 5 Average Water Demand And Flow Condition Available Capacities [Metered Connections & VIP Provision To Backlog]

Local Municipality	Community	Raw Water Abstraction	Water Treatment	Treated Water	Storage Capacity	Sewage Treatment Works

		[ADWD]	**Works** [ADWD]	**Supply** [ADWD]	[48 HOURS]	**Hydraulic Load** [ADDWF]	**Organic Load** [COD]
		Ml/day	Ml/day	Ml/day	Ml	Ml/day	kg/day
MANGAUNG	**Bloemfontein**	173.14	173.14	173.14	207.15	36.18	19246
	Botshabelo	32.89	32.89	32.89	60.98	18.44	10857
	Thaba Nchu	20.48	20.48	20.48	7.66	3.94	1799
Subtotal		**226.51**	**226.51**	**226.51**	**275.79**	**58.56**	**31902**
MANTSOPA	**Ladybrand**	7.24	7.24	11.99	(0.55)	0.36	15
	Hobhouse	0.35	0.35	0.35	0.30	0.25	144
	Thaba Patchoa	0.28	0.28	0.28	0.12	0.21	108
	Tweespruit	(0.34)	(0.34)	(0.34)	(0.66)	1.22	729
	Excelsior	0.65	0.65	0.20	0.41	1.20	736
Subtotal		**8.19**	**8.19**	**12.49**	**(0.38)**	**3.25**	**1732**
NALEDI	**Wepener**	(0.23)	(0.23)	(0.23)	1.03	2.05	1106
	Dewetsdorp	1.36	1.36	1.36	(0.99)	1.17	607
	Vanstadensrus	0.01	0.01	0.01	0.11	0.28	168
Subtotal		**1.13**	**1.13**	**1.13**	**0.16**	**3.51**	**1880**
TOTAL		**235.83**	**235.83**	**240.13**	**275.56**	**65.32**	**35515**

In principle, all water and sanitation related components are designed to meet peak demand and flow condition requirements. A factor of 1,5 was used to determine the peak water demands based on the proposed developments within the respective communities. In the case of sanitation, a peak factor of 2,5 was used to determine the expected sewerage peak flows. In view of the calculations of these peak conditions, the available capacities are indicated in the table below. Again, figures shown in brackets are an indication of the additional capacity required and were used to inform a project to upgrade or increase that specific facility or component.

Table 5.6: Bulk Services Realities : Year 5 Peak Water Demand And Flow Condition Available Capacities

[Metered Connections & VIP Provision To Backlog]

Local Municipality	**Community**	**Raw Water Abstraction**	**Water Treatment**	**Treated Water**	**Storage Capacity**	**Sewage Treatment Works**

		[SSDWD]	**Works** [SSDWD]	**Supply** [SSDWD]	[48 HOURS]	**Hydraulic Load** [PDWWF]	**Organic Load** [COD]
		Ml/day	Ml/day	Ml/day	Ml	Ml/day	kg/day
MANGAUNG	**Bloemfontein**	121.22	121.22	121.22	103.29	(27.99)	19246
	Botshabelo	24.64	24.64	24.64	44.47	16.10	10857
	Thaba Nchu	15.67	15.67	15.67	(1.97)	0.85	1799
Subtotal		**161.52**	**161.52**	**161.52**	**145.80**	**(11.03)**	**31902**
MANTSOPA	**Ladybrand**	5.46	5.46	10.21	(4.11)	(2.11)	15
	Hobhouse	0.12	0.12	0.12	(0.17)	0.19	144
	Thaba Patchoa	0.20	0.20	0.20	(0.03)	0.08	108
	Tweespruit	(0.86)	(0.86)	(0.86)	(1.71)	0.81	729
	Excelsior	0.33	0.33	(0.12)	(0.24)	1.20	736
Subtotal		**5.24**	**5.24**	**9.54**	**(6.27)**	**0.18**	**1732**
NALEDI	**Wepener**	(1.10)	(1.10)	(1.10)	(0.70)	0.63	1106
	Dewetsdorp	0.73	0.73	0.73	(2.23)	0.23	607
	Vanstadensrus	(0.04)	(0.04)	(0.04)	0.02	0.26	168
Subtotal		**(0.41)**	**(0.41)**	**(0.41)**	**(2.91)**	**1.12**	**1880**
TOTAL		**166.36**	**166.36**	**170.66**	**136.62**	**(9.74)**	**35515**

Conclusion

By way of summarising the proposed developments and requirements (and bearing in mind the national targets and legislative requirements), the percentage figures shown in the following tables are an indication of the level of service provision which is expected to be reached in the year as specified. These figures do not include further extensions.

Table 5.7: Expected Service Provision : Water

LOCAL MUNICIPALITY	**FINANCIAL YEAR(S)**				
Level Of Service	**2002/2003**	**2003/2004**	**2004/2005**	**2005/2006**	**2006/2007**
MANGAUNG	**98.1%**	**98.9%**	**99.3%**	**99.6%**	**100.0%**

% Above RDP Provision					
Metered connection	96 011	96 011	96 011	96 011	96 011
Unmetered connection	29 154	29 154	29 154	29 154	29 154
Communal supply	28 679	29 931	30 633	31 028	31 712
None and/or Below RDP	3 033	1 781	1 079	684	
MANTSOPA % Above RDP Provision	**85.1%**	**91.5%**	**94.3%**	**97.2%**	**100.0%**
Metered connection	2 887	9 053	9 053	9 053	9 053
Unmetered connection	6 166				
Communal supply		676	976	1 281	1 581
None and/or Below RDP	1 581	905	605	300	
NALEDI % Above RDP Provision	**92.9%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Metered connection	4 993	5 307	5 307	5 307	5 307
Unmetered connection	314				
Communal supply	760	1 227	1 227	1 227	1 227
None and/or Below RDP	467				

Table 5.8: Expected Service Provision : Sanitation

LOCAL MUNICIPALITY	**FINANCIAL YEAR(S)**				
Level Of Service	**2002/2003**	**2003/2004**	**2004/2005**	**2005/2006**	**2006/2007**
MANGAUNG % Above RDP Provision	**55.6%**	**63.6%**	**72.5%**	**76.4%**	**81.6%**
Full waterborne	85 032	85 032	85 032	85 032	85 032
Wet installations (ie. septic tanks)					
Dry on Site (ie. VIP or equivalent)	13 060	23 639	35 415	40 534	47 425

Buckets (below RDP)	7 640	3 625	3 329	2 573	2 028
No service	51 145	44 581	33 101	28 738	22 392
MANTSOPA % Above RDP Provision	**40.3%**	**54.8%**	**69.3%**	**83.9%**	**96.9%**
Full waterborne	4 221	4 221	4 221	4 221	4 221
Wet installations (ie. septic tanks)	250	250	250	250	250
Dry on Site (ie. VIP or equivalent)		1 500	3 000	4 500	5 847
Buckets (below RDP)	4 503	3 003	1 503	233	
No service	1 660	1 660	1 660	1 430	316
NALEDI % Above RDP Provision	**77.4%**	**85.0%**	**90.4%**	**95.7%**	**100.0%**
Full waterborne	**77.4%**	**85.0%**	**90.4%**	**95.7%**	**100.0%**
Wet installations (ie. septic tanks)	4 962	4 962	4 962	4 962	4 962
Dry on Site (ie. VIP or equivalent)	94	94	94	94	94
Buckets (below RDP)		500	850	1 200	1 478
No service	561	231	81		

It is significant that each local municipality could attain to full service provision towards the end of the 2009/2010 financial year provided that adequate funds are made available during each year. It could therefore be maintained that these municipalities will meet all the set national targets if this development option, namely Option A, is followed

5.3.2 WATER BALANCE FOR OPTION B

In view of the proposed water and sanitation related developments indicated in relevant tables of the Motheo WSDP, the expected average water demand and sewerage generated was calculated and shown in the following three tables. Percentages shown under the "Trend" column to the right of these tables are an indication of what is expected within each community over the following five years. Where no figures are shown, it implies that no significant change will take place over this period. A negative figure is an indication of a decrease in sewerage generated.

Table 5.9: Expected Residential Average Daily Water Demands

Local Municipality	Community	RESIDENTIAL : AVERAGE DAILY WATER DEMAND [ADWD]					TREND
		2002/2003	2003/2004	2004/2005	2005/2006	2006/2007	
		Ml/day	Ml/day	Ml/day	Ml/day	Ml/day	
MANGAUNG	**Bloemfontein**	75.294	75.653	75.844	75.965	76.136	**1.12%**
	Botshabelo	16.509	17.712	17.712	17.712	17.712	**7.29%**
	Thaba Nchu	8.987	10.096	10.308	10.343	10.555	**17.45%**
Subtotal		**100.789**	**103.461**	**103.865**	**104.020**	**104.403**	**3.59%**
MANTSOPA	**Ladybrand**	3.426	3.462	3.495	3.527	3.559	**3.88%**
	Hobhouse	0.453	0.453	0.453	0.453	0.468	**3.27%**
	Thaba Patchoa	0.157	0.157	0.157	0.157	0.157	
	Tweespruit	0.940	0.978	1.016	1.056	1.056	**12.34%**
	Excelsior	0.469	0.513	0.558	0.602	0.647	**37.89%**
Subtotal		**5.445**	**5.563**	**5.678**	**5.795**	**5.887**	**8.11%**
NALEDI	**Wepener**	1.755	1.734	1.714	1.702	1.713	**-2.41%**
	Dewetsdorp	1.291	1.291	1.291	1.291	1.291	
	Vanstadensrus	0.084	0.093	0.093	0.093	0.093	**10.29%**
Subtotal		**3.130**	**3.118**	**3.097**	**3.086**	**3.097**	**-1.07%**
TOTAL		**109.365**	**112.143**	**112.640**	**112.901**	**113.386**	**3.68%**

Table 5.10: Expected Residential Daily Dry Weather Flows

Local Municipality	Community	RESIDENTIAL : AVERAGE DAILY DRY WEATHER FLOW [ADDWF]					TREND
		2002/2003	2003/2004	2004/2005	2005/2006	2006/2007	
		Ml/day	Ml/day	Ml/day	Ml/day	Ml/day	
MANGAUNG	**Bloemfontein**	42.789	42.930	42.999	43.043	43.083	**0.69%**
	Botshabelo	1.930	1.858	1.932	2.160	2.377	**23.14%**
	Thaba Nchu	2.059	2.242	2.387	2.387	2.387	**15.93%**
Subtotal		**46.778**	**47.029**	**47.318**	**47.590**	**47.847**	**2.29%**
MANTSOPA	**Ladybrand**	1.733	1.699	1.665	1.642	1.642	**-5.27%**

	Hobhouse	0.117	0.099	0.081	0.063	0.045	**-61.23%**
	Thaba Patchoa	0.086	0.086	0.086	0.086	0.086	
	Tweespruit	0.368	0.337	0.307	0.276	0.275	**-25.17%**
	Excelsior	0.089	0.058	0.027			**-100.00%**
Subtotal		**2.393**	**2.279**	**2.166**	**2.068**	**2.049**	**-14.38%**
NALEDI	**Wepener**	0.953	0.948	0.948	0.948	0.948	**-0.57%**
	Dewetsdorp	0.635	0.628	0.628	0.628	0.628	**-1.10%**
	Vanstadensrus	0.024	0.022	0.019	0.018	0.018	**-25.66%**
Subtotal		**1.612**	**1.597**	**1.595**	**1.594**	**1.594**	**-1.16%**
TOTAL		**50.783**	**50.906**	**51.078**	**51.251**	**51.490**	**1.39%**

Table 5.11: Expected Residential Chemical Oxygen Demand

Local Municipality	**Community**	**RESIDENTIAL : CHEMICAL OXYGEN DEMAND [COD]**					**TREND**
		2002/2003	**2003/2004**	**2004/2005**	**2005/2006**	**2006/2007**	
		kg/day	kg/day	kg/day	kg/day	kg/day	
MANGAUNG	**Bloemfontein**	29196	29292	29346	29385	29420	**0.77%**
	Botshabelo	2641	1929	1952	2022	2119	**-19.78%**
	Thaba Nchu	1801	1961	2088	2088	2088	**15.93%**
Subtotal		**33639**	**33183**	**33387**	**33495**	**33627**	**-0.03%**
MANTSOPA	**Ladybrand**	1515	1401	1287	1211	1211	**-20.08%**
	Hobhouse	277	218	158	98	40	**-85.75%**
	Thaba Patchoa	76	76	76	76	76	
	Tweespruit	499	397	296	195	190	**-61.85%**
	Excelsior	296	192	89			**-100.00%**
Subtotal		**2663**	**2284**	**1905**	**1579**	**1516**	**-43.06%**
NALEDI	**Wepener**	751	733	733	733	733	**-2.42%**
	Dewetsdorp	520	497	497	497	497	**-4.48%**
	Vanstadensrus	36	28	20	16	16	**-56.80%**
Subtotal		**1308**	**1258**	**1250**	**1246**	**1246**	**-4.75%**

TOTAL	**37610**	**36725**	**36542**	**36321**	**36389**	**-3.25%**

To summarise the aforegoing three tables, the expected average water demand and sewerage flows in year 5 (2006/2007) are indicated in the table below:

Table 5.12: Bulk Services Realities : Year 5 Average Water Demand And Flow
[Metered Connections For All & VIPs To Backlog]

Local Municipality	**Community**	**Raw Water Abstraction** [ADWD]	**Water Treatment Works** [ADWD]	**Treated Water Supply** [ADWD]	**Storage Capacity** [48 HOURS]	**Sewage Treatment Works**	
						Hydraulic Load [ADDWF]	**Organic Load** [COD]
		Ml/day	Ml/day	Ml/day	Ml	Ml/day	kg/day
MANGAUNG	**Bloemfontein**	104.39	104.39	104.39	208.78	43.08	29420
	Botshabelo	17.71	17.71	17.71	35.42	2.38	2119
	Thaba Nchu	10.55	10.55	10.55	21.11	2.39	2088
Subtotal		**132.66**	**132.66**	**132.66**	**265.31**	**47.85**	**33627**
MANTSOPA	**Ladybrand**	3.56	3.56	3.56	7.12	1.64	1211
	Hobhouse	0.47	0.47	0.47	0.94	0.05	40
	Thaba Patchoa	0.16	0.16	0.16	0.31	0.09	76
	Tweespruit	1.06	1.06	1.06	2.11	0.28	190
	Excelsior	0.65	0.65	0.65	1.29	0.00	0
Subtotal		**5.89**	**5.89**	**5.89**	**11.77**	**2.05**	**1516**
NALEDI	**Wepener**	1.71	1.71	1.71	3.43	0.95	733
	Dewetsdorp	1.29	1.29	1.29	2.58	0.63	497
	Vanstadensrus	0.09	0.09	0.09	0.19	0.02	16
Subtotal		**3.10**	**3.10**	**3.10**	**6.19**	**1.59**	**1246**
TOTAL		**141.64**	**141.64**	**141.64**	**283.28**	**51.49**	**36389**

Based on the figures indicated in the aforegoing table, as well as the known design capacities of the various supply and treatment components, the respective available capacities based on average

conditions are indicated in the table below. A negative figure implies that the specific component capacity is exceeded by the value provided between brackets.

Table 5.13: Bulk Services Realities : Year 5 Average Water Demand And Flow Condition Available Capacities
[Metered Connections For All & VIPs To Backlog]

Local Municipality	Community	Raw Water Abstraction [ADWD]	Water Treatment Works [ADWD]	Treated Water Supply [ADWD]	Storage Capacity [48 HOURS]	Sewage Treatment Works	
						Hydraulic Load [ADDWF]	Organic Load [COD]
		Ml/day	Ml/day	Ml/day	Ml	Ml/day	kg/day
MANGAUNG	**Bloemfontein**	172.61	172.61	172.61	206.08	35.87	18976
	Botshabelo	31.69	31.69	31.69	58.58	17.62	10141
	Thaba Nchu	19.55	19.55	19.55	5.79	3.61	1512
Subtotal		**223.84**	**223.84**	**223.84**	**270.45**	**57.10**	**30629**
MANTSOPA	**Ladybrand**	7.24	7.24	11.99	(0.55)	0.36	15
	Hobhouse	0.35	0.35	0.35	0.30	0.25	144
	Thaba Patchoa	0.28	0.28	0.28	0.12	0.21	108
	Tweespruit	(0.34)	(0.34)	(0.34)	(0.66)	1.22	729
	Excelsior	0.65	0.65	0.20	0.41	1.20	736
Subtotal		**8.19**	**8.19**	**12.49**	**(0.38)**	**3.25**	**1732**
NALEDI	**Wepener**	(0.21)	(0.21)	(0.21)	1.07	2.05	1106
	Dewetsdorp	1.31	1.31	1.31	(1.08)	1.17	607
	Vanstadensrus	0.01	0.01	0.01	0.11	0.28	168
Subtotal		**1.10**	**1.10**	**1.10**	**0.11**	**3.51**	**1880**
TOTAL		**233.13**	**233.13**	**237.44**	**270.17**	**63.86**	**34242**

In principle, all water and sanitation related components are designed to meet peak demand and flow condition requirements. A factor of 1,5 was used to determine the peak water demands based on the proposed developments within the respective communities. In the case of sanitation, a peak factor of 2,5 was used to determine the expected sewerage peak flows. In view of the calculations of these peak

conditions, the available capacities are indicated in the table below. Again, figures shown in brackets are an indication of the additional capacity required and were used to inform a project to upgrade or increase that specific facility or component.

