

FRANCES BAARD DISTRICT MUNICIPALITY

INTEGRATED WASTE MANAGEMENT PLAN

INTEGRATED WASTE MANAGEMENT PLAN (Final)







October 2010



ENVIRONMENTAL AND SOCIAL CONSULTANTS

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TITLE AND APPROVAL PAGE TITLE: Frances District Municipality Integrated Waste Baard Management Plan: Status Quo Report (Draft) **CLIENT:** Frances Baard District Municipality Private Bag X6088 Kimberley 8300 PREPARED BY: Nemai Consulting C.C. P.O. Box 1673 Sunninghill 2157 Telephone (011) 781 1730 Facsimile (011) 781 1731 Elani Holton, Ciaran Chidley, Val-Mari van Schalkwyk **AUTHORS: Signature Date**

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APPROVAL

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	AMENDMENTS P	AGE	
Date	Nature of Amendment	Amendment No.	Signature
09 June 2010	First Draft of Status Quo for Client Review	0	
30 July 2010	Draft of IWMP for Client Review	1	
30 August 2010	Draft IWMP for Public Review	2	
30 September 2010	Final IWMP	3	
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LIST OF ABBREVIATIONS

DEA	-	Department of Environmental Affairs
DEAT	-	Department of Environmental Affairs and Tourism
DIF	-	District Intergovernmental Forum
DLM	-	Dikgatlong Local Municipality
DMA	-	District Management Area
DWA	-	Department of Water Affairs
DWAF	-	Department of Water Affairs and Forestry
DWMF	-	District IGR Meeting
EIA	-	Environmental Impact Assessment
ECA	-	Environmental Conservation Act (Act 73 of 1989)
GDACEL	-	Gauteng Department of Agriculture, Conservation, Environment and Land Affairs
IDP	-	Integrated Development Plan
IEM	-	Integrated Environmental Management
IGR	-	Intergovernmental Relations
IGRFA	-	Intergovernmental Relations Framework Act (Act 13 of 2005)
IWMP	-	Integrated Waste Management Plan
IWMSA	-	Institute of Waste Management Southern Africa
	-	G - General waste
	-	C - Communal landfill (< 1 ton per day)
	-	S - Small landfill (between 1 and 25 tons per day)
Landfill	-	M - Medium landfill (between 25 and 500 tons per day)
Classification	-	L - Large landfill (greater than 500 tons per day)
System	-	B+ - Significant leachate produced
	-	B No significant leachate produced
	-	H:H - High hazard with hazard ratings 1 to 4
	-	H:h - Low hazard with hazard ratings 3 and 4

LM	-	Local Municipality
MDB	-	Municipal Demarcation Board
MEC	-	Member of the Executive Council
MFMA	-	Local Government: Municipal Finance Management Act (Act 56 of 2003
MIG	-	Municipal Infrastructure Grant
MLM	-	Magareng Local Municipality
MSA	-	Municipal Structures Act (Act 117 of 1998)
MSYA	-	Municipal Systems Act (Act 32 of 2000)
NEMA	-	National Environmental Management Act (Act 107 of 1998)
NEMWA	-	National Environmental Management: Waste Act (Act 59 of 2008)
NQF	-	National Qualifications Framework
NWA	-	National Water Act (Act 36 of 1998)
NWDC	-	North West Development Corporation
NWMS	-	National Waste Management Strategy
OHSA	-	Occupational Health and Safety Act (Act 25 of 1993)
PIF	-	Provincial Intergovernmental Forum
PLM	-	Phokwane Local Municipality
REL	-	Rear End Loading (Waste Compactor)
SAWIS	-	South African Waste Information System
SMME	-	Small, Medium and Micro Enterprises
SPLM	-	Sol Plaatje Local Municipality
T/a	-	Tonnes per annum
TLB	-	Tractor-Loader-Backactor
WIS	-	Waste Information System

GLOSSARY OF TERMS

Compost	The aerobically decomposed remnants of organic matter. Serves as a growing medium for plants.
Formal Settlement	A residential area, which has completed the formal township application - process. It is characterised by geometrically laid out roads and the provision of household water, sewer and electrical services.
Informal Settlement	A residential area, which has not completed the formal township application process. It is characterised by un-evenly laid out roads, often with insufficient width. The settlement may or may not have water at house level, nor sewer and electrical services.
Organic Waste	A type of waste, typically originating from plant or animal sources, which may be broken down by other living organisms
Peri-Urban	Settlements outside the formal, declared, boundaries of a town or formal - settlement. Density and house construction varies as does service provision
Promulgated	The act of formally proclaiming or declaring new statutory or administrative or administrative law when it receives final approval
Recycle	To separate and process material from waste for further use as new products or resources
Rural Area	Any area that is not classified urban. Rural areas are subdivided into tribal areas and commercial farms (Source Statistics SA)
Urban Area	A classification based on dominant settlement type and land use. Cities, towns, townships, suburbs, etc. are typical urban settlements. Areas - comprising informal settlements, hostels, institutions, industrial and recreational areas, and smallholdings within or adjacent to any formal urban settlement are classified as urban (Source Statistics SA)
Waste	Includes any substance, whether solid, liquid or gaseous, which is: discharged, emitted or deposited in the environment in such volume, constituency or manner as to cause an alteration to the environment, a surplus substance or which is discarded, rejected, unwanted or abandoned, -reused, recycled, reprocessed, recovered or purified by a separate operation from that which produced the substance or which may be or is intended to be re-used, recycled, reprocessed, recovered or purified, or identified as waste by prescribed by regulation

Waste Facility -	Any site or premises used for the accumulation, handling or processing of waste with the purpose of either re-using, treating or disposing of that waste at that site or on another premises
Waste General -	Waste that does not pose an immediate threat or hazard to people or to the environment and includes business waste, domestic waste, garden waste and building waste
Waste, Hazardous	Waste that may, by circumstances of use, quantity, concentration or inherent physical, chemical or toxicological characteristics, have a significant adverse affect on health and the environment
Waste, Industrial	Waste, other than hazardous waste, that is generated by an industry
Waste Treatment	Any method, technique or process that is designed to change the physical, biological or chemical character or composition of a waste, or to remove, separate, concentrate or recover a hazardous or toxic component of a waste or to destroy or reduce the toxicity of the waste in order to minimize the impact of the waste on the environment.
Illegal dumping	Small scale intentional disposal of waste, littering, abandonment of waste by an individual/individuals
Illegal disposal	Large-scale, unpermitted disposal of waste products.
Business waste	Means waste that emanates from premises that are used wholly or mainly for commercial, retail, wholesale, entertainment or government administration purposes
By-product	Means a substance that is produced as part of a process that is primarily intended to produce another substance or product and that has the characteristics of an equivalent virgin product or material

1. INTRODUCTION

Nemai Consulting was appointed by Frances Baard District Municipality to review and update the Integrated Waste Management Plan that was previously developed by this District.

An IWMP was completed and adopted in July 2004. This included a review of the four local municipalities and the district management area of FBDM.

The purpose of this document is to provide a summary on the Status Quo of waste management in FBDM. This section of the report will reflect on previous status quo and objectives set, as well as current conditions, limitations and challenges currently experienced by the local municipalities of this area.

This document will furthermore reflect on the current legislation, policies and statements that could affect waste management in FBDM. The local IWMP's, Integrated Development Plans and By-laws will be investigated.

This IWMP is structured to address each local municipality separately. This is in contrast to typical district level IWMP's which highlight action planning across the district without taking into account the differences between municipalities. This approach has been taken to enable district waste managers to approach each local municipality based upon the guidance contained in this plan. This approach does entail some repetition, particularly in Section 8: Action Planning, but this is deemed a worthwhile sacrifice to obtain more easily implementable waste management planning.

1.1 Study Aims

The study aims were developed to dictate the manner in which this study was conducted. The study aims will also aim to satisfy the needs identified by the client as defined in the scope of work. The study aims can therefore be summarized as follows:

- Develop a comprehensive Integrated Waste Management Plan for Frances Baard District Municipality
- Identify gaps in the information and the needs of waste management plans in the District
- · Address specific needs of municipalities
- Comply with newly promulgated legislation and provincial IWMP

1.2 Methodology

The methodology followed in compiling this IWMP was as follows:

- Legislative Review In terms of the development of an IWMP, certain legislation affects the strategic planning of this document directly or indirectly. Various legislation, policies and guidelines have been developed and this section of the document will briefly review the most significant documents applicable;
- Review of existing documentation this will include the existing IWMP, IDP's and policies of each local municipality;
- Baseline / Situation analysis This section of the report will reflect
 on the current status of each local municipality in terms of waste
 management, information available in terms of waste generation,
 financial matters and current constraints. The main information
 source in this regard was a municipal waste questionnaire and
 interviews with waste managers in the district;
- Identification and Prioritization of Needs this section highlights, in broad strokes, the waste management needs throughout the district. The findings of this section are obtained through an examination of the findings of the status quo and waste generation sections;
- Theoretical Waste Generation Volumes this section provides a
 theoretical model to determine waste generation volumes in the
 district. The model is based on population, estimated growth rates
 and income. The results of this model should be considered first
 order estimates. This is especially true in light of the lack of

- availability of calibration information. Waste Generation Volumes are vital in future waste management planning, in all spheres of government;
- Strategic Waste Planning this section details the options and choices that have been made to ensure that waste management is an effective part of municipal service delivery. It is carried out per waste management field, rather than by local municipality. The contents of this section were derived from an analysis of the previous status quo sections, the NEMWA and the National Waste Management Strategy, 2010;
- Action-Planning these are the action plans that each municipality should take into account when doing their local level planning; and
- Implementation Planning this section details the timeline for implementation of the IWMP. It will be completed once the final waste management workshop has been held with the municipalities of the District Municipality; and
- Stakeholder Participation this section will detail the stakeholder participation process that resulted in this IWMP. This section will be inserted after the final waste management workshop has been held with the municipalities of the District Municipality.

1.3 Structure of the Document

The structure of the report is illustrated in Figure 1.



Figure 1 - IWMP Document Structure

Sections 2 and 3 of this document cover the Status Quo analysis of the FBDM waste management service. This includes a legal review of waste management as it affects the district municipality.

Section 4 includes an estimation of the waste generation volumes for the local municipality. The waste generation analysis presents the expected volumes of waste that should be planned for in the next five years. This is a theoretical calculation which takes into account domestic, commercial and industrial waste generators.

Section 5 of the report then covers strategic waste planning. This section discusses the waste challenges faced by the local municipalities, why they are important to address and a framework for addressing the challenges. This section addresses the goals and targets for waste management over the next five years.

Action-planning uses the outputs from the strategic waste planning section and presents projects that should be implemented in order to achieve the goals of the IWMP.

The final section is the implementation plan which establishes the measures that need to be taken to ensure that the IWMP is implemented.

1.4 Compliance with the Requirements of the Waste Act

The National Environmental Management: Waste Act specifies the contents of a waste management plan. This is contained in Section 12. It is required to demonstrate how this IWMP complies with the requirements of the act.

The table below has been prepared to present the requirements for an IMWP and describes the sections of the document wherein each requirement is met.

Table 1 – NEMWA Content for an IWMP

NEM:WA Section	Description	Applicable section of this document	
12 (1) (a)	An IWMP should contain a situation assessment that contains at least:		
12 (1) (a) (i)	A description of the population and development profiles of the area to which the plan relates	Section 2.2	
12 (1) (a) (ii)	An assessment of the quantities and types of waste that are generated in the area	Section 6	
12 (1) (a) (iii)	A description of the services that are provided for the collection, minimisation, reuse, recycling and recovery, treatment and disposal of waste	Section 4	
12 (1) (a) (iv)	The number of persons in the area not receiving waste collection services	Section 4	
12 (1) (b)	Within the area of the IWMP, show how the municipality intends to:		

NEM:WA Section	Description	Applicable section of this document	
12 (1) (b) (i)	give effect to Chapter Three of the NEMWA	Section 7 and 8	
12 (1) (b) (ii)	give effect to the objects of the NEMWA	Section 8	
12 (1) (b) (iii)	To identify the negative impact of poor waste management practises on health and the environment	Section 4	
12 (1) (b) (iv)	To provide for the implementation of waste minimisation, re-use, recycling and recovery targets and initiatives	Section 8	
12 (1) (b) (v)	To address the delivery of waste management services to residential premises	Section 8	
12 (1) (b) (vi)	To implement any relevant international agreements	Not Applicable	
12 (1) (b) (vii)	To best environmental practise with regards waste management	Section 7 and 8	
12 (1) (c)	Not applicable at municipal level		
12 (1) (d)	Set out the priorities and objectives of the municipality in respect of waste management	Section 8	
12 (1) (e)	Establish targets for the collection, minimisation, re-use and recycling of waste	Section 8	
12 (1) (f)	Set out the approach to the planning of new facilities for disposal and decommissioning of existing waste disposal facilities	Section 8	
12 (1) (g)	Indicate the financial resources required to give effect to the plan	Section 8	
12 (1) (h)	Describe how the municipality intends to give effect to the IWMP	Section 8 and 9	
12 (1) (i)	Comply with the requirements prescribed by the minister	As Above	

The table demonstrates, by reference to the table column entitled "Applicable section of this document", that this IWMP complies with the requirements of the NEM:WA.

1.5 Alignment with the Northern Cape Provincial IWMP

The Northern Cape Province compiled an Integrated Waste Management Plan in 2008. This plan sets objectives to satisfy the needs for a coherent plan to address waste management shortfalls.

The table below has been prepared to present the key goals of the NC Provincial IWMP and describes the sections of this IWMP that satisfy the listed goals / requirements.