Table 5.14: Bulk Services Realities : Year 5 Peak Water Demand And Flow Condition Available capacities
[Metered Connections for all & VIPs to Backlog]

Local Municipality	Community	Raw Water Abstraction [SSDWD]	Water Treatment Works [SSDWD]	Treated Water Supply [SSDWD]	Storage Capacity [48 HOURS]	Sewage Treatment Works	
						Hydraulic Load [PDWWF]	Organic Load [COD]
		Ml/day	Ml/day	Ml/day	Ml	Ml/day	kg/day
MANGAUNG	**Bloemfontein**	120.42	120.42	120.42	101.69	(28.76)	18976
	Botshabelo	22.83	22.83	22.83	40.86	14.06	10141
	Thaba Nchu	14.27	14.27	14.27	(4.76)	0.03	1512
Subtotal		**157.52**	**157.52**	**157.52**	**137.79**	**(14.67)**	**30629**
MANTSOPA	**Ladybrand**	5.46	5.46	10.21	(4.11)	(2.11)	15
	Hobhouse	0.12	0.12	0.12	(0.17)	0.19	144
	Thaba Patchoa	0.20	0.20	0.20	(0.03)	0.08	108
	Tweespruit	(0.86)	(0.86)	(0.86)	(1.71)	0.81	729
	Excelsior	0.33	0.33	(0.12)	(0.24)	1.20	736
Subtotal		**5.24**	**5.24**	**9.54**	**(6.27)**	**0.18**	**1732**
NALEDI	**Wepener**	(1.07)	(1.07)	(1.07)	(0.64)	0.63	1106
	Dewetsdorp	0.66	0.66	0.66	(2.37)	0.23	607
	Vanstadensrus	(0.04)	(0.04)	(0.04)	0.02	0.26	168
Subtotal		**(0.44)**	**(0.44)**	**(0.44)**	**(2.99)**	**1.12**	**1880**
TOTAL		**162.31**	**162.31**	**166.62**	**128.53**	**(13.37)**	**34242**

Conclusion

By way of summarising the proposed developments and requirements (and bearing in mind the national targets and legislative requirements), the percentage figures shown in the following tables are an indication of the level of service provision which is expected to be reached in the year as specified. These figures do not include further extensions.

Table 5.15: Expected Service Provision : Water

LOCAL MUNICIPALITY	**FINANCIAL YEAR(S)**				
Level of Service	**2002/2003**	**2003/2004**	**2004/2005**	**2005/2006**	**2006/2007**
MANGAUNG % Above RDP Provision	**98.1%**	**98.8%**	**99.3%**	**99.5%**	**100.0%**
Metered connection	96 011	122 762	130 773	138 444	147 202
Unmetered connection	29 154	21 878	14 602	7 326	50
Communal supply	28 679	10 420	10 363	10 363	9 625
None and/or Below RDP	3 033	1 817	1 139	744	
MANTSOPA % Above RDP Provision	**85.1%**	**91.5%**	**94.3%**	**97.2%**	**100.0%**
Metered connection	2 887	9 729	10 029	10 334	10 634
Unmetered connection	6 166				
Communal supply					
None and/or Below RDP	1 581	905	605	300	
NALEDI % Above RDP Provision	**92.9%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Metered connection	4 993	6 189	6 304	6 419	6 534
Unmetered connection	314				
Communal supply	760	345	230	115	
None and/or Below RDP	467				

Table 5.16: Expected Service Provision : Sanitation

LOCAL MUNICIPALITY Level of Service	FINANCIAL YEAR(S) 2002/2003	2003/2004	2004/2005	2005/2006	2006/2007
MANGAUNG **% Above RDP Provision**	**55.6%**	**63.6%**	**72.5%**	**76.4%**	**81.6%**
Full waterborne	85 032	86 505	87 328	88 242	89 073
Wet installations (ie. septic tanks)					
Dry on Site (ie. VIP or equivalent)	13 060	22 166	33 119	37 324	43 384
Buckets (below RDP)	7 640	3 625	3 329	2 573	2 028
Pits & No service (below RDP)	51 145	44 581	33 101	28 738	22 392
MANTSOPA **% Above RDP Provision**	**40.3%**	**54.8%**	**69.3%**	**83.9%**	**96.9%**
Full waterborne	4 221	4 221	4 221	4 221	4 221
Wet installations (ie. septic tanks)	250	250	250	250	250
Dry on Site (ie. VIP or equivalent)		1 500	3 000	4 500	5 847
Buckets (below RDP)	4 503	3 003	1 503	233	
Pits & No service (below RDP)	1 660	1 660	1 660	1 430	316
NALEDI **% Above RDP Provision**	**77.4%**	**85.0%**	**90.4%**	**95.7%**	**100.0%**
Full waterborne	4 962	4 962	4 962	4 962	4 962
Wet installations (ie. septic tanks)	94	94	94	94	94
Dry on Site (ie. VIP or equivalent)		500	850	1 200	1 478
Buckets (below RDP)	561	231	81		
Pits & No service (below RDP)	917	747	547	278	

It is significant that these local municipalities could attain to full service provision towards the end of the 2009/2010 financial year provided that additional funding is obtained, especially within the financial years between 2006 and 2010. The need for additional erven to be developed should also be taken into account in this regard. In conclusion, these municipalities can meet all set national targets if this development option, namely Option B, is followed and additional funding is obtained.

5.3.3 WATER BALANCE FOR OPTION C

In view of the proposed water and sanitation related developments indicated in the relevant tables of the WSDP for Motheo District Municipality, the expected average water demand and sewerage generated was calculated and shown in the following three tables. Percentages shown under the "Trend" column on the righthand side of these tables are an indication of what is expected within each community over the following five years. Where no figures are shown, it implies that no significant change will take place over this period. A negative figure indicates a decrease in sewerage generated.

Table 5.17: Expected Residential Average Daily Water Demand

Local Municipality	Community	RESIDENTIAL : AVERAGE DAILY WATER DEMAND [ADWD]					TREND
		2002/2003	2003/2004	2004/2005	2005/2006	2006/2007	
		Ml/day	Ml/day	Ml/day	Ml/day	Ml/day	
MANGAUNG	**Bloemfontein**	75.294	76.434	77.525	77.703	77.854	**3.40%**
	Botshabelo	16.509	17.712	17.712	17.712	17.712	**7.29%**
	Thaba Nchu	8.987	10.500	11.668	12.058	12.270	**36.53%**
Subtotal		**100.789**	**104.647**	**106.906**	**107.473**	**107.837**	**6.99%**
MANTSOPA	**Ladybrand**	3.426	3.622	3.815	4.007	4.203	**22.68%**
	Hobhouse	0.453	0.537	0.621	0.704	0.801	**76.70%**
	Thaba Patchoa	0.157	0.157	0.157	0.157	0.157	
	Tweespruit	0.940	1.120	1.300	1.482	1.598	**70.04%**
	Excelsior	0.469	0.658	0.848	1.037	1.190	**153.90%**
Subtotal		**5.445**	**6.094**	**6.740**	**7.387**	**7.950**	**46.00%**
NALEDI	**Wepener**	1.755	1.750	1.750	1.750	1.750	**-0.26%**
	Dewetsdorp	1.291	1.335	1.380	1.424	1.457	**12.84%**
	Vanstadensrus	0.084	0.104	0.116	0.127	0.137	**62.42%**
Subtotal		**3.130**	**3.190**	**3.246**	**3.301**	**3.344**	**6.83%**
TOTAL		**109.365**	**113.931**	**116.891**	**118.162**	**119.130**	**8.93%**

Table 5.18:Expected Residential Daily Dry Weather Flow

Local Municipality	Community	RESIDENTIAL : AVERAGE DAILY DRY WEATHER FLOW [ADDWF]					TREND
		2002/2003	2003/2004	2004/2005	2005/2006	2006/2007	
		Ml/day	Ml/day	Ml/day	Ml/day	Ml/day	
MANGAUNG	**Bloemfontein**	42.789	43.609	44.298	44.667	44.707	**4.48%**
	Botshabelo	1.930	3.939	6.336	7.347	9.811	**408.27%**
	Thaba Nchu	2.059	2.704	3.941	4.347	4.347	**111.14%**
Subtotal		**46.778**	**50.251**	**54.575**	**56.360**	**58.865**	**25.84%**
MANTSOPA	**Ladybrand**	1.733	1.882	2.031	2.191	2.378	**37.19%**
	Hobhouse	0.117	0.194	0.272	0.349	0.426	**265.33%**
	Thaba Patchoa	0.086	0.086	0.086	0.086	0.086	
	Tweespruit	0.368	0.499	0.631	0.763	0.895	**143.39%**
	Excelsior	0.089	0.224	0.358	0.498	0.622	**599.73%**
Subtotal		**2.393**	**2.886**	**3.379**	**3.888**	**4.407**	**84.15%**
NALEDI	**Wepener**	0.953	0.991	0.991	0.991	0.991	**3.95%**
	Dewetsdorp	0.635	0.679	0.729	0.780	0.817	**28.72%**
	Vanstadensrus	0.024	0.035	0.045	0.057	0.068	**183.01%**
Subtotal		**1.612**	**1.704**	**1.765**	**1.828**	**1.876**	**16.38%**
TOTAL		**50.783**	**54.842**	**59.719**	**62.076**	**65.149**	**28.29%**

Table 5.19: Expected Residential Chemical Oxygen Demand

Local Municipality	Community	RESIDENTIAL : CHEMICAL OXYGEN DEMAND [COD]					TREND
		2002/2003	2003/2004	2004/2005	2005/2006	2006/2007	
		kg/day	kg/day	kg/day	kg/day	kg/day	
MANGAUNG	**Bloemfontein**	29196	29886	30483	30806	30841	**5.63%**
	Botshabelo	2641	3750	5805	6560	8624	**226.52%**
	Thaba Nchu	1801	2366	3448	3803	3803	**111.14%**
Subtotal		**33639**	**36002**	**39736**	**41169**	**43268**	**28.63%**

MANTSOPA	**Ladybrand**	1515	1561	1607	1691	1855	**22.41%**
	Hobhouse	277	301	325	349	372	**34.30%**
	Thaba Patchoa	76	76	76	76	76	
	Tweespruit	499	539	580	620	733	**46.87%**
	Excelsior	296	338	379	435	544	**83.68%**
Subtotal		**2663**	**2815**	**2967**	**3172**	**3580**	**34.41%**
NALEDI	**Wepener**	751	771	771	771	771	**2.60%**
	Dewetsdorp	520	541	586	630	663	**27.38%**
	Vanstadensrus	36	40	43	50	60	**64.46%**
Subtotal		**1308**	**1352**	**1399**	**1451**	**1493**	**14.17%**
TOTAL		**37610**	**40169**	**44102**	**45792**	**48341**	**28.53%**

Based on the aforegoing three tables, the expected average water demand and sewerage flows in year 5 are indicated in the table below:

Table 5.20: Bulk Services Realities : Year 5 Average Water Demand And Flow
[Metered Connections & Waterborne For All]

Local Municipality	**Community**	**Raw Water Abstraction** [ADWD]	**Water Treatment Works** [ADWD]	**Treated Water Supply** [ADWD]	**Storage Capacity** [48 HOURS]	**Sewage Treatment Works**	
						Hydraulic Load [ADDWF]	**Organic Load** [COD]
		Ml/day	Ml/day	Ml/day	Ml	Ml/day	kg/day
MANGAUNG	**Bloemfontein**	100.00	100.00	100.00	200.00	44.71	30841
	Botshabelo	17.71	17.71	17.71	35.42	9.81	8624
	Thaba Nchu	12.27	12.27	12.27	24.54	4.35	3803
Subtotal		**129.98**	**129.98**	**129.98**	**259.96**	**58.87**	**43268**
MANTSOPA	**Ladybrand**	4.20	4.20	4.20	8.41	2.38	1855
	Hobhouse	0.80	0.80	0.80	1.60	0.43	372
	Thaba Patchoa	0.16	0.16	0.16	0.31	0.09	76
	Tweespruit	1.60	1.60	1.60	3.20	0.89	733

	Excelsior	1.19	1.19	1.19	2.38	0.62	544
Subtotal		**7.95**	**7.95**	**7.95**	**15.90**	**4.41**	**3580**
NALEDI	**Wepener**	1.75	1.75	1.75	3.50	0.99	771
	Dewetsdorp	1.46	1.46	1.46	2.91	0.82	663
	Vanstadensrus	0.14	0.14	0.14	0.27	0.07	60
Subtotal		**3.34**	**3.34**	**3.34**	**6.69**	**1.88**	**1493**
TOTAL		**141.28**	**141.28**	**141.28**	**282.55**	**65.15**	**48341**

Drawing on the figures in the above table, as well as the known design capacities of the various supply and treatment components, the respective available capacities, based on average conditions, are indicated in the table below. A negative figure implies that the specific component capacity is exceeded with that value provided between brackets.

Table 5.21: Bulk Services Realities : Year 5 Average Water Demand And Flow Condition Available Capacities[Metered Connections & Waterborne For All]

Local Municipality	**Community**	**Raw Water Abstraction** [ADWD]	**Water Treatment Works** [ADWD]	**Treated Water Supply** [ADWD]	**Storage Capacity** [48 HOURS]	**Sewage Treatment Works**	
						Hydraulic Load [ADDWF]	**Organic Load** [COD]
		Ml/day	Ml/day	Ml/day	Ml	Ml/day	kg/day
MANGAUNG	**Bloemfontein**	177.00	177.00	177.00	214.86	34.24	17555
	Botshabelo	31.69	31.69	31.69	58.58	10.19	3636
	Thaba Nchu	17.83	17.83	17.83	2.36	1.65	(203)
Subtotal		**226.52**	**226.52**	**226.52**	**275.79**	**46.08**	**20988**
MANTSOPA	**Ladybrand**	6.60	6.60	11.35	(1.84)	(0.38)	(629)
	Hobhouse	0.02	0.02	0.02	(0.37)	(0.13)	(189)
	Thaba Patchoa	0.28	0.28	0.28	0.12	0.21	108
	Tweespruit	(0.88)	(0.88)	(0.88)	(1.74)	0.61	187
	Excelsior	0.11	0.11	(0.34)	(0.68)	0.58	192
Subtotal		**6.12**	**6.12**	**10.43**	**(4.51)**	**0.89**	**(331)**
NALEDI	**Wepener**	(0.25)	(0.25)	(0.25)	1.00	2.01	1068

	Dewetsdorp	1.14	1.14	1.14	(1.41)	0.98	441
	Vanstadensrus	(0.04)	(0.04)	(0.04)	0.03	0.23	124
Subtotal		**0.86**	**0.86**	**0.86**	**(0.39)**	**3.22**	**1633**
TOTAL		**233.50**	**233.50**	**237.80**	**270.90**	**50.20**	**22291**

In principle, all water and sanitation related components are designed to meet peak demand and flow condition requirements. A factor of 1,5 was used to determine the peak water demands based on the proposed developments within the respective communities. In the case of sanitation, a peak factor of 2,5 was used to determine the expected sewerage peak flows. In view of the calculations of these peak conditions, the available capacities are indicated in the table below. Again, figures shown in brackets are an indication of the additional capacity required and were used to inform a project to upgrade or increase that specific facility or component.