Table 2 - Northern Cape Provincial IWMP Key Goals

Description of key goals	Applicable section of this document	
Provision of an integrated waste management strategy that combines and aligns all methods of waste management in terms of the National Waste Management Hierarchy	Sections 7, 8 and 9	
To ultimately reduce the amount of waste requiring landfill disposal	Section 7.2	
To minimise the adverse social and environmental impacts related to waste management	Sections 7 and 8	
To identify and plan for future waste management needs including financial, infrastructural and human resource requirements	Section 6	
To minimise waste management related costs	Sections 7 and 8	
To identify gaps and assess the capacity for the implementation and management of a Provincial integrated waste management plan	Section 5	
To influence decision making on waste related programs	Section 10	

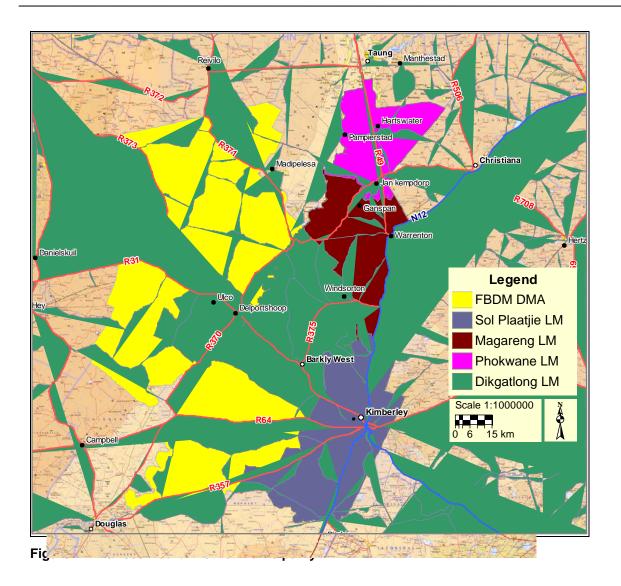
2. FRANCES BAARD LOCAL MUNICIPALITY OVERVIEW

2.1 Location



The FBDM is situated within the Northern Cape Province. Although it is the smallest district in the province (covering a total area of approximately 12 384 km²), it has the largest population density (26.2 persons per km²) with a total of approximately 324 800 inhabitants (FBDM, 2009a).

The FBDM is characterised by a mixture of land uses of which agriculture and mining are dominant. The residential area varies from the city sized Kimberley to small-scattered rural communities.



Kimberley, located in Sol Plaatje Local Municipality, is the capital of the province and also the home of the FBDM head offices.

2.2 Development Profile

1.2.1 Approach

The discussion of the demographics and the development profile of the municipality will be carried out using Census 2001 data and data compiled from the EconoMonitor prepared for the SPLM: Local Economic Development Office. Additional demographic and service delivery information was taken from the Community Survey 2007.

2.3 SOCIAL ENVIRONMENT

2.3.1 Overview and Demographics

The four local municipalities and their main towns are indicated below:

- SPLM Kimberly, Beaconsfield, Kenilworth, Modderrivier, Ritchie, Riverton, Ronald's Vlei and Spytfontein.
- DLM Barkly West, Delportshoop, Longlands, Mount Rupert, Sidney-on-Vaal, Ulco and Windsorton.
- MLM Content, Espagsdrif, Warrenton, Windsorton Warrenvale and Ikhutseng.
- PLM Ganspan, Hartswater, Jan Kempdorp, Pampierstad, Valspan.

Dikgatlong Local Municipality (DLM) has seven wards and consists of Barkly West, Windsorton and Delportshoop as he main centres. The head office of the municipality is situated in the town of Barkly West, which is approximately 35-km northwest of the city of Kimberley on the northern bank of the Vaal River. Barkly West is situated on the growth corridor Kimberley-Postmasburg and agriculture and mining forms the economic basis of this area. The Municipal area covers approximately 2 377 km² and borders the Magareng Municipality in the north-east, Sol Plaatje in the south-east and the FBDM in the southern and western borders. The population of the Dikgatlong Municipality (2007) was approximately 40 752.



Magareng Local Municipality (MLM), centred around Warrenton, is situated approximately 77 km from Kimberley on the banks of the Vaal River. The N12 National Road between Kimberley and Christiana as well as the N18 route

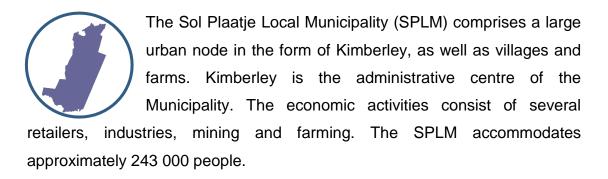
to Vryburg pass through the centre of town. The municipal area comprises an urban node, villages and farms. The urban nodes consist of Warrenton, Warrenvale and Ikhutseng. Small agricultural villages have been established

throughout the municipal area, of which Bullhill, Fourteen Streams, Sydney's Hope, Windsorton Station, Moleleko's Farm, Nazareth and Hartsvallei Farms are the most prominent. The rest of the area comprises mainly mixed farming. The area of jurisdiction is approximately 1542 km² in extent and accommodates approximately 20 433 (2007) people.



Phokwane Local Municipality (PLM), centred around Hartswater and is located approximately 110 km north of Kimberley and 92 km south of Vryburg. The municipality consists mainly of small towns surrounded by farming and agricultural land. The towns of Hartswater, Jan Kempdorp,

Pampierstad and Ganspan are the main residential areas in the municipality. Economic activities are mainly agricultural, varying from stock farmers in the dry areas, to irrigated crops in the Vaalharts irrigation scheme. The area of jurisdiction accommodates approximately 46 409 people (2007 figures).





The Frances Baard District Management Area (FBDMA) is a sparsely populated area within the FBDM. It is situated approximately 75 km west of Kimberley. The area covers approximately 573 415 ha and represents 46% of the total

area of FBDM, but accommodates only 1.4% of the population. The FBDMA is predominantly a farming area with 95% of the area occupied by extensive livestock farming. Intensive crop farming takes place along the Riet River, the Vaal River and the Harts River. The DMA accommodates approximately 2 588 people with the majority living on various farms. The area is characterized by sheep and cattle grazing farms mainly to the west of the

area. Game farms are prevalent to the south of Kimberley. The northern part of the study area, in the vicinity of Hartswater, is an important irrigation area.

The trend between 2001 and 2007 indicates that population migration within the FBDM is towards the larger economic and social centres. Economic migration is created due to the perception of better economic prospects, better work opportunities and higher living standards.

The population trend within the FBDM indicates that the economic opportunities offered by the Sol Plaatjie and Dikgatlong Local Municipalities are perceived to be better than those offered by the Magareng and Phokwane Local Municipalities.

The FBDM has a very young population characterised by a high birth rate; the majority of the population is between 0–34 years of age.

2.3.2 Living Standards

Living conditions in the municipality can be approximated by reference to figures for the indicators listed below:

- Type of main residential dwelling;
- Household water source;
- Energy source used for cooking; and
- Tenure status.

The above-mentioned indicators are used as they represent the socioeconomic conditions of the household.

The Community Survey 2007 indicates that 79% of the population of the FBDM live in formal brick structures located on a private stand or erf. The second highest type of dwelling is a shack located in an informal settlement (namely, 12.1%). The percentage change in the six years between the

Census 2001 and the Community Survey in 2007 is 0.5% which indicates that housing demand in the area is not very high.

The number of traditional dwellings, house/flat/room in back yard and backyard shack have decreased in the past six years between the two surveys as the number of formal brick structures increased.

The Community Survey 2007 indicates that the main source of water for the residents within the FBDM is water in the household dwelling for 55% of the population. 30% of the population have water supplied in the yard. 10% have water supplied to an access point outside their yards.

Most (52%) of the households within the FBDM own their own dwellings. 17% are paying off debt in order to own the property. 11% of the FBDM's population live in rented property. A further 18.7% live in rent free accommodation.

The Community Survey indicated that the number of households with access to flush toilets (connected to sewerage system) has increased from 68% to 76% as indicated by the Community Survey Report (2007) between 2001 and 2007. The number of households with no toilets has decreased from 9% to 4%.

77% of the population within the FBDM use electricity as the main source of energy for cooking. This indicates that the electricity grid is quite widely available within the FBDM. The decrease in the use of other fuels indicates that electricity represents the most economic and convenient form of cooking energy available within the FBDM.