Table 5.22: Bulk Services Realities : Year 5 Peak Water Demand And Flow Condition Available Capacities [Metered Connections & Waterborne For All]

Local Municipality	**Community**	**Raw Water Abstraction** [SSDWD]	**Water Treatment Works** [SSDWD]	**Treated Water Supply** [SSDWD]	**Storage Capacity** [48 HOURS]	**Sewage Treatment Works**	
						Hydraulic Load [PDWWF]	**Organic Load** [COD]
		Ml/day	Ml/day	Ml/day	Ml	Ml/day	kg/day
MANGAUNG	**Bloemfontein**	127.00	127.00	127.00	114.86	34.24	17555
	Botshabelo	22.83	22.83	22.83	40.86	10.19	3636
	Thaba Nchu	11.70	11.70	11.70	(9.91)	1.65	(203)
Subtotal		**161.53**	**161.53**	**161.53**	**145.81**	**46.08**	**20988**
MANTSOPA	**Ladybrand**	4.50	4.50	9.25	(6.05)	(5.13)	(629)
	Hobhouse	(0.38)	(0.38)	(0.38)	(1.17)	(0.98)	(189)
	Thaba Patchoa	0.20	0.20	0.20	(0.03)	0.04	108
	Tweespruit	(1.68)	(1.68)	(1.68)	(3.34)	(1.18)	187
	Excelsior	(0.49)	(0.49)	(0.94)	(1.87)	(0.66)	192
Subtotal		**2.15**	**2.15**	**6.45**	**(12.46)**	**(7.92)**	**(331)**
NALEDI	**Wepener**	(1.13)	(1.13)	(1.13)	(0.75)	0.03	1068

	Dewetsdorp	0.42	0.42	0.42	(2.87)	(0.65)	441
	Vanstadensrus	(0.11)	(0.11)	(0.11)	(0.11)	0.10	124
Subtotal		**(0.82)**	**(0.82)**	**(0.82)**	**(3.73)**	**(0.53)**	**1633**
TOTAL		**162.86**	**162.86**	**167.16**	**129.62**	**37.64**	**22291**

Conclusion

The percentage figures shown in the following tables are an indication of the level of service provision which is expected to be reached in that specific year. These figures do not include further extensions.

Table 5.23: Expected Service Provision : Water

LOCAL MUNICIPALITY	**FINANCIAL YEAR(S)**				
Level of Service	**2002/2003**	**2003/2004**	**2004/2005**	**2005/2006**	**2006/2007**
MANGAUNG % Above RDP Provision	**98.1%**	**98.8%**	**99.3%**	**99.5%**	**100.0%**
Metered connection	96 011	122 762	130 773	138 444	147 202
Unmetered connection	29 154	21 878	14 602	7 326	50
Communal supply	28 679	10 420	10 363	10 363	9 625
None and/or Below RDP	3 033	1 817	1 139	744	
MANTSOPA % Above RDP Provision	**85.1%**	**91.5%**	**94.3%**	**97.2%**	**100.0%**
Metered connection	2 887	9 729	10 029	10 334	10 634
Unmetered connection	6 166				
Communal supply					
None and/or Below RDP	1 581	905	605	300	
NALEDI % Above RDP Provision	**92.9%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Metered connection	4 993	6 189	6 304	6 419	6 534
Unmetered connection	314				
Communal supply	760	345	230	115	
None and/or Below RDP	467				

Table 5.24: Expected Service Provision : Sanitation

MANGAUNG	FINANCIAL YEAR(S)				
	2002/2003	**2003/2004**	**2004/2005**	**2005/2006**	**2006/2007**
MANGAUNG % Above RDP Provision	**55.6%**	**63.6%**	**72.5%**	**76.4%**	**81.6%**
Full waterborne	85 032	95 611	107 387	112 506	119 397
Wet installations (ie. septic tanks)					
Dry on Site (ie. VIP or equivalent)	13 060	13 060	13 060	13 060	13 060
Buckets (below RDP)	7 640	3 625	3 329	2 573	2 028
No service	51 145	44 581	33 101	28 738	22 392
MANTSOPA % Above RDP Provision	**40.3%**	**54.8%**	**69.3%**	**83.9%**	**96.9%**
Full waterborne	4 221	5 721	7 221	8 721	10 068
Wet installations (ie. septic tanks)	250	250	250	250	250
Dry on Site (ie. VIP or equivalent)					
Buckets (below RDP)	4 503	3 003	1 503	233	
No service	1 660	1 660	1 660	1 430	316
NALEDI % Above RDP Provision	**77.4%**	**85.0%**	**90.4%**	**95.7%**	**100.0%**
Full waterborne	4 962	5 462	5 812	6 162	6 440
Wet installations (ie. septic tanks)	94	94	94	94	94
Dry on Site (ie. VIP or equivalent)					
Buckets (below RDP)	561	231	81		
No service	917	747	547	278	

The national targets will not be reached if this option, namely **Option C** is followed.

5.4 LEJWELEPUTSWA DISTRICT MUNICIPALITY[5]

[5] Compiled from WSDP of Lejweleputswa District Municipality

5.4.1 SCENARIO 1

For the purposes of scenario one, it is proposed that the water services remain the same since all consumers are serviced by some sort of water service, be it communal standpipes or water provision to individual sites. The attention will mainly be focused on eradication of the sanitation backlog for the whole Lejweleputswa District by upgrading the night soil removal system (ie. bucket system) to an "on site dry" sanitation system (e.g. VIP toilets). The proposal of VIP toilets is in accordance with the minimum standard for "on site dry" sanitation systems as prescribed by the Department of Water Affairs and Forestry but, more importantly, the sewerage treatment works of the districts' respective towns will not require any further upgrading since no additional effluent will be disposed to these works. It is important to note that the free basic water implementation, and the individual site metering national targets, would in this case not be met. Urgent requirements in respect of certain bulk services will however be addressed. A summary of Scenario 1 can be seen in Tables 5.25 and 5.26 below.

Table 5.25: Scenario 1 – Water Provision

Priority	Description of Activity	Location	Proposed Project	Proposed Project Cost	Target date	Compliance with National Targets
	Increase Water Storage Capacity to ensure storage for at least 48 hours:					
B	Masilonyana Local Municipality	Winburg	Construction of a 2.0 Ml Reservoir	R1 800 000	Year 1	N/A
B	Nala Local Municipality	Bothaville	Construction of a 10 Ml Reservoir	R5 500 000		
			SUB TOTAL	R7 300 000		
	Implementation of bulk water measuring / metering system:					
B	Masilonyana Local Municipality	All five towns	Installation of bulk meters at WTW's and supply zones (at least 3 meters per town)	R225 000	Year 2	No
B	Nala Local Municipality	Wesselsbron	Installation of bulk meters at WTW's and supply zones (at least 3 meters per town)	R45 000	Year 2	No
B	Tokologo Local Municipality	All three towns	Installation of bulk meters at WTW's and supply zones (at least 3 meters per town)	R135 000	Year 2	No

B	Tswelopele Local Municipality	Both the towns	Installation of bulk meters at WTW's and supply zones (at least 3 meters per town)	R90 000	Year 2	No
			SUB TOTAL	R495 000		
			TOTAL FOR WATER PROVISION	R7 795 000		

Table 5.26: Scenario 1 – Sanitation Provision

Priority	Description of Activity	Location	Proposed Project	Proposed Project Cost	Target date	Compliance with National Targets
	Upgrade Night Soil Removal System to an "On Site Dry" sanitation system					
A	Masilonyana Local Municipality	Brandfort	Provision for VIP toilets to 250 sites	R625 000	Year 1	Yes
A	Masilonyana Local Municipality	Theunissen	Provision for VIP toilets to 4 714 sites	R11 785 000	Year 1-5	Yes
A	Masilonyana Local Municipality	Verkeerdevlei	Provision for VIP toilets to 415 sites	R1 037 500	Year 1-3	Yes
A	Masilonyana Local Municipality	Winburg	Provision for VIP toilets to 2 343 sites	R5 857 500	Year 1-5	Yes
A	Matjhabeng Local Municipality	Allanridge	Provision for VIP toilets to 1 273 sites	R3 182 500	Year 1-5	Yes
A	Matjhabeng Local Municipality	Hennenman	Provision for VIP toilets to 3 745 sites	R9 362 500	Year 1-5	Yes
A	Matjhabeng Local Municipality	Odendaalsrus	Provision for VIP toilets to 4 275 sites	R10 687 500	Year 1-5	Yes
A	Matjhabeng Local Municipality	Virginia	Provision for VIP toilets to 5 892 sites	R14 730 000	Year 1-5	Yes
A	Matjhabeng Local Municipality	Welkom	Provision for VIP toilets to 3 740 sites	R9 350 000	Year 1-5	Yes
A	Nala Local Municipality	Bothaville	Provision for VIP toilets to 6 655 sites	R16 637 500	Year 1-5	Yes
A	Nala Local Municipality	Wesselsbron	Provision for VIP toilets	R8 695 000	Year 1-5	Yes

			to 3 478 sites			
A	Tokologo Local Municipality	Boshof	Provision for VIP toilets to 2 280 sites	R5 700 000	Year 1-5	Yes
A	Tokologo Local Municipality	Dealesville	Provision for VIP toilets to 934 sites	R2 335 000	Year 1-5	Yes
A	Tokologo Local Municipality	Hertzogville	Provision for VIP toilets to 1 972 sites	R4 930 000	Year 1-5	Yes
			TOTAL FOR SANITATION PROVISION	**R104 915 000**		

Evaluating Scenario 1

In the context of this WSDP, Scenario 1 can be classified as the worst case scenario since no water services (except for a few urgent bulk services) are addressed. The project priority classification can vary from **A** to **C** with **A** the *critically important* projects, **B** *important but not critical* and **C** the *less important* projects. The construction of reservoirs for Winburg and Bothaville are classified as **B** priority projects since the storage capacity (in hours) for the respective towns is in the order of 42 and 47 hours bearing in mind that 48 hours of storage capacity is set as the minimum standard. It is significant to note that the storage capacity for some towns indicated as between 50 and 60 hours might be sufficient but water losses and water inefficiencies can cause the storage capacity to drop below the minimum standard of 48 hours. Additional storage capacity for these towns is not necessary at this point in time but emphasis is placed on water conservation and demand management and therefore attention should be given to the installation of bulk water meters. The upgrading of the night soil removal system (or bucket system) to an "on site dry" sanitation system is the main focal point which verifies the **A** priority project classification. Eradication of the bucket system will be done on an ongoing basis for the whole five year planning cycle in order to reach DWAF's new target for bucket eradication by the year 2007. The presently occupied unserviced sites, with regards to sanitation services, will also remain a **B** priority since the target date as reflected in Table 5.26 can be extended for an additional two years in order to meet the national target for the provision of basic sanitation services by March 2010. Cognisance should be taken that a zero population growth rate, as prescribed by DWAF, was applied throughout Scenario 1. In conclusion, it could be said of Scenario 1 that it

would be the ideal scenario only if all water services backlogs were eradicated, all bulk services were sufficient (in terms of capacity) and if all local municipalities accept VIP toilets as the suitable sanitation system for the replacement of the bucket system and unserviced sites.

5.4.2 SCENARIO 2

Scenario 2 is similar to Scenario 1 except for the existing level of service regarding the water services of residential consumer units. For the purposes of Scenario 2, the following is proposed:

- Provision of metered potable water to all unserviced sites and new extensions where water services are urgently required.
- Upgrading of sites with communal water supply to metered individual site connections including a yard tap.
- Provision of water meters to all unmetered sites.
- Upgrading of night soil removal system (ie. bucket system) to an “on site dry” sanitation system.

It is evident that Scenario 2 will follow a more comprehensive approach than Scenario 1 so that all three of the national targets (ie. free basic water implementation, individual site metering and basic household sanitation) are addressed. The option of VIP toilets as the on-site dry sanitation system is again proposed for reasons as set out already. Urgent requirements regarding bulk services are also addressed. A summary of the additional requirements for bulk services in year five for Scenario 2 is listed in Table 5.27 below.

Table 5.27: Additional Requirements for Bulk Services in Year 5

Current Consumption (Ml /d)	Additional Consumption Year 5 (Ml /d)	Total Consumption Year 5 (Ml /d)	Current Capacity of WTW (Ml)	Additional Capacity for WTW in Year 5 (Ml)	Current Reservoir Capacity (Ml)	Current Storage Capacity (hours)	Additional Reservoir Storage Capacity Year 5 (Ml)	Current Capacity of STW (Ml)	Additional Capacity of STW (Ml)
1.40	0.55	1.95	2.50	Not required	2.50	42	**1.40**	1.60	**0.80**
6.30	3.50	9.80	6.30	Not required	12.37	47	**7.60**	8.50	Not required
1.89	1.04	2.93	3.00	Not required	6.95	88	Not required	1.20	**2.30**
0.55	0.13	0.68	0.55	**0.13**	2.30	100	Not required	1.00	Not required
0.28	0.09	0.37	0.28	**0.09**	0.65	56	**0.10**	NA	Not required
0.68	Not required	0.65	0.68	Not required	1.53	54	Not required	NA	Not required
0.91	0.47	1.38	5.80	Not required	6.10	160	Not required	1.20	0.50

Evaluating Scenario 2

Although Scenario 2 followed a more diversified approach than Scenario 1 the national targets for free basic water and individual site metering will again not be met but future planning regarding these services is incorporated in this instance. The project classification criteria for Scenario 2 is identical to that of Scenario 1. The implementation of bulk measuring/metering systems also remains the same as for Scenario 1. The provision of metered potable water to unserviced sites (and new extensions) and the upgrading of communal water supply to metered individual yard connections significantly impacts on the 48 hour water storage capacity of the respective towns as a result of the additional water to be consumed. The additional amount of water that will be consumed in Year 5 is based on an average consumption of 330 litres per household per day for a household size of six persons (ie. 55 litres per person per day). Table 5.27 clearly indicates that the WTWs for Boshof and Dealesville (ie. the borehole yield) do not have sufficient capacity to comply with the additional water demand whereas additional reservoir storage capacities are required for Winburg and Bothaville .The provision of

metered yard connections to individual sites can either be a **B** priority or a **C** priority depending on the size of the backlog that needs to be eradicated. The same principle applies for the installation of water meters bearing in mind that the national target for individual metering will not be met since the target dates (as listed in the detail tables in the WSDP) for these projects are set at the earliest for Year 2. Note that the highlights indicate a shortage in bulk capacity.

The upgrading of the bucket system to dry on-site sanitation remains a focal point in this scenario as befits the **A** priority project classification. Eradication of the bucket system will be done on a continuous basis covering the entire five year planning cycle. The supplying of sanitation services to presently occupied unserviced sites will also remain a **B** priority since the target date can be extended for an additional two years. Again a zero population growth rate, as prescribed by DWAF, was applied to Scenario 2. Scenario 2 can be considered as a well-balanced scenario focusing on water and sanitation related services but also taking the national targets into account

5.4.3 SCENARIO 3

For the purposes of Scenario 3, emphasis will be placed on the eradication of the sanitation backlog by providing full waterborne sanitation systems to all unserviced sites and by upgrading the bucket system to full waterborne sanitation including the construction of toilet structures. This means that it will also be necessary to upgrade the communal water supply to individual metered yard connections for each site and to provide metered potable water to all the unserviced sites. Scenario 3 can be summarised as follows:

- Provision of full waterborne sanitation systems to all unserviced sites.
- Upgrading of bucket system to full waterborne sanitation.
- Provision of metered potable water to all unserviced sites and new township extensions that urgently require water services.
- Upgrading of communal water supply to individual metered yard connections including a yard tap.
- Provision of water meters to all unmetered sites.

It is evident that Scenario 3 is a combination of Scenarios 1 and 2 with the exception of the type of sanitation system that is provided. The provision of a full waterborne sanitation system as an alternative will have a major financial impact since this option is the most expensive but, more to the

point, most of the sewerage treatment works will have to be upgraded to ensure that sufficient capacity is available for the additional disposed effluent. In some instances the capacity of the water treatment works and the storage capacity will also have to be upgraded since the water demand of the individual consumer will be much higher as a result of the full waterborne sanitation system. Operational and maintenance costs will also increase and concern is expressed as to whether the consumers could afford this level of service. The three national targets are addressed but doubt exists as to whether the target dates could be met. A summary of the outcome of Scenario 3 is listed in Table 5.28.