2.3.3 Health Care

Primary health care services within the FBDM are provided by three district hospitals, one TB hospital, one community health clinic, 19 fixed clinics, four mobile clinics and six satellite clinics. The Sol Plaatje Local Municipality

manages nine clinics and the rest of the facilities are managed by the provincial Department of Health.

A major problem affecting the accessibility to health services and the quality of care in the clinics is the shortage of professional nurses. The main health problems are TB, HIV/AIDS, STDs and maternal and child health.

2.4 ECONOMIC ENVIRONMENT

2.4.1 Employment

Employment in the study area quantifies the proportion of the workforce that was employed in 2001. The table below presents the details:

Table 3 - Employment in the FBDM, 2001

Row Labels	Employed	Unemployed	Not Economically Active	Unemployment (Strict Definition)
Dikgatlong	5 921	11 253	5 578	66%
Magareng	3 432	6 248	3 694	65%
Sol Plaatje	46 411	54 221	32 928	54%
Phokwane	11 816	10 239	3 471	46%
District Management Area	2 098	723	206	26%
Grand Total 69 678		82 684	45 877	
Labour Force (Strict De	152 362			
Unemployment (Strict D	54%			
Labour Force (Expanded	198 239			
Unemployment (Expanded	65%			

According to the strict definition for unemployment, the unemployment rate is 54% for the study area. The expanded definition takes into account people who should be economically active, but are not. According to this expanded definition, unemployment along this route was 65% in 2001.

The overall district unemployment rates masks the trends within the five areas of the district. The two most populous areas, Sol Plaatje and Phokwane, have amongst the lowest unemployment rates at 54% and 46% respectively. These figures reinforce the finding that the population in these municipalities is growing faster than that of its peer municipalities and is higher than the Northern Cape as a whole.

The low unemployment rate in the DMA corresponds with the fact that most inhabitants are living on commercial farms, and are therefore employed at the farms. This implies that the reason for the steep decline in DMA population between 2001 and 2007 is due to the commercial farms reducing employment opportunities between these years. Those laid-off from the farms have left the area in search of work, which is most likely to be found in the nearest urban area, most likely to be Kimberley.

2.4.2 Household Income

Figures for household income were produced in the study area. The results are presented in the table below:

Table 4 - Household Income Summary

Row Labels	No income	Low Income (R1 to 38 400)	Medium Income (R38 401 to R307 200)	High Income (R307 201 and above)
Dikgatlong	2 600	5 821	967	47
Dikgationg	27.6%	61.7%	10.2%	0.5%
Magazang	1 321	3 770	601	34
Magareng	23.1%	65.8%	10.5%	0.6%
Sal Diagria	8 256	28 071	12 991	896
Sol Plaatje	16.4%	55.9%	25.9%	1.8%
Phokwane	1 111	8 868	1 795	110
Priokwane	9.3%	74.6%	15.1%	0.9%
District Management	45	1 212	161	6
Area	3.2%	85.1%	11.3%	0.4%
Grand Total	13 333	47 742	16 515	1 093
Grand Total	16.9%	60.7%	21.0%	1.4%

The table clearly demonstrates that the residents of SPLM are relatively wealthier than the residents of other municipalities. This is shown by the 26% of income earners who are considered middle income, compared to the district average of 21% in the same category. Sol Plaatje maintains the district average household income when the low income category is analysed. This can be compared to the Magareng and Dikgatlong Local Municipalities, which have higher than average low and no income earners; these facts distinguish them as poorer areas.

Phokwane Local Municipality is not wealthier than Sol Plaatje, nor is it poorer than its neighbours, Magareng and Dikgatlong.

The DMA has a very high percentage of low income earners, with a very low percentage of no income earners. This is consistent with the finding that this area is mainly populated by farm workers living on commercial farms.

It should be noted that the district average income band is an annual household income between R1 and R38 000, with 60% of households falling into this income bracket. This marks the study area as being characterized by poverty and generally vulnerable economic circumstances.

2.4.3 Economic Sectors and their Size

FBDM Gross Domestic Product was estimated at R23.3 billion in 2010 (EconoMonitor, 2010). This was expected to grow at 10% per year, to R30.8 billion in 2014. The SPLM area contributes 82% of this value. Thus, the remaining three local municipalities, Phokwane, Dikgatlong and Magareng, contribute 18% of the Gross Domestic Product of the district.

The table below details the Gross Value Added for each economic sector under discussion in the district. These figures were obtained from the EconoMonitor, 2010.

Table 5 - Gross Values Added, by Economic Sector

Carter	GVA		
Sector	[R millions]	% of Total	
Community	4 772	28.4%	
Financial	3 796	22.6%	
Wholesale and retail trade	2 457	14.6%	
Transport	1 900	11.3%	
Mining and quarrying	1 511	9.0%	
Manufacturing	731	4.4%	
Agriculture	712	4.2%	
Construction	482	2.9%	
Electricity	428	2.5%	
Other			
Private Households			
Undetermined			
	16 790		
Taxes less subsidies on Products	2 362		
Gross Domestic Product	19 152		

Table 4 demonstrates that the most important economic sector is Community Services, at 28% of GDP. This is followed by the financial sector at 23% of GDP, and then Wholesale and Retail Trade, at 14%. Transport and Mining and Quarrying contribute a further 11% and 9% respectively.

Thus the FBDM economy is characterised by activity in the tertiary sector of the economy. The primary sector – made up of agriculture at just 4% of GDP, and mining, at 9% of GDP – is a small contributor to the economy. The secondary sector – made up of manufacturing, at 4%, Electricity at 2% and construction at 2% – is also a small contributor. The remaining sectors, all in the tertiary sector, contribute 77% of the total GDP of the study area.

Thus the study area is dependent upon economic activity generated by population size and accessibility, as well as by government spending. Therefore, any changes in these two measures would disproportionately affect the economy of the district.

2.4.4 Mining Sector

The district's mining industry is focused upon diamond mining, with some quarrying being carried out for construction purposes. The GVA for mining in the district is R1.5 billion, whilst that for the SPLM is R1.29 billion. Thus, R220 million worth of GVA is attributable to the rest of the district. Most, if not all, of this mining activity, is focused in the DLM.

Thus the contribution from the largely small scale mines in DLM is R220 million per annum, which is 5% of the total economy of the district, excluding the SPLM. The employment contribution of mining to the local municipality is 18% of the municipal employment and 6% from a district perspective.

Thus mining in DLM is not insignificant from an economic perspective and provides employment in one of the most vulnerable local municipalities in the district.

2.4.5 Economic Sectors by Local Municipal Area

A review of the economy of the FBDM finds that the economy is biased towards the tertiary sectors of the economy. That is, the service sector, which relies upon population size and tends to be wealth consuming rather than wealth producing.

The important economic sectors in FBDM are:

- Community Services;
- Wholesale and Retail Trade;
- Finance;
- Transport;
- Mining;
- Manufacturing;
- Agriculture; and
- Private Households.

The important economic sectors in the SPLM are:

- Community Services;
- Wholesale and Retail Trade;
- Financial;
- Manufacturing;
- Mining;
- Transport;
- · Construction; and
- Private Households.

The important economic sectors in the PLM are:

- Agriculture;
- · Community Services;
- Wholesale and Retail Trade; and
- Private Households.