Table 5.28: Additional Requirements for Bulk Services in Year 5

Current Consumption (Ml /d)	Additional Consumption Year 5 (Ml /d)	Total Consumption Year 5 (Ml /d)	Current Capacity of WTW (Ml)	Additional Capacity for WTW in Year 5 (Ml)	Current Reservoir Capacity (Ml)	Current Storage Capacity (hours)	Additional Reservoir Storage Capacity Year 5 (Ml)	Current Capacity of STW (Ml)	Additional Capacity of STW (Ml)
1.78	2.42	4.20	8.20	Not required	8.20	110	Not required	2.40	0.60
0.48	0.30	0.78	0.60	**0.40**	1.00	51	**0.40**	0.30	**0.50**
2.70	2.50	5.20	6.82	Not required	6.00	53	**4.40**	3.50	Not required
0.12	0.29	0.41	0.40	**0.10**	1.80	375	Not required	0.25	Not required
1.40	2.5	3.90	2.50	**2.20**	2.50	42	**5.30**	1.60	**0.90**
2.72	2.68	5.40	2.72	Not required	Adequate	Adequate	Not required	3.00	**0.80**
0.94	1.46	2.40	0.94	Not required	Adequate	Adequate	Not required	N/A	**Required**
6.30	3.50	9.80	6.30	Not required	12.37	47	**7.60**	8.50	Not required
1.89	3.71	5.60	1.89	Not required	6.95	88	**5.00**	1.20	**2.90**
0.55	0.85	1.40	**0.55**	**0.85**	2.30	100	**0.40**	1.00	Not required
0.28	0.47	0.75	**0.28**	**0.47**	0.65	56	**0.85**	N/A	Not required
0.68	0.62	1.30	**0.68**	**0.62**	1.53	54	**1.00**	N/A	Not required
0.80	3.70	4.50	7.00	Not required	6.45	193	**2.55**	8.00	Not required

Evaluating Scenario 3

Scenario 3 is optimal if the objective is to provide each consumer unit with the highest level of water and sanitation service. The provision of a full waterborne sanitation system as an alternative will have major financial implications since this option is the most expensive. Full waterborne sanitation system will entail higher water consumption since the average consumption per household of six persons is increased from 330 litres per household per day (55 litres per person per day) to 780 litres per household per day (130 litres per person per day). Furthermore, the water treatment works and reservoir storage capacity of various towns will have to be upgraded and increased in order to meet the future water demand. Scenario 3 will require roughly twice as much funding as will Scenario 2.

The highlighted information in Table 5.28 indicates that these bulk services have insufficient capacity**.** The existing capacities of certain sewerage treatment works (STW) and oxidation pond systems will to a great extent be affected by the provision of full waterborne sanitation. The respective sewerage

treatment works and oxidation pond systems will have to be upgraded to ensure that sufficient capacity is available for the additional disposed effluent. The total cost for the sanitation related services of Scenario 3 will exceed the costs for Scenario 2 by approximately R123-million. It is significant to note that the operational and maintenance costs will also increase and concern is expressed as to whether the consumers can afford this type of sanitation service. The upgrading of the bucket system to a full waterborne sanitation system remains a focal point in this scenario which verifies the **A** priority project classification. Eradication of the bucket system will be done on an ongoing basis covering the whole five year planning cycle in order to reach DWAF's new target for bucket eradication by the year 2007. Sanitation services for the presently occupied unserviced sites will remain a **B** priority since the target date can be extended for an additional two years in order to meet the national target for the provision of basic sanitation services by March 2010. Cognisance should be taken that a zero population growth rate, as prescribed by DWAF, was applied throughout Scenario 3 and that the prioritization of projects was based on the same principles as that for Scenario 2. The three national targets (ie. free basic water implementation, individual site metering and basic household sanitation) are addressed but doubt exists whether the target dates could be met. From a financial perspective it is evident that funding to the order of R54-million per year for the next five years is required to implement Scenario 3. At present, the average funding allocated to this region is in the order of R10-million and there is therefore some concern as to whether Scenario 3 is a realistic option.

5.5 NORTHERN FREE STATE DISTRICT MUNICIPALITY[6]

5.5.1 OPTION A

The following key issues are applicable in the selection of this option:

- Communal supply remains unchanged
- Metered connections to urban backlog
- Water supply to rural households (Farmland)
- "Dry on Site" sanitation systems to urban backlog
- "Dry on Site" sanitation systems to rural households (Farmland)

[6] Compiled from WSDP of Northern Free State District Municipality.

Based on this scenario and the figures indicated in Section 7.1 (Residential Erven Occupied), Section 7.2 (Community Population), Section 7.3 (Community Household Size) and Section 7.6 (Bulk Supply, Treatment and Water Demand) of the WSDP the "average" bulk requirements in Year 5 (2007) are indicated in Table 5.29 below.

Table 5.29: Bulk Services Realities : Year 5 Requirement
[Metered Connections & VIPs To Backlog And Future Growth]

Community	Raw Water Abstraction [ADWD]	Water Treatment Works [ADWD]	Treated Water Supply [ADWD]	Storage Capacity [48 HOURS]	Sewage Treatment Works	
					Hydraulic Load [ADDWF]	Organic Load [COD]
	M/day	M/day	M/day	M	M/day	kg/day
Kroonstad	25.6	25.6	25.6	51.3	13.2	16335
Viljoenskroon	5.5	5.5	5.5	11.0	1.7	2838
Steynsrus	1.7	1.7	1.7	3.3	0.4	732
Parys	9.2	9.2	9.2	18.3	5.6	72671
Vredefort	1.5	1.5	1.5	3.1	1.0	15881
Koppies	2.2	2.2	2.2	4.4	1.5	17969
Edenville	0.5	0.5	0.5	0.9	0.3	3810
Heilbron	4.3	4.3	4.3	8.6	2.8	35031
Sasolburg	41.2	41.2	41.2	82.3	12.9	11982
Deneysville	2.5	2.5	2.5	5.0	1.4	1474
Oranjeville	2.0	2.0	2.0	4.1	1.7	1139
Frankfort	4.1	4.1	4.1	8.3	2.3	2416
Villiers	1.5	1.5	1.5	3.0	1.8	950
Cornelia	0.4	0.4	0.4	0.8	0.1	87
Tweeling	0.7	0.7	0.7	1.5	0.9	439

Based on the figures indicated in the previous table it is possible to calculate the peak requirements for each bulk component and this is indicated in Table 5.30 below.

Table 5.30: Bulk Services Realities : Year 5 Peak Condition Requirement

[Metered Connections & VIPs To Backlog And Future Growth]

Community	Raw Water Abstraction [SSDWD]	Water Treatment Works [SSDWD]	Treated Water Supply [SSDWD]	Storage Capacity [48 HOURS]	Sewage Treatment Works	
					Hydraulic Load [PDWWF]	Organic Load [COD]
	Ml/day	Ml/day	Ml/day	Ml	Ml/day	kg/day
Kroonstad	38.5	38.5	38.5	51.3	37.5	16334.6
Viljoenskroon	8.3	8.3	8.3	11.0	5.1	2838.4
Steynsrus	2.5	2.5	2.5	3.3	1.5	732.0
				0.0		
Parys	13.8	13.8	13.8	18.3	16.9	72671.3
Vredefort	2.3	2.3	2.3	3.1	3.0	15881.4
Koppies	3.3	3.3	3.3	4.4	7.0	17969.3
Edenville	0.7	0.7	0.7	0.9	1.0	3809.5
Heilbron	6.4	6.4	6.4	8.6	8.3	35030.5
				0.0		
Sasolburg	61.8	61.8	61.8	82.3	38.6	11982.2
Deneysville	3.7	3.7	3.7	5.0	5.9	1473.6
Oranjeville	3.0	3.0	3.0	4.1	7.1	1139.4
				0.0		
Frankfort	6.2	6.2	6.2	8.3	9.8	2415.8
Villiers	2.2	2.2	2.2	3.0	7.5	949.9
Cornelia	0.6	0.6	0.6	0.8	0.5	86.7
Tweeling	1.1	1.1	1.1	1.5	3.7	439.0

Based on current capacities and the peak condition requirements indicated in Table 5.30 the available bulk capacity for each component is indicated in Table 5.31 below. The impact of this option is evident and the negative figures shown are an indication that the capacity is exceeded by that specific volume and needs to be increased. The specific year of increase and the associated budget is indicated in the "*Option A Project List"* in the WSDP.

Table 5.31: Bulk Services Realities: Year 5 Requirement - Peak Condition Available Capacity
[Metered Connections & VIPs To Backlog And Future Growth]

Community	Raw Water Abstraction [SSDWD]	Water Treatment Works [SSDWD]	Treated Water Supply [SSDWD]	Storage Capacity [48 HOURS]	Sewage Treatment Works	
					Hydraulic Load [PDWWF]	Organic Load [COD]
	Ml/day	Ml/day	Ml/day	Ml	Ml/day	kg/day
Kroonstad	21.5	21.5	21.5	20.0	16.8	-3711.6
Viljoenskroon	0.4	0.4	0.4	-1.3	4.5	318.6
Steynsrus	0.5	0.5	0.5	-1.4	0.4	-281.0
Parys	1.2	1.2	1.2	8.8	4.7	-65831.3
Vredefort	0.9	0.9	0.9	-1.1	-0.6	-15121.4
Koppies	0.4	0.4	0.3	1.3	-2.5	-16675.3
Edenville	-0.2	-0.2	-0.2	0.2	0.5	-3334.5
Heilbron	-0.9	-0.9	-0.9	0.5	4.0	-31135.5
Sasolburg	RAND WATER	RAND WATER	RAND WATER	65.3	SCI	21391.8
Deneysville	1.5	1.5	1.5	2.5	2.9	1613.6
Oranjeville	-2.2	-2.2	-2.2	-2.5	-5.2	-466.1
Frankfort	1.3	1.3	1.3	3.2	1.9	244.2
Villiers	2.3	2.3	2.3	1.5	0.1	1150.1
Cornelia	0.2	0.2	0.2	0.4	0.5	150.8
Tweeling	-0.8	-0.8	-0.8	-0.3	0.5	511.0

5.5.2 OPTION B

The following key issues are applicable in the selection of this option:

- Upgrading of communal supply to metered connections
- Metered connections to urban backlog
- Water supply to rural households (Farmland)
- “Dry on Site” sanitation systems to urban backlog
- “Dry on Site” sanitation systems to rural households (Farmland)

Based on this scenario and the figures indicated in Section 7.1 (Residential Erven Occupied), Section 7.2 (Community Population), Section 7.3 (Community Household Size) and Section 7.6 (Bulk Supply, Treatment and Water Demand) in the WSDP, the “average” bulk requirements in Year 5 (2007) are indicated in Table 5.32 below.

Table 5.32: Bulk Services Realities: Year 5 Requirement
[Metered Connections For All & VIPs To Backlog And Future Growth]

Community	Raw Water Abstraction [ADWD]	Water Treatment Works [ADWD]	Treated Water Supply [ADWD]	Storage Capacity [48 HOURS]	Sewage Treatment Works	
					Hydraulic Load [ADDWF]	Organic Load [COD]
	Ml/day	Ml/day	Ml/day	Ml	Ml/day	kg/day
Kroonstad	25.6	25.6	25.6	51.3	13.2	16335
Viljoenskroon	5.5	5.5	5.5	11.0	1.7	2838
Steynsrus	1.7	1.7	1.7	3.3	0.4	732
Parys	9.2	9.2	9.2	18.3	5.6	72671
Vredefort	1.5	1.5	1.5	3.1	1.0	15881
Koppies	2.2	2.2	2.2	4.4	1.5	17969
Edenville	0.5	0.5	0.5	0.9	0.3	3810
Heilbron	4.3	4.3	4.3	8.6	2.8	35031
Sasolburg	41.2	41.2	41.2	82.3	12.9	11982
Deneysville	2.5	2.5	2.5	5.0	1.4	1474
Oranjeville	2.0	2.0	2.0	4.1	1.7	1139
Frankfort	4.1	4.1	4.1	8.3	2.3	2416
Villiers	1.5	1.5	1.5	3.0	1.8	950
Cornelia	0.4	0.4	0.4	0.8	0.1	87
Tweeling	0.7	0.7	0.7	1.5	0.9	439

Based on the figures indicated in Table 5.32 it is now possible to calculate the peak requirements for each bulk component and this is indicated in Table 5.33 below.

Table 5.33: Bulk Services Realities : Year 5 Peak Condition Requirement
[Metered Connections For All & VIPs To Backlog And Future Growth]

Community	Raw Water Abstraction [SSDWD]	Water Treatment Works [SSDWD]	Treated Water Supply [SSDWD]	Storage Capacity [48 HOURS]	Sewage Treatment Works	
					Hydraulic Load [PDWWF]	Organic Load [COD]
	M/day	M/day	M/day	M	M/day	kg/day
Kroonstad	38.5	38.5	38.5	51.3	37.5	16334.6
Viljoenskroon	8.3	8.3	8.3	11.0	5.1	2838.4
Steynsrus	2.5	2.5	2.5	3.3	1.5	732.0
Parys	13.8	13.8	13.8	18.3	16.9	72671.3
Vredefort	2.3	2.3	2.3	3.1	3.0	15881.4
Koppies	3.3	3.3	3.3	4.4	7.0	17969.3
Edenville	0.7	0.7	0.7	0.9	1.0	3809.5
Heilbron	6.4	6.4	6.4	8.6	8.3	35030.5
Sasolburg	61.8	61.8	61.8	82.3	38.6	11982.2
Deneysville	3.7	3.7	3.7	5.0	5.9	1473.6
Oranjeville	3.0	3.0	3.0	4.1	7.1	1139.4
Frankfort	6.2	6.2	6.2	8.3	9.8	2415.8
Villiers	2.2	2.2	2.2	3.0	7.5	949.9
Cornelia	0.6	0.6	0.6	0.8	0.5	86.7
Tweeling	1.1	1.1	1.1	1.5	3.7	439.0

Based on the current capacities and the peak condition requirements indicated in Table 5.33 the available bulk capacity for each component is indicated in the table below. The impact of this option is evident and the negative figures shown are an indication that the capacity is exceeded by that specific volume and needs to be increased. The specific year of increase and the associated budget is indicated in the "*Option B Project List"* in the WSDP.

Table 5.34: Bulk Services Realities : Year 5 Requirement - Peak Condition Available Capacity[Metered Connections For All & VIPs To Backlog And Future Growth]

Community	Raw Water Abstraction [SSDWD]	Water Treatment Works [SSDWD]	Treated Water Supply [SSDWD]	Storage Capacity [48 HOURS]	Sewage Treatment Works	
					Hydraulic Load [PDWWF]	Organic Load [COD]
	Ml/day	Ml/day	Ml/day	Ml	Ml/day	kg/day
Kroonstad	21.5	21.5	21.5	20.0	16.8	-3711.6
Viljoenskroon	0.4	0.4	0.4	-1.3	4.5	318.6
Steynsrus	0.5	0.5	0.5	-1.4	0.4	-281.0
Parys	1.2	1.2	1.2	8.8	4.7	-65831.3
Vredefort	0.9	0.9	0.9	-1.1	-0.6	-15121.4
Koppies	0.4	0.4	0.3	1.3	-2.5	-16675.3
Edenville	-0.2	-0.2	-0.2	0.2	0.5	-3334.5
Heilbron	-0.9	-0.9	-0.9	0.5	4.0	-31135.5
Sasolburg	RAND WATER	RAND WATER	RAND WATER	65.3	SCI	SCI
Deneysville	1.5	1.5	1.5	2.5	2.9	1613.6
Oranjeville	-2.2	-2.2	-2.2	-2.5	-5.2	-466.1
Frankfort	1.3	1.3	1.3	3.2	1.9	244.2
Villiers	2.3	2.3	2.3	1.5	0.1	1150.1
Cornelia	0.2	0.2	0.2	0.4	0.5	150.8
Tweeling	-0.8	-0.8	-0.8	-0.3	0.5	511.0

5.5.3 OPTION C

The following key issues are applicable in the selection of this option:

- Upgrading of communal supply to metered connections
- Metered connections to urban backlog
- Water supply to rural households (Farmland)
- “Dry on Site” sanitation systems to Edenville urban backlog only
- Waterborne to urban backlog (All other than Edenville)
- “Dry on Site” sanitation systems to rural households (Farmland)

Based on this scenario and the figures indicated in Section 7.1 (Residential Erven Occupied), Section 7.2 (Community Population), Section 7.3 (Community Household Size) and Section 7.6 (Bulk Supply, Treatment and Water Demand) in the WSDP, the "average" bulk requirements in Year 5 (2007) are indicated in Table 5.35 below.