The important economic sectors in the DLM are:

- Agriculture;
- · Mining and quarrying;
- Community Services;
- Wholesale and Retail Trade; and
- Private Households.

The important economic sectors in the MLM are:

- Agriculture;
- · Community Services;
- Wholesale and Retail Trade;
- Mining and quarrying; and
- Private Households.

2.5 Review of 2004 Integrated Waste Management Plan

The review of the SPLM Integrated Waste Management Plan of 2004 is carried out in tabular form below. The goals and objectives laid out in the plan are briefly commented upon in terms of the degree to which they have been achieved.

Overall, progress towards achieving the objectives highlighted in the 2004 IWMP has been very low. It has been observed that this IWMP is not present at any of the waste management offices; it seems to be forgotten and remains largely unimplemented.

Table 6 - Review of the 2004 SPLM IWMP Goals and Targets

No.	le 6 - Review of the 2004 SPLM IW Goal	Objectives	Recommendation	Achievement to Date
1		Permit the Ritchie Landfill Site	Obtain permit for continued use of the Ritchie Landfill	No progress
	Improve and develop infrastructure to comply with legislative requirements and municipal needs	Upgrade Kimberley and Ritchie landfill sites	Upgrade Kimberley and Ritchie landfill sites to adhere to the Minimum Requirements	No progress
		Improve management of Kimberley	Upgrade Kimberley and Ritchie landfill sites to adhere to the Minimum Requirements	No progress
		and Ritchie landfill sites	Appoint private waste management company to operate Kimberley Landfill	A private contractor was appointed during 2008, the contract ended unsuccessfully
		Develop new transfer station	Develop strategically located transfer stations	No progress
	Provide effective waste collection	Improve refuse collection		Progress undetermined
2		Extend and maintain collection fleet for service delivery	Purchase 16m3 REL	Completed.
		Standardise collection and optimise collection route	Standardise refuse receptacles	No progress
			Appoint consultant to develop plan and optimise collection route and system	No progress
3	Provide effective waste	Effective structure of human	Extend landfill management staff at Ritchie	No progress
	management service	resources	Restructure Kimberley Landfill staff	No progress

FBDM IWMP – August 2010

No.	Goal	Objectives	Recommendation	Achievement to Date
		Manage job creation projects		Progress undetermined
		Train staff	Locally train low-level staff and provide specialised training for specialised positions	No progress
4	Financial Resources	Standardise tariff structure	Implement standardised tariff system	
	Tindicial (Coources	Decrease non-payment of tariffs	Implement pre-paid system in informal areas	No progress
		Develop and maintain a waste information system	Develop WIS	No progress
5	Capacity building through information sharing	Contribute to inter-municipal waste information workshops	Attend workshops	No progress
		Build community awareness	Build awareness through flyers and newspaper notices	No progress
	Minimise/prevent illegal activities		Amend by-laws	No progress
6			Establish community watch	No progress
		ent illegal activities Develop penalty system for illegal activities	Introduce incentive schemes for clean neighbourhoods	No progress
			Provide skips throughout town for refuse dumping	No progress

FBDM IWMP – August 2010

1	No.	Goal	Objectives	Recommendation	Achievement to Date
7	,	Decrease waste deposited on landfill	Formalise and encourage recycling activities	Contractual agreement with recycling companies to provide market for recycled products	Recycling contracts were put in place during 2005, the effort failed and no formal recycling exists at the landfills
				Provide recycling containers throughout town	No progress
			Encourage waste minimisation	Incentive scheme for in-house recycling	No progress

FBDM IWMP – August 2010

3. LEGISLATIVE REVIEW

Waste management planning must be contextualised within the framework of the national and provincial government, district and local municipalities, legal, regulatory and policy. Below follows a brief summary of the framework and the implications thereof on waste management and waste management planning.

Waste management is covered by the National Environmental Management Waste Act (NEMWA) at national, provincial or local levels in South Africa Other legislation, also mentioned in the section to follow, should be read with NEMWA to get a clear understanding of the waste requirements.

3.1 The National Waste Management Strategy (NWMS)

3.1.1 <u>Integrated Waste Management</u>

The White Paper on Integrated Waste Management and Pollution Control identifies a number of waste management issues, including:

- The lack of priority afforded to waste management Previously, waste management was not afforded the priority as an essential function in respect of pollution prevention and control in the environment and public health. A lack of funds and human resources resulted in a lack of long term planning, information, appropriate legislation and capacity to manage the waste generated in South Africa;
- Fragmented legislation and the ineffective enforcement thereof before NEMWA, legislation was disjointed and the lack of government capacity lead to an unfocused legislation, especially in terms of waste disposal;
- Unacceptable Health, Safety and Environmental practices for pollution and waste management - unacceptable environmental and social practices characterises many aspects of waste management such as: substandard, ineffective to non-existent

- waste collection and street cleaning systems; illegal dumping and littering, and poorly sited waste disposal sites.
- The absence of integrated waste management options to date, focus has been on waste disposal and impact control, which resulted in a lack of focus on issues such as: waste avoidance, minimisation and cleaner production technology initiatives, regulatory initiatives to manage waste minimisation, inadequate resource recovery and a lack of recycling and inadequate variety and appropriate waste treatment methods.

The focus of integrated waste management is based upon a hierarchical approach. This can be compared with the previous waste management approach which had a strong focus on collection, transport and disposal. The application of the waste hierarchy dictates that disposal of waste to a landfill is the last resort, as an increasing focus is being placed on the minimisation of waste through cleaner production, recycling and treatment.

The waste hierarchy illustrated above can be divided into four main categories: cleaner production, recycling, treatment and disposal. The outcome of cleaner production is prevention and minimisation of waste. Recycling through composting, recovering of materials and reuse of material play an important role in the waste hierarchy. The physical and chemical treatment, as well as the destruction of materials, is the third step in the waste hierarchy, with disposal forming the final step. If the first three steps are followed there will be a reduction in the amount of waste that is destined to reach landfills.

3.1.2 Integrated Waste Management Plans (IWMP)

The NWMS is the long term plan (up to 2010) of the government to address the key issues, needs and problems experienced in waste management in South Africa. The aim of the strategy is to reduce both the generation of waste and the impact of waste on the environment. The NWMS presents a

plan for the socio-economic development, the health of the people and ensuring that the environmental resources are no longer adversely affected by uncontrolled and uncoordinated waste management. It also establishes a waste management system that concentrates on avoiding, preventing and minimising waste, as well as making provision for waste management services at an acceptable standard for waste collection, transportation, treatment and disposal services to all communities.

As in chapter 7 of the NWMS: Integrated Waste Management Planning, the primary objective is to integrate and optimise waste management so that the efficiency of the waste management system is maximised and the impacts and financial costs associated with waste management are minimised, thereby improving the quality of life for all communities in South Africa.

Responsibilities for the generation of IWMP's according to the NWMS are as follows:

- Local government Integrated Waste Management Plans for General Waste;
- Provincial Government Hazardous Waste Management Plans;
 and
- Individual Industries Waste Management Plans for their respective businesses.

This means that the Northern Cape Province is responsible for the development of an IWMP for the management of hazardous waste in the province and the district and local municipalities are responsible for the development of the IWMPs.

IWMPs are also a statutory requirement of the National Environmental Management Waste Act. Section 11 of NEMWA, states that each provincial department and local authority have to prepare an IWMP, and that the IWMPs prepared by the local authorities have to be approved by the MEC and incorporated into the Integrated Development Plan (IDP) of each municipality.