Table 5.35: Bulk Services Realities : Year 5 Requirement
[Metered Connections & Waterborne For All Except Edenville]

Community	Raw Water Abstraction [ADWD]	Water Treatment Works [ADWD]	Treated Water Supply [ADWD]	Storage Capacity [48 HOURS]	Sewage Treatment Works	
					Hydraulic Load [ADDWF]	Organic Load [COD]
	Ml/day	Ml/day	Ml/day	Ml	Ml/day	kg/day
Kroonstad	28.2	28.2	28.2	56.5	15.5	17452
Viljoenskroon	9.0	9.0	9.0	18.0	4.2	5809
Steynsrus	1.7	1.7	1.7	3.3	0.4	732
Parys	11.2	11.2	11.2	22.5	7.9	79597
Vredefort	2.4	2.4	2.4	4.9	2.6	18349
Koppies	2.9	2.9	2.9	5.7	2.4	22066
Edenville	0.5	0.5	0.5	0.9	0.3	3810
Heilbron	5.4	5.4	5.4	10.9	4.1	40993
Sasolburg	45.5	45.5	45.5	91.1	15.9	15313
Deneysville	3.5	3.5	3.5	7.0	2.5	2235
Oranjeville	2.2	2.2	2.2	4.5	1.9	1304
Frankfort	5.3	5.3	5.3	10.6	3.4	3368
Villiers	1.6	1.6	1.6	3.2	2.1	1012
Cornelia	0.9	0.9	0.9	1.9	0.7	613
Tweeling	0.9	0.9	0.9	1.8	1.2	564

Based on the figures indicated in the previous table it is now possible to calculate the peak requirements for each bulk component and this is indicated in Table 5.36 below:

Table 5.36: Bulk Services Realities : Year 5 Peak Condition Requirement
[Metered Connections & Waterborne For All Except Edenville]

Community	Raw Water Abstraction [SSDWD]	Water Treatment Works [SSDWD]	Treated Water Supply [SSDWD]	Storage Capacity [48 HOURS]	Sewage Treatment Works	
					Hydraulic Load [PDWWF]	Organic Load [COD]
	Ml/day	Ml/day	Ml/day	Ml	Ml/day	kg/day
Kroonstad	42.4	42.4	42.4	56.5	44.1	17451.9
Viljoenskroon	13.5	13.5	13.5	18.0	12.5	5809.3
Steynsrus	2.5	2.5	2.5	3.3	1.5	732.0
Parys	16.9	16.9	16.9	22.5	23.7	79597.2
Vredefort	3.7	3.7	3.7	4.9	7.8	18349.0
Koppies	4.3	4.3	4.3	5.7	11.1	22065.7
Edenville	0.7	0.7	0.7	0.9	1.0	3809.5
Heilbron	8.2	8.2	8.2	10.9	12.3	40992.7
Sasolburg	68.3	68.3	68.3	91.1	47.8	15313.3
Deneysville	5.3	5.3	5.3	7.0	10.5	2235.2
Oranjeville	3.4	3.4	3.4	4.5	8.0	1304.1
Frankfort	8.0	8.0	8.0	10.6	14.3	3367.9
Villiers	2.4	2.4	2.4	3.2	8.7	1012.3
Cornelia	1.4	1.4	1.4	1.9	2.8	613.0
Tweeling	1.4	1.4	1.4	1.8	5.2	564.4

Based on the current capacities shown in Section 3.14, Table 3.18 in the WSDP and the peak condition requirements indicated in Table 5.36 above the available bulk capacity for each component is indicated in Table 5.37 below. Contrary to Options A and B the impact of this option is markedly greater and in almost all instances the respective capacities are exceeded. The specific year of increase and the associated budget is indicated in the "*Option C Project List"* in the WSDP.

Table 5.37: Bulk Services Realities : Year 5 Requirement - Peak Condition Available Capacity[Metered Connections & Waterborne For All Except Edenville]

Community	Raw Water Abstraction [SSDWD]	Water Treatment Works [SSDWD]	Treated Water Supply [SSDWD]	Storage Capacity [48 HOURS]	Sewage Treatment Works	
					Hydraulic Load [PDWWF]	Organic Load [COD]
	M/day	M/day	M/day	M	M/day	kg/day
Kroonstad	17.6	17.6	17.6	14.8	18.6	-4828.9
Viljoenskroon	-4.9	-4.9	-4.9	-8.3	-2.0	-2652.3
Steynsrus	0.5	0.5	0.5	-1.4	0.6	-281.0
Parys	-1.9	-1.9	-1.9	4.7	-2.1	-72757.2
Vredefort	-0.4	-0.4	-0.4	-4.9	-5.4	-17589.0
Koppies	-0.6	-0.6	-0.7	0.0	-6.6	-20771.7
Edenville	-0.2	-0.2	-0.2	0.2	0.5	-3334.5
Heilbron	-5.0	-2.6	-2.6	-1.8	-0.0	-37097.7
Sasolburg	RAND WATER	RAND WATER	RAND WATER	56.5	SCI	SCI
Deneysville	-0.1	-0.1	-0.1	0.4	-1.6	852.0
Oranjeville	-2.5	-2.5	-2.5	-2.8	-6.1	-630.8
Frankfort	-0.5	-0.5	-0.5	0.9	-2.6	-707.9
Villiers	2.1	2.1	2.1	1.3	-1.1	1087.7
Cornelia	-0.6	-0.6	-0.6	-0.7	-1.7	-375.5
Tweeling	-1.1	-0.5	-1.1	-0.2	-1.0	385.6

Conclusion

In the context of this WSDP, ***OPTION A*** can be classified as the worst-case scenario since no water services (except for bulk services) are addressed. The project priority classification can vary from **A** to **C** with **A** the *critically important* projects, **B** *important but not critical* and **C** the *less important* projects. Emphasis though, is placed on water conservation and demand management for this area and therefore additional provision is made for the installation of bulk water meters. The upgrading of the night soil removal systems to dry on-site is the main focal point which necessitates the **A** priority project classification. Eradication of the buckets will be attempted on a continuous basis for the full five year planning cycle in order to reach DWAF's latest target for bucket eradication by the year 2007. Since the target date is set at March 2010, the five year cycle can be extended for an additional three years to meet the national target for the provision of basic sanitation services. VIP toilets are in accordance with the minimum standard for sanitation prescribed by DWAF, but more importantly the sewage treatment works with sufficient available capacity will not require any further upgrading since no additional effluent is disposed thereto. Although a zero population growth rate is prescribed by DWAF, growth rates as indicated in Sections 7.1 and 7.2 in the WSDP were applied throughout ***OPTION A***. ***OPTION A*** would have been the ideal scenario only if all water services backlogs were eradicated, all bulk services were sufficient and if all local municipalities accepted VIP toilets as a suitable alternative to waterborne systems including for provision to unserviced and future erven.

OPTION B is a more diversified approach than ***OPTION A*** and aims to address all national targets. The analysis clearly indicates that the national targets for Free Basic Water and individual site metering will again not be met, but future planning regarding these services is incorporated in this instance. The project classification (ie. **A** to **C**) criteria for ***OPTION B*** are identical to that of ***OPTION A***. The implementation of bulk measuring/metering systems also remains the same as for ***OPTION A***. The provision of metered connections to unserviced erven (and new extensions), as well as the upgrading of communal water supply to individual metered connections, significantly impacts on the 48-hour water storage capacity of the respective communities. The analysis clearly indicates that the respective WTWs have sufficient capacity to address the additional water demand but additional reservoir storage capacity is a necessity in certain towns. The provision of metered connections to individual sites can be either a **B** priority or a **C** priority depending on the size of the backlog to be eradicated. The same principle applies to the installation of water meters bearing in mind that the national target for individual metering will not be met since the target dates for these projects are set at the earliest for Year 2.

As with ***OPTION A***, the option of VIPs is again proposed, but more importantly the sewage treatment works of the respective towns, if sufficient capacity is available, will not require any further upgrading. The replacement of the night soil removal systems is the main focal point which necessitates the **A** priority project classification. Replacement will be done on a continuous basis for the full five year planning cycle in order to reach DWAF's latest target for bucket eradication by the year 2007. Since the target date is set at March 2010, the five year cycle can be extended for an additional three years to meet the national target for the provision of basic sanitation services. Although a zero population growth rate is prescribed by DWAF, growth rates as indicated in Sections 7.1 and 7.2 of the WSDP were applied throughout ***OPTION B***. In general, ***OPTION B*** can be considered as a well-balanced scenario focusing on water and sanitation related services but also taking the national targets into account.

OPTION C is the most ideal situation if the objective is to provide each consumer unit with the highest level of water and sanitation service. ***OPTION C*** followed a similar approach to that of ***OPTION B*** with the exception of the type of sanitation system (ie. full waterborne). The provision of a full waterborne sanitation system as an alternative will have major financial implications since it is the most expensive option. Furthermore it will result in a higher water demand. The water treatment works and reservoir storage capacities of various towns will also have to be upgraded and increased in order to meet the future water demand. ***OPTION C*** will require much higher capital funding than will either of ***OPTION S A and B***.

The existing capacities of certain sewerage treatment works (STW) and oxidation pond systems will, to a great extent, be affected by the full waterborne sanitation system option. The respective sewerage treatment works and oxidation pond systems will have to be upgraded to ensure that sufficient capacity is available for the additional disposed effluent. It is significant to note that the operational and maintenance costs will also increase and concern is expressed as to whether the consumers can afford this type of sanitation service. The eradication of the bucket systems dictates the **A** priority project classification. However, most of the sewage treatment works' capacities are exceeded and will require substantial upgrading since much higher volumes of effluent will be disposed thereto. Growth rates as indicated in Sections 7.1 and 7.2 of the WSDP were applied throughout ***OPTION C***. Prioritization of projects was based on the same principles for ***OPTION B***. The three national targets are addressed but target dates will not be met. Concern is raised as to whether ***OPTION C*** is a realistic approach.

5.6 THABO MOFUTSANYANE DISTRICT MUNICIPALITY[7]

5.6.1 SCENARIO 1

For the purposes of scenario one, it is proposed that the present water services remain the same since all consumers are serviced by some sort of water service, be it communal standpipes or water provision to individual sites. Future extensions to the residential areas will also not be considered since most of these sites are currently vacant. Attention will mainly be focused on the eradication of the sanitation backlog for the whole Thabo Mofutsanyane District by upgrading the bucket system to VIP toilets and by providing a similar solution to all unserviced sites. The proposal of VIP toilets is in accordance with the minimum standards as prescribed by the Department of Water Affairs and Forestry but more importantly the sewerage treatment works of the respective towns will not require any further upgrading since no additional effluent is disposed to these works. However, it is important to note that the national targets for free basic water implementation and individual site metering will in this case not be met. Urgent requirements in respect of certain bulk services will also be addressed. A summary of the water and sanitation related projects for Scenario 1 can be seen in Tables 5.38 and 5.39 below.

Table 5.38: Scenario 1- Water Services Provision

PRIORITY : SANITATION SERVICES PROVISION						
Priority	Description of Activity	Location	Proposed Project	Estimated Cost (R)	Target date	Compliance with National Targets
	Upgrade Night Soil Removal System to an "On Site Dry" sanitation system:					
A	- Dihlabeng Local Municipality	Fouriesburg	Provision of VIP toilets to 2 274 sites	5 685 000	Year 1-5	Yes
A	- Dihlabeng Local Municipality	Paul Roux	Provision of VIP toilets to 1 237 sites	3 092 500	Year 1-5	Yes
A	- Dihlabeng Local Municipality	Rosendal	Provision of VIP toilets to 459 sites	1 147 500	Year 1-5	Yes
A	- Maluti A Phofung Local Municipality	Harrismith	Provision of VIP toilets to 541 sites	1 352 500	Year 1-5	Yes
A	- Maluti A Phofung Local Municipality	Kestell	Provision of VIP toilets to 1 010 sites	2 525 000	Year 1-5	Yes
A	- Nketoana Local Municipality	Reitz	Provision of VIP toilets to 3 775 sites	9 437 500	Year 1-5	Yes
A	- Nketoana Local Municipality	Petrus Steyn	Provision of VIP toilets to 3 000 sites	7 500 000	Year 1-5	Yes
A	- Nketoana Local Municipality	Lindley	Provision of VIP toilets to 2 610 sites	6 525 000	Year 1-5	Yes
A	- Nketoana Local Municipality	Arlington	Provision of VIP toilets to 720 sites	1 800 000	Year 1-5	Yes
A	- Phumelela Local Municipality	Vrede	Provision of VIP toilets to 1 261 sites	3 152 500	Year 1-5	Yes

[7] Compiled from WSDP of Thabo Mofutsanyane District Municipality.

Table 5.39: Scenario 1 - Sanitation Services Provision

PRIORITY : SANITATION SERVICES PROVISION						
Priority	Description of Activity	Location	Proposed Project	Estimated Cost (R)	Target date	Compliance with National Targets
	Upgrade Night Soil Removal System to an "On Site Dry" sanitation system:					
A	- Dihlabeng Local Municipality	Fouriesburg	Provision of VIP toilets to 2 274 sites	5 685 000	Year 1-5	Yes
A	- Dihlabeng Local Municipality	Paul Roux	Provision of VIP toilets to 1 237 sites	3 092 500	Year 1-5	Yes
A	- Dihlabeng Local Municipality	Rosendal	Provision of VIP toilets to 459 sites	1 147 500	Year 1-5	Yes
A	- Maluti A Phofung Local Municipality	Harrismith	Provision of VIP toilets to 541 sites	1 352 500	Year 1-5	Yes
A	- Maluti A Phofung Local Municipality	Kestell	Provision of VIP toilets to 1 010 sites	2 525 000	Year 1-5	Yes
A	- Nketoana Local Municipality	Reitz	Provision of VIP toilets to 3 775 sites	9 437 500	Year 1-5	Yes
A	- Nketoana Local Municipality	Petrus Steyn	Provision of VIP toilets to 3 000 sites	7 500 000	Year 1-5	Yes
A	- Nketoana Local Municipality	Lindley	Provision of VIP toilets to 2 610 sites	6 525 000	Year 1-5	Yes
A	- Nketoana Local Municipality	Arlington	Provision of VIP toilets to 720 sites	1 800 000	Year 1-5	Yes
A	- Phumelela Local Municipality	Vrede	Provision of VIP toilets to 1 261 sites	3 152 500	Year 1-5	Yes
A	- Phumelela Local Municipality	Memel	Provision of VIP toilets to 1 556 sites	3 890 000	Year 1-5	Yes
A	- Phumelela Local Municipality	Warden	Provision of VIP toilets to 1 506 sites	3 765 000	Year 1-5	Yes
A	- Setsoto Local Municipality	Ficksburg	Provision of VIP toilets to 6 107 sites	15 267 500	Year 1-5	Yes
A	- Setsoto Local Municipality	Clocolan	Provision of VIP toilets to 3 509 sites	8 772 500	Year 1-5	Yes
A	- Setsoto Local Municipality	Marquard	Provision of VIP toilets to 2 922 sites	7 305 000	Year 1-5	Yes
A	- Setsoto Local Municipality	Senekal	Provision of VIP toilets to 3 258 sites	8 145 000	Year 1-5	Yes

	SUB TOTAL	**89 362 500**		

Table to continue on next page

	Provision of "On Site Dry" sanitation system to unserviced sites:					
B	- Dihlabeng Local Municipality	Fouriesburg	Provision of VIP toilets to 621 sites	1 552 500	Year 1-5	Yes
A	- Maluti A Phofung Local Municipality	Harrismith	Provision of VIP toilets to 700 sites	1 750 000	Year 1-5	Yes
B	- Maluti A Phofung Local Municipality	Qwa Qwa	Provision of VIP toilets to 62 030 sites	155 075 000	Year 1-5	Yes
B	- Nketoana Local Municipality	Petrus Steyn	Provision of VIP toilets to 456 sites	1 140 000	Year 1-5	Yes
B	- Phumelela Local Municipality	Vrede	Provision of VIP toilets to 2 200 sites	5 500 000	Year 1-5	Yes
B	- Setsoto Local Municipality	Ficksburg	Provision of VIP toilets to 540 sites	1 350 000	Year 1-5	Yes
B	- Setsoto Local Municipality	Marquard	Provision of VIP toilets to 300 sites	750 000	Year 1-5	Yes
B	- Setsoto Local Municipality	Senekal	Provision of VIP toilets to 760 sites	1 900 000	Year 1-5	Yes
	TOTAL			**258 380 000**		

Evaluating Scenario 1

In the context of this WSDP, Scenario 1 can be classified as the worst case scenario since no water services (except for a few urgent bulk services) are addressed. The project priority classification can vary from **A** to **C** with **A** the *critically important* projects, **B** *important but not critical* and **C** the *less important* projects. The construction of reservoirs for Paul Roux and Ficksburg are classified as **B** priority projects since the storage capacity (in hours) for the respective towns is in the order of 24 hours whereas the storage capacities for Memel and Fouriesburg are far below 24 hours bearing in mind that 48 hours of storage capacity is set as the minimum standard. In the case of Qwa Qwa, it is significant to note that the storage capacity is sufficient (56 hours) but major water losses and water inefficiencies cause the storage capacity to drop to an average of 24 hours. Additional storage capacity for the Qwa Qwa region is not necessary at this point in time but emphasis is placed on water conservation and demand management for this area and therefore additional provision is made for the installation of bulk water meters. The upgrading of the night soil removal system (or bucket system) to an on-site dry sanitation system is the main focal point which accounts for the **A** priority project classification. Eradication of the bucket system will be done on an ongoing basis for the whole five year planning cycle in order to reach DWAF's new target for bucket eradication by the year 2007. The presently occupied unserviced sites, with regards to sanitation services, will also remain a **B** priority (except for the Qwa Qwa region) since the target date can be extended for an additional two years in order to meet the national target for the provision of basic sanitation services of March 2010. A zero population growth rate was applied throughout Scenario 1. Scenario 1 would have been the ideal scenario only if all water services backlogs were eradicated, all bulk services were sufficient (in terms of capacity) and if all local municipalities were to accept VIP toilets as the suitable sanitation system for the replacement of the bucket system and for unserviced sites.

5.6.2 SCENARIO 2

Scenario 2 is similar to Scenario1 except for the upgrading of existing levels of service regarding water services of the residential consumer units. For the purposes of Scenario 2, the following is proposed:

- Provision of metered potable water to all unserviced sites and new extensions that urgently require water services.

- Upgrading of communal water supply to individual metered yard connections including a yard tap.

- Provision of water meters to all unmetered sites.
- Upgrading of night soil removal system (bucket system) to an “on site dry” sanitation system.
- Provision of on-site dry sanitation systems to all unserviced sites.

Projects relating to water and sanitation services for Scenario 2 are comprehensively summarised in Tables 6.22 and 6.23 of the WSDP.

Scenario 2 followed a more diversified approach than Scenario 1 in order that all four national targets (ie. free basic water implementation, individual site metering, bucket eradication and basic household sanitation) are addressed. The tables in the WSDP clearly indicate that the national targets for free basic water and individual site metering will again not be met but future planning regarding these services are incorporated in this instance. The project classification (ie. **A** to **C**) criteria for Scenario 2 are identical to that of Scenario 1. The implementation of bulk measuring/metering systems also remains the same as for Scenario 1. The provision of metered potable water to unserviced sites (and new extensions) and the upgrading of communal water supply to metered individual yard connections impact significantly on the 48 hour water storage capacity of the respective towns as a result of the additional water consumed. The additional amount of water that will be consumed in Year 5 is based on an average consumption of 330 litres per household per day for a household size of six persons (ie. 55 litres per person per day). Table 5.40 below clearly indicates that the respective WTWs have sufficient capacity to comply with the additional water demand but additional reservoir storage capacity is a necessity in certain towns (see project list of Table 6.22 in WSDP).The provision of metered yard connections to individual sites can be either a **B** priority or a **C** priority depending on the size of the backlog that needs to be eradicated. The same principle applies for the installation of water meters bearing in mind that the national target for individual metering will not be met since the target dates (as listed) for these projects are set at the earliest for Year 2.

Table 5.40 : Additional Requirements to Bulk Services in Year 5 for Scenario 2

Local Municipality	Existing Consumption (*Mℓ*/d)	Additional Consumption in Year 5 (*Mℓ*/d)	Total Consumption in Year 5 (*Mℓ*/d)	Existing Capacity of WTW (*Mℓ*/d)	Additional Capacity required for WTW in Year 5 (*Mℓ*/d)	Existing Reservoir Capacity (*Mℓ*)	Existing Storage Capacity (hours)	Additional Reservoir Storage Capacity required in Year 5 (*Mℓ*)
Dihlabeng								
Fouriesburg	0.964	0.180	1.440	1.44	Not Required	0.682	17	2
2.1 Maluti								
Harrismith	8.904	0.320	9.224	10	Not Required	23	62	Not Required
Qwa Qwa	41.500	12.730	54.230	106	Not Required	96.8	56	15
2.2 Nketoana								
Reitz	2.055	0.070	2.125	6.9	Not Required	8.4	98	Not Required
Petrus Steyn	Unknown	0.150	Unknown	1.73	Unknown	1.458	Unknown	Unknown
2.3 Phumelela								
Vrede	1.589	0.650	2.239	8.64	Not Required	9.5	143	Not Required
Memel	0.765	0.120	0.885	1.56	Not Required	0.2	6	2
Warden	1.280	0.150	1.430	7.2	Not Required	3.5	65	Not Required
2.4 Setsoto								
Ficksburg	8.337	1.700	10.037	15.6	Not Required	7.7	22	12.5
Clocolan	Unknown	0.010	Unknown	Upgrading in	Not Required	6	Unknown	Unknown

					Progress				
2.5	*Marquard*	7.285	0.060	7.345	Upgrading in Progress	Not Required	2.5	Upgrading in Progress	Not Required
2.6	*Senekal*	3.971	0.890	4.861	8.5	Not Required	10	60	Not Required

As with Scenario 1, the option of VIP toilets is again proposed since it complies with the minimum standards as prescribed by the Department Water Affairs and Forestry but more importantly the sewerage treatment works of the respective towns will not require any further upgrading since no additional effluent will be disposed to these works. The replacement of the night soil removal system remains a focal point in this scenario which explains the **A** priority project classification. Eradication of the bucket system will be done on a continuous basis covering the whole five year planning cycle in order to reach DWAF's new target for bucket eradication by the year 2007. With regards to sanitation services, the presently occupied unserviced sites, will also remain a **B** priority (except for the Qwa Qwa region) since the target date as reflected in Table 6.23 of the WSDP can be extended for an additional two years in order to meet the national target for the provision of basic sanitation services by March 2010. Cognisance should be taken that a zero population growth rate, as prescribed by DWAF, was applied throughout Scenario 2. In general, Scenario 2 can be considered as a well-balanced scenario focusing on water and sanitation related services but also taking the national targets into account.

5.6.3 SCENARIO 3

For the purposes of Scenario 3, emphasis will be placed on the eradication of the sanitation backlog by providing full waterborne sanitation systems to all unserviced sites and by upgrading the bucket system to full waterborne sanitation systems. Therefore it will also be necessary to upgrade the communal water supply to individual metered yard connections for each site and to provide metered potable water to all the unserviced sites. Scenario 3 can be summarised as follows:

- Provision of full waterborne sanitation systems to all unserviced sites.
- Upgrading of night soil removal systems (bucket system) to full waterborne sanitation systems.
- Provision of metered potable water to all unserviced sites and new extensions that urgently require water services.
- Upgrading of communal water supply to individual metered yard connections including a yard tap.
- Provision of water meters to all unmetered sites.

The relevant water and sanitation projects for Scenario 3 are listed in Tables 6.26 and 6.27 of the WSDP.

Evaluating Scenario 3

Scenario 3 is the most ideal situation if the objective is to provide each consumer unit with the highest level of water and sanitation service. Scenario 3 followed a similar approach to that of Scenario 2 except for the type of sanitation system (ie. full waterborne) that is provided. The provision of a full waterborne sanitation system as an alternative will have major financial implications since this option is the most expensive that can be provided. Full waterborne sanitation will have a higher water demand and water consumption since the average consumption per household of six persons is increased from 330 litres per household per day (55 litres per person per day) to 780 litres per household per day (130 litres per person per day). Furthermore, the water treatment works and reservoir storage capacity of various towns will have to be upgraded and increased in order to meet the future water demand (see Table 5.41 below). Scenario 3 will require approximately twice as much funding for water services as will Scenario 2.

Table 5.41: Additional Requirements to Bulk Services in Year 5 for Scenario 3

Local Municipality	Existing Consumption (Mℓ/d)	Additional Consumption in Year 5 (Mℓ/d)	Total Consumption in Year 5 (Mℓ/d)	Existing Capacity of WTW (Mℓ/d)	Additional Capacity required for WTW in Year 5 (Mℓ/d)	Existing Reservoir Capacity (Mℓ)	Existing Storage Capacity (hours)	Additional Reservoir Storage Capacity required in Year 5 (Mℓ)	Existing Capacity of STW (Mℓ/d)	Additional Capacity required for STW in Year 5 (Mℓ/d)
Dihlabeng										
Fouriesburg	0.964	2.261	3.225	1.44	1.785	0.682	17	6.0	0.178	1.112
Paul Roux	0.947	0.965	1.912	1.37	0.542	0.9	23	3.0	4.0	Not Required
Rosendal	0.472	0.358	0.83	Upgrading in Progress	Not Required	0.5	Upgrading in Progress	Not Required	0.5	Not Required
Maluti a Phofung										
Harrismith	8.904	1.023	9.927	10	Not Required	23	62	Not Required	9.0	Not Required
Kestell	0.51	0.788	1.289	0.51	Not Required [1]	1.025	48	2.0	0.805	Not Required
Qwa Qwa	41.5	48.379	89.879	106	Not Required	96.8	56	85	21	15
Nketoana										
Reitz	2.055	2.949	5.004	6.9	Not Required	8.4	98	2.0	5.184	Not Required
Petrus Steyn	Unknown	2.7	Unknown	1.73	Unknown	1.458	Unknown	Unknown	1.15	Unknown
Lindley	1.112	2.036	3.148	5.3	Not Required	6.0	129	0.5	2.2	Not Required
Arlington	Unknown	0.562	Unknown	0.432	Unknown	2.15	Unknown	Unknown	Unknown	Unknown
Phumelela										
Vrede	1.589	2.695	4.284	8.64	Not Required	9.5	143	Not Required	1.6	0.3
Memel	0.765	1.214	1.979	1.56	0.419	0.2	6	4.0	Unknown	Unknown
Warden	1.28	1.525	2.805	7.2	Not Required	3.5	65	2.0	1.452	Not Required

Table to continue on next page

Setsoto										
Ficksburg	8.337	5.17	13.507	15.6	Not Required	7.7	22	20	4.6	1.0
Clocolan	Unknown	2.74	Unknown	Upgrading in Progress	Not Required	6.0	Unknown	Unknown	Unknown	Unknown
Marquard	7.285	2.513	9.798	Upgrading in Progress	Not Required	2.5	Upgrading in Progress	Not Required	0.17	4.0
Senekal	3.971	3.134	7.105	8.5	Not Required	10	60	5.0	3.0	Not Required

[1] The amount of bulk water supplied by Sedibeng Water needs to be increased since Kestell does not have a WTW.

The existing capacities of certain sewerage treatment works (STW) and oxidation pond systems will be greatly affected by full waterborne sanitation systems. The respective sewerage treatment works and oxidation pond systems will have to be upgraded to ensure that sufficient capacity is available for the additional disposed effluent (see Table 5.41). The total cost for the sanitation related services (as listed in Table 6.27 of WSDP) of Scenario 3 will exceed the sanitation costs of Scenario 2 by approximately R250-million. It is significant to note that the operational and maintenance costs will also increase and concern is expressed as to whether the consumers can afford this type of sanitation service. The upgrading of the night soil removal system (bucket system) to a full waterborne sanitation system remains a focal point in this scenario hence the **A** priority project classification. Eradication of the bucket system will be done on a continuous basis covering the whole five year planning cycle in order to reach DWAF's new target for bucket eradication by the year 2007. With regards to sanitation services, the presently occupied unserviced sites, will remain a **B** priority (except for the Qwa Qwa region) since the target date as reflected in Table 6.27 of WSDP can be extended for an additional two years in order to meet the national target for the provision of basic sanitation services by March 2010. A zero population growth rate, as prescribed by DWAF, was applied throughout Scenario 3. The prioritisation of projects was based on the same principles as that for Scenario 2.The three national targets (ie. free basic water implementation, individual site metering and basic household sanitation) are addressed but doubt exists to whether the target dates could be met. From a financial perspective it is evident that funding of R135-million per year for the next five years is required to implement Scenario 3. At present, the average funding allocated to this region is R40-million and therefore it is doubtful whether Scenario 3 is a realistic approach.

CHAPTER 6 WATER DEMAND PER WATER BOARD

The boundaries of the three water boards servicing the Free State Province are indicated on Map 3.4. Each of these Water Boards provided information on water demand which is presented below.

6.1 BLOEM WATER

The main function of Bloem Water is to supply bulk water to municipalities in its service area. Other activities include assisting the Department of Water Affairs and Forestry with catchment management and doing bio monitoring and chemical quality control of water in co-operation with the Centre for Environmental Management and the Institute for Ground Water Studies at the University of the Free State.

Tables 6.1 to 6.5 are the expected average yearly water demands in the Bloem Water service area for five supply areas. The estimates are based on population and per capita consumption predictions shown in the tables. Also indicated in the tables is the Bloem Water supply system capacity.

The absence of scenarios for Xhariep District Municipality in Chapter 5 is somewhat compensated for by Bloem Water data as the yearly water demand and supply situation for a number of communities in Xhariep is presented. The water demand of local communities in Xhariep will increase from 2.24-million m^3 per annum in 2002/2003 to 4.17-million m^3 per annum in 2022/2023.

6.2 SEDIBENG WATER

Sedibeng Water is a Water Board as stipulated in the Water Services Act. It provides bulk water to the Goldfields region of the Free State, while bulk and household water and sewerage services are provided to Qwa Qwa and bulk water to Kestell. Within the Matjhabeng and Nala Local Municipalities (in the Lejweleputswa District Municipality) all sectors and groups are supplied with bulk water. This includes mining, municipal and a few farmers along the bulk supply line.

Water predictions received from Sedibeng Water for the Lejweleputswa District Municipality are presented in Table 6.6. Predictions are given for Matjhabeng and Nala Local Municipalities as well as for mines in the Lejweleputswa District Municipality. Actual water consumption figures dating from 1997/98 are given as well as demand projections until 2027/2028. Total consumption is expected to increase from 57.3-million m^3 per annum in 2002/2003 to 61.2-million m^3 per annum in 2027/2028.

6.3 RAND WATER

Rand Water supplies to some municipalities in the Free State Province. Rand Water provided actual demand figures, as well as projected demand until 2015 (Tables 6.7), for the greater Harrismith area. This consists of Harrismith plus the townships of Intabazwe and Tshiame. It is predicted that the demand will increase from 2.9-million litres in 2003 to 5.1-million litres in 2015[8].

[8] Information about water supply to other municipalities, like Sasolburg and Heilbron could not be obtained in time.