3.1.3 The IWMP in the context of the IDP

The Municipal Systems Act (Act No. 32 of 2000) defines the IDP as one of the core functions of the municipality. Furthermore, it is a legal requirement for every council to adopt a single, inclusive and strategic plan for the development of the municipality. The IMWP is an integral part of the IDP and its alignment with each municipality's IDP is thus crucial.

IWMPs ensure that service requirements from local development priorities are integrated into both the Local Municipality and District Municipality IDPs. The IWMP contains a summary of the current solid waste management priorities for inclusion within the IDPs - which should include objectives, strategies and projects – with targets and time frames.

The Local Municipality ensures that solid waste management requirements arising from local development priorities are integrated into the Local Municipality and District Municipality IDP's. This ensures that the requirements are communicated to the District Municipality and that they are included in the District Municipality's IWMP and IDP.

Identified key aspects in IDP's, relating to General Waste Management, which need to be taken into account when developing IWMPs are summarised as follows:

Broad Development Goals, which include:

 Meeting Basic Needs: To alleviate poverty by ensuring that disadvantaged residents have access to free lifeline basic services, including food and security through the implementation of co-ordinated urban / peri-urban renewal and integrated development through the district; and Good Governance: To ensure sustainable and representative governance through the efficient and sustainable utilisation of resources in consultation with local municipalities of FBDM.

The development of priorities and strategic objectives may include:

- Developing regional landfill sites to ensure effective waste management that contributes to the health and safety of the environment; and
- Providing and sustaining solid waste collection services to ensure that all areas are kept clean, to promote waste minimisation in municipalities, to promote sanitary waste disposal at all sites and extending the current service areas in Local Municipalities to all who may require such services through refuse removal and a clean environment.

An IWMP constitutes the waste sector-planning instrument in respect of solid waste management and presents a summary of the relevant issues, priorities and requirements in municipalities.

The local IWMP ensures that waste management requirements from local development priorities are integrated into both the Local Municipality and District Municipality IDPs. This ensures that the requirements are communicated to the District Municipality (DM) and that they are included in the district's IWMP and IDP.

The IMWP of a district constitutes the solid waste management plans, proposals and targets for the area within the DM's area of jurisdiction. It is a comprehensive plan addressing all components related to solid waste management, including: social, economical, financial, technical, institutional and environmental issues. Solid waste targets and requirements are incorporated into every local municipality within the district area.

The Department of Environmental Affairs and Tourism (DEAT) specifies the content, format and processes associated with the development and adoption of IWMPs.

3.2 National Legislation / Policy

3.2.1 Constitution of South Africa – Act No. 108 of 1996

Environmental rights

Section 24 of the Constitution: Environmental Rights – gives the right to citizens to:

"to an environment that is not harmful to their health or well being: and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:

- prevent pollution and ecological degradation;
- promote conservation; and
- secure ecological sustainable development and use of natural resources while promoting justifiable economic and social development."

National, Provincial and Local Government are, in terms of Section 24, obligated to take responsible legislative, operational and other measures to ensure the rights stated above are fulfilled.

The following sections of the constitution are applicable to local government

<u>Chapter 7: Local Government Matters</u>

Section 151 – Status of municipalities:

"(3) A municipality has the right to govern, on its own initiative, the local government affairs of its community, subject to national and provincial legislation, as provided for in the Constitution."

Section 152 - Objectives of local government:

- "(1) (b) to ensure provision of services to communities in a sustainable manner;
- (1) (d) to promote a safe and healthy environment; and promote social and economic development; encourage the involvement of communities organisations in matters of local government.
- (2) A municipality must strive, within its financial and administrative capacity, to achieve the objects set out in subsection (1)."

 Section 156 Powers and functions of municipalities:
- (1) "a municipality has executive authority in respect of, and has right to administer-
- a. the local government matters listed in Part B of Schedule 4 and Part B of Schedule 5; and
- b. Part B of Schedule 4:
 - Air pollution
 - Building regulations
 - Childcare facilities
 - Electricity and gas reticulation
 - Fire fighting services
 - Local tourism
 - Municipal airports
 - Municipal planning
 - Municipal health services
 - Municipal public transport
- c. Part B of Schedule 5:
 - Beaches and amusement facilities
 - Billboards and the display of advertisements in public places
 - Cemeteries, funeral parlours and crematoria
 - Cleansing
 - Control of public nuisances
 - Control of undertakings that sell liquor to the public
 - Facilities for the accommodation, care and burial of animals
 - Fencing and fences
 - Licensing for dogs

- Licensing and control of undertakings that sell food to the public
- Local amenities
- Local sport facilities
- Markets
- Municipal abattoirs
- Municipal parks and recreation
- Municipal roads
- Noise pollution
- Pounds
- Public places
- · Refuse removal, refuse dumps and solid waste disposal
- Street trading
- Street lighting
- Traffic and parking
- d. any other matter assigned to it by national or provincial legislation.
- (2) A municipality may make and administer by-laws for the effective administration of matters which it has the right to administer.
- (3) Subject to Section 151 (4), a by-law that conflicts with national or provincial legislation is invalid
- (4) A municipality has the right to exercise any power concerning a matter reasonably necessary for, or incidental to, the effective performance of its functions."

Section 162 – Publication of Municipal by-laws

(3) "Municipal by-laws must be accessible to the public"

The legislative, functional and executive competences of national, provincial and local government are dealt with in Schedules Four and Five and are divided into Parts A and B. Part B of Schedules Four and Five lists the areas over which local government has some executive authority.

The functional areas of exclusive provincial legislative competence are listed in Section Five. Matters relevant to local government in Section 5 Part B are:

cleansing, control of public nuisances, refuse removal, refuse dumps and solid waste disposal. A municipality has executive authority over the right to administer local government matters listed in Part B of Schedules Four and Five or which were assigned to them in terms of national and/or provincial legislation. Municipalities may pass and administer by-laws for the effective administration of those matters.

Section 139 of the Constitution of South Africa provides for provincial government to interfere in the event of local government not meeting this obligation. This could include; issuing directives to local government; or assuming responsibility to the extent necessary to ensure maintenance of essential national standards; or establishing minimum standards for rendering the service to be met.

Cases where the provision of basic services is unsatisfactory, the MEC for local government may, in terms of Section 87 of the Local Government: Municipal Structures Act (Act No. 117 of 1998), allocate the functions to another municipality.

Local authorities can be subject to criminal legal liabilities in respect of actions that affects human health or cause pollution. Local communities are also subject to civil liabilities and the potential financial burdens particularly in matters related to the closure and rehabilitation of dumps and remediation of contaminated land for urban development.

3.2.2 White Paper on Integrated Pollution and Waste Management

The white paper represents formal government policy regarding integrated pollution and waste management that deals with related vision, principles, goals and objectives. It highlights important issues such as:

- A lack of priority afforded to waste management;
- Unacceptably high levels of water and air pollution;
- Sub-optimal use of natural resources; and

 Insufficient resources to monitor and implement the extensive South African waste and environmental legislation.

The white paper seeks to invoke a paradigm shift from the "end-of-pipe treatment" of waste management to an integrated pollution and waste management system and process of management. The system is aimed at minimisation at source and pollution prevention, managing the impact of pollution and waste on the receiving environment and remediation of damaged environments.

The white paper includes the following relevant strategic goals:

- An effective institutional framework and legislation;
- Pollution and waste minimisation impact management and remediation;
- Holistic and integrated planning;
- Participation and partnerships in integrated pollution and waste management governance;
- Empowerment and education in integrated pollution and waste management; and
- Information management.

3.2.3 <u>The National Environmental Management: Waste Act (Act No. 59 of 2008)</u>

Purpose of the Act – To reform to law regulating waste management.

It proposes this by "providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development; to provide national norms and standards for regulating the management of waste by all spheres of government; for specific waste management measures; and for all matters incidental thereto".

National Environmental Management Waste Act (NEMWA) is the overarching legislation governing waste management in South Africa. As such, compliance with its provisions is taken for granted by the IWMP. The IWMP highlights important areas of waste management that are important in the context of the FBDM, but does not absolve the district or any other municipality from the responsibility with complying with every aspect of this piece of legislation.

The framework that the NEMWA sets for Integrated Waste Management in South Africa includes the following:

- Giving effect to the National Waste Management Strategy (NWMS). The NWMS is in the process of being reviewed and the draft is being finalised. The NWMS should be fully developed by 2011 and according to NEMWA, the NWMS should be developed within two years of promulgation of the Act;
- Provides for the written appointment of a waste management officer in each municipality where this officer is responsible for coordinating waste management matters in that municipality;
- Setting National standards in terms of the classification of waste, provision of waste management services, the waste management hierarchy, remediation of contaminated land, waste treatment and disposal;
- IWMP's have to be prepared by Local and District Municipalities, and Provincial Waste Management Plans must be incorporated into Provincial Development Plans contemplated under the Local Government: Municipals Systems Act (Act No. 32 of 2000);
- Institutional arrangements including setting the general powers and duties of the MEC's and Provincial departments and Municipalities. Decision making powers are delegated to MEC's and the Minister, while the majority of the implementation duties area assigned to waste generators and provincial departments;
- The provision to identify priority wastes and set requirements for the management thereof. Priority wastes will be declared by the

Minister or MEC and will have implications in terms of waste generation, minimisation, storage, reuse, recycling or recovering, treatment and disposal, trade or any other measures that the MEC or minister believes are necessary to manage the threat posed by the waste; and

- Establishing the concept of General Duty of any holder or generator of waste to avoid the generation, reuse, recycle or recover and manage waste so that is does not pose a threat to health or the environment, and
- Establishing a list of waste management activities that may have a detrimental effect on the environment, which require a waste management licence, and the licensing procedures. The following waste management activities require a licence in terms of the NEMWA and should be equivalent to activities that require a Basic Assessment or EIA in terms of the NEMA respectively.

Schedule A:

Storage and Transfer of waste-

- Temporary storage of waste at a facility, including a waste transfer facility and container yard, that has the capacity to receive in excess of 30 tonnes of general waste per day or that has a throughput capacity to in excess of 20m³ per day, including the construction of a facility and associated structures and infrastructures for such storage; and
- The temporary storage of hazardous waste at a facility, including a waste transfer facility and container yard, which has the capacity to receive in excess of three tonnes of hazardous waste per day, including the construction of a facility and associated structures or infrastructure for such storage.

Recycling and recovery-

- The sorting and shredding of general waste at a facility that has
 the capacity to receive in excess of one ton of general waste per
 day, including the construction of a facility and associated
 structures or infrastructure for such sorting or shredding; and
- The recovery of waste, excluding recovery that takes place as an integral part of an internal manufacturing process, at a facility that has the capacity to receive in excess of three tonnes of general waste or 100 kilograms of hazardous waste per day, including the construction of a facility and associated structures and infrastructure for such recovery.

Treatment of waste-

- The biological, physical or physiochemical treatment of general waste or the autoclaving, drying or microwaving of general waste at a facility that has the capacity to receive in excess of 10 tonnes of general waste per day, including the construction of a facility and associated structures or infrastructure for such treatment;
- The biological or physiochemical treatment of hazardous waste or the autoclaving, drying or microwaving of hazardous waste, including the construction of a facility and associated structures and infrastructure for such treatment; and
- Treatment of waste in sludge lagoons.

Disposal of waste on land-

The disposal of inert waste, excluding the disposal of less than 25 tonnes of inert waste for the purposes of levelling and building that has been authorised by/under legislation, including the construction of facilities and associated structures and infrastructure for such disposal; and

3.2.4 The Environmental Conservation Act (73 of 1989)

The objective of the Environmental Conservation Act (ECA) is to provide for the effective protection and controlled utilisation of the environment. This Act was historically the main act that governed waste disposal in South Africa. Although sections of the ECA have been repealed, those dealing with waste matter are still in effect.

Section Nineteen provides for general prohibition against littering and illegal dumping. It further provides that "every person or authority in control of or responsible for the maintenance of any place to which the general public has access shat at all times ensure that containers or places are provided which will normally be adequate and suitable for the discarding of litter by the public".

Section 16A provides that "every person or authority in control of or responsible for the maintenance of any place to which the public has access, shall within a reasonable time after any litter has been discarded, dumped or left behind at such place (with the inclusion of any pavement adjacent to, or land situated between, such a place and a street, road or site used by the public to get access to such place) remove such litter or cause it to be removed".

Section 20(1) of the ECA stipulates that no person may establish or operate a landfill site without a permit. Although the ECA was passed in 1989, the application form for disposal site permits was published only in 1994. This resulted in landfill sites in the late 1980's and early 1990's being issued with what was known as "concept permits".

Section 20(6) of the ECA provides that no person shall discard waste in any manner except at a permitted site or such other manner and under such conditions as may be prescribed by the Minister.

The ECA also contains a provision for the Minister to make regulations pertaining to waste management. This includes matters concerning "the

location, planning and design of disposal sites and sites used for waste disposal".

Section 24(I) of the ECA allows for the Minister to introduce "the imposition of compulsory charging, deposits or related financial measures on waste types or specified items in waste types with the concurrence of the Minister of Finance" and furthermore in Section 24(B) gives authority to the Minister the power "with regard to the prohibition, control, sale, distribution, import or export of products that may have a substantial detrimental effect on the environment or on human health" (new section 24B).

DWAF have produced a Trilogy of Documents entitled: the Minimum Requirements for Waste Disposal by Landfill; Handling and Disposal of Hazardous Waste; and the Water Quality Monitoring at Waste Management Facilities (September 2005).

The Minimum Requirements documents cover:

- Classification of disposal sites. Ten classes of landfill sites are provided. The criteria used to classify a site is based on the type of waste, resulting in either a G (General) or H (Hazardous) classification, the size or volume of waste resulting in either a C (Communal), M (Medium) or L (Large), as well as the water balance, resulting in either a B⁺ (positive water balance) or B⁻ (negative water balance);
- Siting, investigation, design, permitting, operation, monitoring and closure requirements for landfills;
- Requirements for pre-treatment, disposal, handling, transportation and storage of hazardous waste, including waste prevention and minimisation; and
- · Water quality monitoring.

While the Minimum Requirements documents are not law they form the basis for the permitting process and are normally included as permit conditions, thereby becoming legally binding on the permit holder.