TABLE 6.1: EXPECTED AVERAGE WATER DEMANDS AND SUPPLY ACCORDING TO BLOEMWATER FOR SUPPLY AREA 1(INCLUDING MOHAKARE SCHEME), 2003

PROJECTED POPULATION	Units	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Mangaung/Bloemfontein	people			353 994	361 129	368 423	374 000	379 679	385 461	391 350	397 349	401 792	406 305	410 890	415 551	420 286	423 629	427 025	430 48
Edenburg	growth				2.32%	2.32%	1.81%	1.81%	1.81%	1.81%	1.80%	1.38%	1.38%	1.39%	1.38%	1.37%	1.02%	1.02%	1.02%
Edenburg	people			7 783	7 963	8 148	8 295	8 445	8 598	8 753	8 911	9 034	9 159	9 286	9 414	9 543	9 640	9 738	9 83
Reddersburg	growth				2.34%	2.34%	1.82%	1.82%	1.82%	1.82%	1.80%	1.41%	1.40%	1.40%	1.41%	1.40%	1.03%	1.04%	1.03%
Reddersburg	people			5 760	5 895	6 033	6 143	6 255	6 369	6 485	6 602	6 695	6 789	6 884	6 981	7 079	7 152	7 227	7 30
Wepener	people			17 375	17 776	18 187	18 515	18 848	19 188	19 534	19 886	20 160	20 438	20 718	21 003	21 291	21 506	21 723	21 94
Dewetsdorp	people			14 427	14 760	15 101	15 373	15 650	15 932	16 219	16 512	16 739	16 970	17 203	17 439	17 678	17 857	18 037	18 21
Rouxville	people			10 814	11 063	11 317	11 519	11 726	11 935	12 148	12 364	12 534	12 705	12 879	13 055	13 234	13 368	13 503	13 63
Smithfield	people			10 045	10 279	10 519	10 709	10 903	11 102	11 303	11 509	11 670	11 833	11 998	12 165	12 336	12 463	12 591	12 72
Zastron	people			14 219	14 532	14 852	15 103	15 359	15 619	15 884	16 153	16 358	16 565	16 776	16 988	17 203	17 359	17 517	17 67
Total Population for Area	people			434 417	443 397	452 580	459 657	466 865	474 204	481 676	489 286	494 982	500 764	506 634	512 596	518 650	522 974	527 361	531 81
PROJECTED WATER DEMAND	Units	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Water Demand (per person)																			
Mangaung/Bloemfontein: Low Income Group (72%)	l/p/d			210	210	210	189	189	189	189	189	189	189	189	189	189	189	189	18
Mangaung/Bloemfontein: High Income Group (28%)	l/p/d			650	650	650	585	585	585	585	585	585	585	585	585	585	585	585	58
Rural towns: Low Income Group (87%)	l/p/d			45	46	48	50	52	54	56	58	60	62	64	66	68	70	72	7
Rural towns: High Income Group (13%)	l/p/d			200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	20
Projected Annual Demand																			
Caledon-Bloemfontein Pipeline	Ml/yr						1 910	1 910	1 910	1 910	1 910	1 910	1 910	1 910	1 910	1 910	1 910	1 910	1 91
Edenburg	Ml/yr						210	220	229	239	249	258	267	277	287	297	306	315	32
Reddersburg	Ml/yr						156	163	170	177	184	191	198	205	213	220	227	234	24
Wepener	Ml/yr						470	490	511	533	555	575	596	618	640	662	682	703	72
Dewetsdorp	Ml/yr						390	407	424	442	461	478	495	513	531	549	566	584	60
Rouxville	Ml/yr						292	305	318	331	345	358	371	384	398	411	424	437	45
Smithfield	Ml/yr						272	284	296	308	321	333	345	358	370	383	395	407	42
Zastron	Ml/yr						383	399	416	433	451	467	483	500	517	535	551	567	58
Total Projected Annual Demand for Area	Ml/yr						45 020	45 736	46 465	47 209	47 968	48 549	49 138	49 739	50 351	50 970	51 430	51 898	52 37
Total Projected Peak Demand for Area	Ml/day	(Peak Factor = 1.6)					197	200	204	207	210	213	215	218	221	223	225	227	23
PROJECTED BLOEM WATER SUPPLY SYSTEM CAPACITY	Units	Max. Supply	Max. Portion				2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Potential Supply from Local Resources																			
Mangaung/Bloemfontein: Maselspoort WTW	Ml/yr	40 150	100%	of plant capacity			40 150	40 150	40 150	40 150	40 150	40 150	40 150	40 150	40 150	40 150	40 150	40 150	40 15
Edenburg: Boreholes	Ml/yr	226	30%	of supply to town			63	66	69	72	75	77	80	83	86	89	92	95	9
Reddersburg: Boreholes	Ml/yr	139	30%	of supply to town			47	49	51	53	55	57	59	62	64	66	68	70	7
Wepener: Boreholes	Ml/yr	256	30%	of supply to town			141	147	153	160	167	173	179	185	192	199	205	211	21
Dewetsdorp: Boreholes	Ml/yr	146	30%	of supply to town			117	122	127	133	138	143	146	146	146	146	146	146	14
Rouxville: Boreholes	Ml/yr	551	30%	of supply to town			88	92	95	99	104	107	111	115	119	123	127	131	13
Smithfield: Boreholes	Ml/yr	442	30%	of supply to town			82	85	89	92	96	100	104	107	111	115	119	122	12
Zastron: Boreholes	Ml/yr	1 332	30%	of supply to town			115	120	125	130	135	140	145	150	155	161	165	170	17
Less: System Losses (@ 6.5%)	Ml/yr						-2 652	-2 654	-2 656	-2 658	-2 660	-2 662	-2 663	-2 665	-2 666	-2 668	-2 670	-2 671	-2 67
Total Potential Supply from Local Resources	Ml/yr						38 151	40 534	40 550	40 568	40 585	40 600	40 614	40 626	40 638	40 650	40 661	40 672	40 68
Potential Supply from Bloem Water Resources																			
Welbedacht WTW	Ml/yr	51 465	100%	of plant capacity			51 465	51 465	51 465	51 465	51 465	51 465	51 465	51 465	51 465	51 465	51 465	51 465	51 46
Rustfontein WTW	Ml/yr	36 500	33%	of plant capacity			12 045	12 045	12 045	12 045	12 045	12 045	12 045	12 045	12 045	12 045	12 045	12 045	12 04
Less: System Losses (@ 6.5%)	Ml/yr						-4 128	-4 128	-4 128	-4 128	-4 128	-4 128	-4 128	-4 128	-4 128	-4 128	-4 128	-4 128	-4 12
Total Potential Supply from Bloem Water Resources	Ml/yr						59 382	59 382	59 382	59 382	59 382	59 382	59 382	59 382	59 382	59 382	59 382	59 382	59 38
Source: Ninham Shand Consulting Services March 2003																			

TABLE 6.2 : EXPECTED AVERAGE WATER DEMAND AND SUPPLY ACCORDING TO BLOEMWATER FOR SUPPLY AREA 2, 2003

PROJECTED POPULATION	Units	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Botshabelo/Thaba Nchu	people			271 885	271 885	271 885	271 885	271 885	271 885	271 885	271 885	271 885	271 885	271 885	271 885	271 885	271 885	271 885	271 885	271 885	271 885	271 885	271 885
Excelsior	people			5 500	5 628	5 759	5 863	5 970	6 079	6 190	6 302	6 390	6 479	6 570	6 662	6 755	6 825	6 895	6 966	7 038	7 110	7 173	7 237
Total Population for Area	people			277 385	277 513	277 644	277 748	277 855	277 964	278 075	278 187	278 275	278 364	278 455	278 547	278 640	278 710	278 780	278 851	278 923	278 995	279 058	279 122
PROJECTED WATER DEMAND	Units	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Water Demand (per person)																							
Botshabelo/Thaba Nchu: Low Income Group (91%)	l/p/d			75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
Botshabelo/Thaba Nchu: High Income Group (9%)	l/p/d			250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250
Rural towns: Low Income Group (87%)	l/p/d			55	57	59	61	63	65	67	69	71	73	75	77	79	81	83	85	87	89	91	93
Rural towns: High Income Group (13%)	l/p/d			275	275	275	275	275	275	275	275	275	275	275	275	275	275	275	275	275	275	275	275
Projected Annual Demand																							
Botshabelo/Thaba Nchu	Ml/yr			9 006	9 006	9 006	9 006	9 006	9 006	9 006	9 006	9 006	9 006	9 006	9 006	9 006	9 006	9 006	9 006	9 006	9 006	9 006	9 006
Lesaka Pipeline	Ml/yr						57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57
Excelsior	Ml/yr						190	197	205	212	220	227	235	242	250	258	265	272	279	286	294	301	308
Total Projected Annual Demand for Area	Ml/yr						9 253	9 260	9 268	9 275	9 283	9 290	9 298	9 305	9 313	9 321	9 328	9 335	9 342	9 349	9 357	9 364	9 371
Total Projected Peak Demand for Area	Ml/day	(Peak Factor = 1.6)					41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41
PROJECTED BLOEM WATER SUPPLY SYSTEM CAPACITY	Units	Max. Supply	Max. Portion				2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Potential Supply from Local Resources																							
Excelsior: Boreholes & Dam	Ml/yr	309	30%	of supply to town			57	59	62	64	66	68	71	73	75	77	80	82	84	86	88	90	92
Less: System Losses (@ 6.5%)	Ml/yr						-4	-4	-4	-4	-4	-4	-5	-5	-5	-5	-5	-5	-5	-6	-6	-6	-6
Total Potential Supply from Local Resources	Ml/yr						53	59	62	64	66	68	71	73	75	77	80	82	84	86	88	90	92
Potential Supply from Bloem Water Resources																							
Rustfontein WTW	Ml/yr	36 500	60%	of plant capacity			21 900	21 900	21 900	21 900	21 900	21 900	21 900	21 900	21 900	21 900	21 900	21 900	21 900	21 900	21 900	21 900	21 900
Groothoek WTW	Ml/yr	6 570	24.44%	of plant capacity			1 606	1 606	1 606	1 606	1 606	1 606	1 606	1 606	1 606	1 606	1 606	1 606	1 606	1 606	1 606	1 606	1 606
Less: System Losses (@ 6.5%)	Ml/yr						-1 528	-1 528	-1 528	-1 528	-1 528	-1 528	-1 528	-1 528	-1 528	-1 528	-1 528	-1 528	-1 528	-1 528	-1 528	-1 528	-1 528
Total Potential Supply from Bloem Water Resources	Ml/yr						21 978	21 978	21 978	21 978	21 978	21 978	21 978	21 978	21 978	21 978	21 978	21 978	21 978	21 978	21 978	21 978	21 978
Total Potential Supply from All Resources	Ml/yr						22 031	22 037	22 040	22 042	22 044	22 046	22 049	22 051	22 053	22 055	22 058	22 060	22 062	22 064	22 066	22 068	22 070
Theoretical Spare Supply Capacity	Ml/yr						12 778	12 777	12 772	12 767	12 761	12 756	12 751	12 746	12 740	12 734	12 730	12 725	12 720	12 715	12 709	12 704	12 699
Potential Peak Supply from All Resources	Ml/day						60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Theoretical Spare Peak Supply Capacity	Ml/day						19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19

TABLE 6.3 : EXPECTED AVERAGE WATER DEMANDS AND SUPPLY ACCORDING TO BLOEMWATER FOR SUPPLY AREA 3

PROJECTED POPULATION	Units	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	201
Bethulie	people			13 450	13 758	14 074	14 326	14 583	14 844	15 109	15 379	15 588	15 800	16 015	16 233	16 453	16 618	16 784	16 952	17 121	17 292	17 441	17 59
Springfontein	people			4 000	4 094	4 191	4 268	4 347	4 427	4 509	4 592	4 658	4 724	4 791	4 859	4 928	4 980	5 033	5 086	5 140	5 195	5 242	5 28
Trompsburg	people			5 500	5 629	5 761	5 866	5 973	6 082	6 193	6 307	6 395	6 485	6 576	6 668	6 761	6 832	6 904	6 976	7 049	7 123	7 187	7 25
Total Population for Area	people			22 950	23 481	24 026	24 460	24 903	25 353	25 811	26 278	26 641	27 009	27 382	27 760	28 142	28 430	28 721	29 014	29 310	29 610	29 870	30 13
PROJECTED WATER DEMAND	Units	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	201
Water Demand (per person)																							
Rural towns: Low Income Group (87%)	l/p/d			55	56	58	60	62	64	66	68	70	72	74	76	78	80	82	84	86	88	90	9
Rural towns: High Income Group (13%)	l/p/d			275	275	275	275	275	275	275	275	275	275	275	275	275	275	275	275	275	275	275	27
Projected Annual Demand																							
Bethulie	Ml/yr						460	477	495	514	533	550	567	585	604	622	639	656	673	691	709	726	74
Springfontein	Ml/yr						137	142	148	153	159	164	170	175	181	186	191	197	202	207	213	218	22
Trompsburg	Ml/yr						188	196	203	211	218	226	233	240	248	256	263	270	277	284	292	299	30
Total Projected Annual Demand for Area	Ml/yr						785	815	846	878	910	940	970	1 000	1 033	1 064	1 093	1 123	1 152	1 182	1 214	1 243	1 27
Total Projected Peak Demand for Area	Ml/day	(Peak Factor = 1.6)					3.44	3.57	3.71	3.85	3.99	4.12	4.25	4.38	4.53	4.66	4.79	4.92	5.05	5.18	5.32	5.45	5.5
PROJECTED BLOEM WATER SUPPLY SYSTEM CAPACITY	Units	Max. Supply		Max. Portion			2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	201
Potential Supply from Local Resources																							
Bethulie: Boreholes	Ml/yr	321	30%	of supply to town			138	143	149	154	160	165	170	176	181	187	192	197	202	207	213	218	22
Springfontein: Boreholes	Ml/yr	161	30%	of supply to town			41	43	44	46	48	49	51	53	54	56	57	59	61	62	64	65	6
Trompsburg: Boreholes	Ml/yr	135	30%	of supply to town			56	59	61	63	65	68	70	72	74	77	79	81	83	85	88	90	9
Less: System Losses (@ 6.5%)	Ml/yr						-15	-16	-17	-17	-18	-18	-19	-20	-20	-21	-21	-22	-22	-23	-24	-24	-2
Total Potential Supply from Local Resources	Ml/yr						220	245	254	263	273	282	291	301	309	320	328	337	346	354	365	373	38
Potential Supply from Bloem Water Resources																							
Bethulie WTW	Ml/yr	1 752	100%	of plant capacity			1 752	1 752	1 752	1 752	1 752	1 752	1 752	1 752	1 752	1 752	1 752	1 752	1 752	1 752	2 628	2 62	
Less: System Losses (@ 6.5%)	Ml/yr						-114	-114	-114	-114	-114	-114	-114	-114	-114	-114	-114	-114	-114	-114	-171	-17	
Total Potential Supply from Bloem Water Resources	Ml/yr						1 638	1 638	1 638	1 638	1 638	1 638	1 638	1 638	1 638	1 638	1 638	1 638	1 638	1 638	2 457	2 45	
Total Potential Supply from All Resources	Ml/yr						1 858	1 883	1 892	1 901	1 911	1 920	1 929	1 939	1 947	1 958	1 966	1 975	1 984	1 992	2 003	2 830	2 83
Theoretical Spare Supply Capacity	Ml/yr						1 073	1 068	1 046	1 023	1 001	980	959	939	914	894	873	852	832	810	789	1 587	1 56
Potential Peak Supply from All Resources	Ml/day						5.09	5.16	5.18	5.21	5.24	5.26	5.28	5.31	5.33	5.36	5.39	5.41	5.44	5.46	5.49	7.75	7.7
Theoretical Spare Peak Supply Capacity	Ml/day						1.65	1.59	1.47	1.36	1.25	1.14	1.03	0.93	0.8	0.7	0.6	0.49	0.39	0.28	0.17	2.3	2.

Source: Ninham Shand Consulting Services March 2003

TABLE 6.4 : EXPECTED AVERAGE WATER DEMANDS AND SUPPLY ACCORDING TO BLOEMWATER FOR SUPPLY AREA 4

PROJECTED POPULATION	Units	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Gariep	people			1 188	1 217	1 246	1 269	1 292	1 316	1 340	1 365	1 384	1 404	1 424	1 444	1 465	1 481	1 497	1 513
Total Population for Area	people			1 188	1 217	1 246	1 269	1 292	1 316	1 340	1 365	1 384	1 404	1 424	1 444	1 465	1 481	1 497	1 513
PROJECTED WATER DEMAND	Units	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Water Demand (per person)																			
Gariep: Low Income Group (40%)	l/p/d			250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250
Gariep: High Income Group (60%)	l/p/d			1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Projected Annual Demand																			
Gariep	Ml/yr			304	311	318	324	330	336	342	349	354	359	364	369	374	378	382	387
Fisheries	Ml/yr			49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49
DWAF Sites	Ml/yr			71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
Resort	Ml/yr			44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44
Total Projected Annual Demand for Area	Ml/yr			468	475	482	488	494	500	506	513	518	523	528	533	538	542	546	551
Total Projected Peak Demand for Area	Ml/day	(Peak Factor = 1.6		2.05	2.08	2.11	2.14	2.17	2.19	2.22	2.25	2.27	2.29	2.32	2.34	2.36	2.38	2.39	2.42
PROJECTED BLOEM WATER SUPPLY SYSTEM CAPACITY	Units	Max. Supply	Max. Portion				2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Potential Supply from Bloem Water Resources																			
Gariep WTW	Ml/yr	1 022	100%	of plant capacity			1 022	1 022	1 022	1 022	1 022	1 022	1 022	1 022	1 022	1 022	1 022	1 022	1 022
Less: System Losses (@ 6.5%)	Ml/yr						-66	-66	-66	-66	-66	-66	-66	-66	-66	-66	-66	-66	-66
Total Potential Supply from Bloem Water Resources	Ml/yr						956	956	956	956	956	956	956	956	956	956	956	956	956
Total Potential Supply from All Resources	Ml/yr						956	956	956	956	956	956	956	956	956	956	956	956	956
Theoretical Spare Supply Capacity	Ml/yr						468	462	456	450	443	438	433	428	423	418	414	410	405
Potential Peak Supply from All Resources	Ml/day						2.62	2.62	2.62	2.62	2.62	2.62	2.62	2.62	2.62	2.62	2.62	2.62	2.62
Theoretical Spare Peak Supply Capacity	Ml/day						0.48	0.45	0.43	0.4	0.37	0.35	0.33	0.3	0.28	0.26	0.24	0.23	0.2

Source: Ninham Shand Consulting Services March 2003

TABLE 6.5: EXPECTED AVERAGE WATER DEMANDS AND SUPPLY ACCORDING TO BLOEMWATER FOR SUPPLY AREA 5

PROJECTED POPULATION	Units	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Philippolis	people			4 787	4 902	5 019	5 114	5 208	5 304	5 402	5 504	5 581	5 662	5 745	5 827	5 911	5 976	6 041
Total Population for Area	people			4 787	4 902	5 019	5 114	5 208	5 304	5 402	5 504	5 581	5 662	5 745	5 827	5 911	5 976	6 041
PROJECTED WATER DEMAND	Units	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Water Demand (per person)																		
Philippolis: Low Income Group (87%)	l/p/d			55	57	59	61	63	65	67	69	71	73	75	77	79	81	83
Philippolis: High Income Group (13%)	l/p/d			275	275	275	275	275	275	275	275	275	275	275	275	275	275	275
Projected Annual Demand																		
Philippolis	Ml/yr			146	153	160	166	172	179	185	192	199	205	212	219	225	232	238
Total Projected Annual Demand for Area	Ml/yr			146	153	160	166	172	179	185	192	199	205	212	219	225	232	238
Total Projected Peak Demand for Area	Ml/day	(Peak Factor = 1.6)		0.64	0.67	0.7	0.73	0.75	0.78	0.81	0.84	0.87	0.9	0.93	0.96	0.99	1.02	1.04
PROJECTED BLOEM WATER SUPPLY SYSTEM CAPACITY	Units	Max. Supply	Max. Portion				2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Potential Supply from Local Resources																		
Philippolis: Boreholes	Ml/yr	126	30%	of supply to town			50	52	54	56	58	60	62	64	66	68	70	71
Less: System Losses (@ 6.5%)	Ml/yr						-3	-3	-4	-4	-4	-4	-4	-4	-4	-4	-5	-5
Total Potential Supply from Local Resources	Ml/yr						47	49	50	52	54	56	58	60	62	64	65	66
Potential Supply from Bloem Water Resources																		
Philippolis WTW	Ml/yr	453	100%	of plant capacity			453	453	453	453	453	453	453	453	453	453	453	453
Less: System Losses (@ 6.5%)	Ml/yr						-29	-29	-29	-29	-29	-29	-29	-29	-29	-29	-29	-29
Total Potential Supply from Bloem Water Resources	Ml/yr						424	424	424	424	424	424	424	424	424	424	424	424
Total Potential Supply from All Resources	Ml/yr						471	473	474	476	478	480	482	484	486	488	489	490
Theoretical Spare Supply Capacity	Ml/yr						305	301	295	291	286	281	277	272	267	263	257	252
Potential Peak Supply from All Resources	Ml/day						1.29	1.3	1.3	1.31	1.31	1.32	1.32	1.33	1.33	1.34	1.34	1.34
Theoretical Spare Peak Supply Capacity	Ml/day						0.56	0.55	0.52	0.5	0.47	0.45	0.42	0.4	0.37	0.35	0.32	0.3

Source: Ninham Shand Consulting Services March 2003

TABLE 6.6 : YEARLY WATER CONSUMPTION IN CUBIC METERS ('000) PLUS FUTURE PREDICTIONS

Sub area	1997/ 1999	1998/ 2000	1999/ 2001	2000/ 2002	2001/ 2003	2002/ 2004	2003/ 2005	2004/ 2006	2005/ 2007	2006/ 2008	2007/ 2009	2008/ 2010	20 2
Matjhabeng	26 967	24 055	21 062	22 954	23 790	27 167	27 302	27 283	27 758	27 887	28 007	28 127	28
Mines	30 043	27 896	26 235	25 336	26 197	27 327	27 590	27 376	27 640	27 172	26 371	26 113	26
Nala	2 930	3 072	2 751	2 989	2 681	2 838	2 918	2 964	3 003	3 038	3 069	3 198	3
Total	**59 939**	**55 023**	**50 047**	**51 278**	**52 668**	**57 332**	**57 810**	**57 622**	**58 401**	**58 097**	**57 446**	**57 438**	**57**

Source: Sendibeng Water, 2004

Table 6.7: Water Demand for the greater Harrismith area, 2004

Year	Demand (Million Litre)
2000	3.2 ML
2001	3.4 ML
2002	3.2 ML
2003	2.9 ML
2004	2.8 ML
2010	3.5 ML
2015	5.1 ML

Source: Rand Water, 2004

CHAPTER 7 GOVERNMENT WATER SCHEMES (GWSs)

Water use on government water schemes in the Free State Province as provided by the Department of Water Affairs (Free State Regional Office) is presented in this Chapter. Water quotas are set on enlisted irrigation areas and should not increase in future.

7.1 WATER USE ON SAND-VET GOVERNMENT WATER SCHEME (LEJWELEPUTSWA DISTRICT MUNICIPALITY)

Table 7.1 presents water use figures from 1996/07 to 2003/04 for the Sand-Vet GWS. A distinction is made between the Vet Canal and the Sand Canal. The following should be noted about the values in the table:

The figures represent the outlets from two dams (Allemanskraal and Erfenis) and distribution losses are included. Total scheduling on the Sand-Vet Scheme is 11 760.5 ha with an annual quota of 7 200 m^3 per ha per annum. The total irrigation quota for the scheme is therefore 84.7-million m^3 per annum. Allocation for domestic and industrial use is 22.3-million m^3 per annum (losses excluded in both cases). During 2003/4 water restrictions were imposed and only 80% of the quota from the Erfenis Dam and 30% from the Allemanskraal Dam were available. After the WUA has taken over the management of the scheme, it is anticipated that the trading of water will take place on a more regular basis. The scheme will therefore use its full allocation. With 20% added for distribution losses, the total releases are estimated at 128.4-million m^3 per annum, when the water is available. There is no surplus water available from the present scheme for additional development.

7.2 WATER USE RENOSTER RIVIER GOVERNMENT WATER SCHEME (KOPPIES DAM) NORTHERN FREE STATE DISTRICT MUNICIPALITY

The water use on the scheme for 2003/4 was 4 626 166 m^3 (distribution losses excluded). Figures for previous years are not available at this stage. Originally 2 604 ha were scheduled on the scheme. After 1998, many plots were descheduled as a result of poor soils and high water cost. The current scheduled area is 1 750 ha. The water quota is 6 100 m^3 per ha per annum. Water supply to many of the remaining plots has been suspended because of outstanding water debt. The present demand for domestic and industrial use from the dam is 0.6-million m^3 per annum. De Beers is negotiating with the irrigators to buy out some of their

water rights to use for mining purposes. The intention is to purchase water use rights from between 500 to 1 000 ha irrigation and to convert this to industrial use.

Table 7.1 Water use Sand-Vet Government Water Scheme (Lejweleputswa DM), 2004

Year	Vet Canal	Sand Canal	Total
1996/7	26,382,700	29,913,128	56,295,828
1997/8	25,064,093	31,387,516	56,451,609
1998/9	51,021,660	53,744,336	104,765,996
1999/0	47,754,880	55,442,612	103,197,492
2000/1	49,816,492	58,471,112	108,287,604
2001/2	24,165,936	55,889,529	80,055,465
2002/3	50,313,855	64,880,870	115,194,725
2003/4	51,197,228	22,756,288	73,953,516

Source: Department of Water Affairs and Forestry, Free State Regional Office, 2004

The estimated future use is 11.3-million m^3 per annum of which most will be for industrial use. 30% water distribution losses will have to be added to this figure.

7.3 GOVERNMENT WATER SCHEMES IN UPPER ORANGE CONTROL AREA

Table 7.2 provides information regarding irrigation water use on government water schemes in the Upper Orange Government Control Water Area. Leeurivier and Tierpoort are located in the Motheo District Municipality while the rest of the schemes are located in the Xhariep District Municipality. The per hectare quotas on these schemes varies between 6 500 and 11 000 m^3 per ha per annum and set the upper limits. Due to drought it was not possible for irrigators on quite a number of these schemes to use their full annual quota over the reporting period. The Rietrivier and Tierpoort schemes are particular vulnerable.

TABLE 7.2: IRRIGATION WATER USE: GOVERNMENT WATER SCHEMES UPPER ORANGE

SCHEME	AREA Ha.	QUOTA m3	1996/7	1997/8	1998/9	1999/0	2000/01	2001/02	2002/03	2003/04	2004/05
Leeurivier (Armenia)	907.9	6,500	5,901,350	5901350	5901350	5901350	5901350	5901350	5901350	5901350	3540810
Wittespruit (Egmont)	850.0	6,500	5,525,000	5525000	5525000	5525000	5525000	5525000	5525000	5525000	5525000
Rietrivier (Kalkfontein)	3,046.3	11,000	23,456,510	16754650	0	0	10052790	13403720	26807440	23456510	26807440
Oranje-Riet	16,853.4	11,000	185,387,400	185387400	185387400	185387400	185387400	185387400	185387400	185387400	185387400
Vanderkloof-kanale	5,188.0	11,000	57,068,000	57068000	57068000	57068000	57068000	57068000	57068000	57068000	57068000
Modderrivier (Krugersdrift) T1	1,758.0	8,130	14,292,540	14292540	14292540	14292540	14292540	14292540	14292540	14292540	3858985.8
Modderrivier (Krugersdrift) T2	1,807.2	8,640	15,614,208	15614208	15614208	15614208	15614208	15614208	15614208	15614208	4215836.16
Tierpoort	690.0	9,000	1,863,000	1552500	1242000	1552500	931500	6210000	6210000	6210000	2794500
TOTAL/YEAR			**309,108,008**	**302,095,648**	**285,030,498**	**285,340,998**	**294,772,788**	**303,402,218**	**316,805,938**	**313,455,008**	**289,197,972**

Source: Department of Water Affairs and Forestry, Free State Regional Office,2004

CHAPTER 8 SUMMARY AND CONCLUSIONS

The aim of this chapter is to summarise information on past, present and expected future water demands for different sectors and geographical areas in the Free State Province focussing on conclusions reached.

8.1 DEMAND PER WATER MANAGEMENT AREA

Water demand data per Water Management Area and Water Use Sector give an overview of the total water demand situation in the Free State Province. Information was obtained from DWAF for 2000 and two scenarios for 2025; a base scenario and a high scenario. Main conclusions from the analysis are:

- The Free State Province has sufficient water now and until 2025 (at a 98% assurance rate) in all water management areas.
- The Upper Orange Water Management Area and the Irrigation Sector will continue to be, up until 2025, the highest consumers of water.
- Total water requirements will increase from 1068-million m^3 in 2000, to 1081- or 1142-million m^3 per annum in 2025, depending on whether the base or high scenario will be true.
- Although different trends occur in different water management and sub-catchment areas the overriding trends between 2000 and 2025 are:

- A decrease in water consumption in the rural household sector.
- Constant water consumption in mining and bulk industries.
- Small increases of 2.67% and 4.87% in water for irrigation and power generation respectively.
- A substantial increase in urban demand of 8.37% and 36.74% under the base and high scenarios respectively.

8.2 DEMAND PER DISTRICT MUNICIPALITY

To determine the water demand and supply situation in the various district municipalities with regard to removing backlogs and improving water supply and sanitation services in urban communities, recourse was had to the DMs' Water Services Development Plans. The WSDPs covered the period 2002 to 2010 and show what the water and sanitation provision demand and financial needs will be for three possible scenarios/options. The scenarios are directed by informed by Integrated Development Planning (IDP) targets (1 – 5 year projects) as stipulated

in the WSDPs. The IDP targets are based on the national targets of implementing "Free Basic Water" and "Individual Site Metering" by all local municipalities which was set for July 2003, and providing "Basic Household Sanitation" by March 2010 and "Eradication of the Bucket System" by end 2007. Due to shortage of funds it will not be possible for the various local and district municipalities to meet their IDP targets within the time frame of five years. To overcome this (keeping the vision in mind) it was thus necessary to formulate alternative scenarios to meet the national targets.

The strategies, spelled out in the various WSDPs guide strategic decisions towards the progressive attainment of efficient, affordable, economical and sustainable water services. Scenario 1/Option A is the more conservative approach addressing the most urgent backlogs and basic needs in water and sanitation provision only. It is indicated in the WSDP for Motheo District Municipality, for instance, that it will be possible for local municipalities to reach full service provision towards the end of the 2009/2010 financial year provided that adequate funds are made available each year. Municipalities should thus meet all national targets if Scenario 1/Option A is followed[9].

Scenario 2/Option B requires a higher grade of service provision than Scenario 1/Option A. It is suggested by the Motheo District Municipality WSDP that local municipalities can reach a 100% service provision with Scenario2/Option B towards the end of 2009/2010 but that more funds are required than for Scenario 1/Option A especially between 2006 and 2010. The need for additional erven to be developed should also be taken into account in this regard.

Scenario 3/Option C requires the highest grade of service provision but is considered over-ambitious, given the financial constraints experienced by local government. It is stated in the WSDPs that it will be all but impossible for any local municipality in the Free State Province to reach the national targets if Scenario 3/Option C is followed.

[9] For other district municipalities, similar conclusions are reached as for Motheo. Detail on the situation with regard to the Scenarios/Options for the District Municipalities of Motheo, Lejwelephutswa, Northern Free State and Thabo Mofutsanyane are summarised in Chapter 5 of this report. For a full discussion and analysis the WSDPs must be consulted.

8.3 DEMAND PER WATER BOARD

Water demand projections by water boards indicate the predicted water requirements to be supplied within the Free State service areas of the respective boards: Bloem Water, Sedibeng Water and Rand Water. This information reflects a longer planning horison than that of the district municipalities. Water boards are primary involved in bulk water supply and plan their service provision according to expected future demand requirements. Information received from Bloem Water for instance indicated that supply will be aligned with predicted demand until 2023. No problems with regard to service provision are anticipated within the time horizon of this report for any of the water boards.

8.4 DEMAND PER GOVERNMENT WATER SCHEME

Water consumption on government water schemes in the Free State Province, provided in Chapter 7, indicates that no further expansion in irrigation areas (water demand) is planned for within the period covered by this report[10]. Developments that should be noted include:

- Water trading on a more regular basis in the Sand-Vet GWS in future is expected due to the takeover of the management of the scheme by the Water User Association.
- The intended buying out of irrigation water rights on the Renoster River GWS (Koppies Dam) by De Beers for mining purposes will necessarily reduce the irrigation application of the scheme.
- Problems of insufficient water availability on schemes like Rietriver (Kalkfontein) and Tierpoort resulted in irrigation farmers not being able to fully utilize the yearly quota allocated. It is also hinted that the quotas allocated, and/or the irrigation areas enlisted, may be too large for the schemes.

8.5 FINAL CONCLUSION

Sufficient water should be available in all catchment management areas of the Free State Province until 2025. The main challenge is to provide sufficient water such that national and IDP targets for the residential sector in urban and rural areas are reached. Financial constraints on district and local municipality level pose major challenges in this regard. Water

[10] The only exception is 3000 ha of irrigation development earmarked for resource poor farmers in the Kraai Sub-Catchment of the Upper Orange River

boards should be able to render the necessary bulk water provision services to ensure that the supply of water will meet predicted future demand.

Water provision to the irrigation sector on governmental water schemes will not expand in future except for the settlement of small farmers in, for instance, the Kraai Sub-Catchment. Water trading amongst users and sectors should become more common in future as is indicated by developments in the Sand-Vet and Renoster River Government Water Schemes.

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