3.2.5 The National Water Act (Act 36 of 1998)

The National Water Act (NWA) deals with, inter alia, the protection of South Africa's water resources. The NWA defines waste as:

"any solid material, or material that is suspended, dissolved or transported in water (including sediment) and which is spilled or deposited on land or into a water resource in such volume, composition or manner as to cause, or to be reasonably likely to cause, the water resource to be polluted".

Along similar lines to NEMA, Section 19(1) of the NWA contains a pollution prevention requirement placing a pollution prevention duty on landowners, persons in control, users or occupiers of land to take all reasonable measures to prevent water pollution from occurring, continuing or recurring.

Section 21 of the NWA defines water use and includes:

- "(f) discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;
- (g) disposing of waste in a manner which may detrimentally impact on a water resource;
- (h) disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process"

Section 22 deals with permissible water uses and deals with the use of water subject to a number of conditions which include registration and licensing provisions.

3.2.6 The National Health Act (Act 61 of 2003)

The Act provides measures for the promotion of health of the inhabitants of South Africa.

Section 1 of the Act includes a lengthy discussion of nuisance, including:

- "(c) any accumulation of refuse... which is offensive or is injurious or dangerous to health;
- (g) any factory or industrial or business premises causing or giving rise to smells or effluvia which are offensive or which are injurious or dangerous to health; and
- (h) any area of land kept or permitted to remain in such a state as to be offensive".

Section 14(1)(c) obliges the Department of National Health to "take steps for the promotion of a safe and healthy environment".

Section 20(1) compels local government to take measures:

- (a) To maintain its district at all times in a hygienic and clean condition;
- (b) To prevent the occurrence within its district of any nuisance, any unhygienic condition, any offensive condition, or any other condition which will or could be harmful or dangerous to the health of any person within its district or the district of any other local authority; and
- (c) To prevent the pollution of any water intended for the use of inhabitants".

Proposed Regulations for the Control of Environmental Conditions Constituting a Danger to Health or a Nuisance were published in Government Gazette No 20796 dated 14th January 2000 dealing, inter alia, with medical

waste and including a schedule of 50 trades which are potentially polluting and which will require registration.

3.2.7 The Occupational Health and Safety Act (Act 85 of 1993)

The Occupational Health and Safety Act (OHSA) provides for the health and safety of persons at work and the protection of persons other than persons at work against hazards to health and safety concerns arising out of or in connection with the activities of persons at work. It places duties on employers and employees not to endanger the health of others and to provide a safe place of employment.

A number of regulations promulgated under the Act are important with respect to the management of hazardous substances (and therefore) hazardous wastes:

- Hazardous Chemical Substances Regulations;
- Asbestos Regulations; and
- Lead Regulations.

3.2.8 The Local Government: Municipal Structures Act (Act 117 of 1998)

This Act provides for the establishment of the three categories of Municipalities envisaged in the Constitution (which will replace the transition structures given in the Local Government Transition Act) and the division of powers and functions between the categories of Municipality.

Under Section 15 of the Act, if an existing municipality is wholly or partially superseded in terms of the act, the by-laws, regulations and resolutions of the existing municipality, to the extent that they continue to apply in the area or part of the area of the superseding municipality, must be reviewed and where necessary rationalised by the superseding municipality.

Section 84(1) of the Act relates to the functions and powers of the district municipality and details, inter alia:

- "(a) Integrated development planning for the district as a whole, including a framework for integrated development plans of all municipalities in the area of a district municipality; and
- (b) Solid waste disposal sites in so far as it relates to (i) the
 determination of a waste strategy (ii) the regulation of waste
 disposal (iii) the establishment, operation and control of waste
 disposal sites, bulk waste transfer facilities and waste disposal
 facilities for more than one local municipality in the district".

Section 88 deals with the co-operation required between the District and Local Municipalities

3.2.9 The Local Government: Municipal Systems Act (Act 32 of 2000)

The Act provides the enabling framework for planning processes. It also ensures environmentally sustainable service delivery by including the following definition in Chapter 1, with respect to the provision of a municipal service in a manner aimed at ensuring that:

- "(a) the risk of harm to the environment and to human health and safety is minimised to the extent reasonably possible under the circumstances;
- (b) the potential benefits to the environment and to human health and safety are maximized to the extent reasonably possible under the circumstances; and
- (c) legislation intended to protect the environment and human health and safety is complied with".

The process to facilitate development at a local level is referred to as Integrated Development Planning (IDP). Chapter 5 of the Act provides for IDP's with Part 2 detailing the core components of IDP's. They must include, inter alia:

 "a spatial development framework which must include the provision of basic guidelines for a land-use system for the municipality".

The Act aims to:

- Clarify the executive power of municipalities and in particular, develop the notion of a separation between the roles of "service authority" and "service provider". This lays the basis to enable municipalities to choose the most appropriate service provider from a menu of options, ranging from internal departmental delivery to corporatisation and joint ventures to private sector delivery options;
- Rationalise the system of planning into a single five year planning cycle, subject to annual monitoring and review, in which IDP's are adopted by Council as their core planning and management instrument;
- Provide a clear regulatory framework for municipal service partnerships; and
- Augment the legal capacity of municipalities to prosecute for contraventions of by-laws.

Section Four of the Act confirms the right and the duty of Council to:

"ensure the provision of municipal services to all residents and communities in a financially and environmentally sustainable manner; and promote a healthy and safe environment in the Municipality".

Section 78 assessments must be undertaken by a Municipality in terms of Section 78 of the Municipal Systems Act 2000 and Section 11 of the Municipal Systems Amendment Act 2003 whenever a municipality decides on a service delivery mechanism or whenever a municipality reviews a service delivery mechanism. There is no discretion in this regard – it is a legal requirement. The content process and format of the study are prescribed in the legislation.

S78 assessments are usually implemented in two distinct phases, viz.:

- Phase I: Situation Assessment, Output Specifications and S 78
 (1) Analysis; and
- Phase II: Section 78(3) Analysis.

Phase I of the analysis includes a detailed current situation assessment that generally entails:

- The current status of service delivery;
- Service coverage, service levels, demographics and projections;
- Physical assets;
- Organisation structure & staffing;
- Cost of the service:
- Tariff structure:
- · Comment on current situation;
- The identification of the policy and regulatory framework;
- The determination of needs and priorities;
- A study of existing reports, studies and documentation;
- Consultation with all stakeholders, including officials, councillors and other interested and affected parties; and
- Field investigations may have to be undertaken to inform this phase of the assignment.

Phase I of the assessment also provides for an assessment of the ability of an internal mechanism to render the service within the Municipality and includes:

- The determination of the optimal internal mechanism;
- The direct and indirect costs and benefits of service provision through an internal mechanism;
- The effects on the environment, human health, well-being and safety of the internal mechanism;
- The Local Municipality present and potential capacity to furnish the skills, expertise and resources for an internal mechanism;

- The potential for re-organisation and human resource development to effect delivery through an internal mechanism;
- The likely effect on development, job creation and employment patterns of an internal mechanism;
- The views of organized labour; and
- The effect of any developing trends in the sustainable provision of municipal services generally.

The municipality may, on the completion of this phase, per Section 78(2) of the Act, decide on an appropriate internal mechanism or it may decide to explore the possibility of providing the service through an external mechanism.

Phase II, the Section 78(3) Assessment, usually proceeds only if the Council decides to explore the possibility of providing waste management services through an external mechanism and usually includes:

- The identification of the optimal external services delivery mechanism;
- The direct and indirect costs and benefits;
- The capacity and future capacity of prospective service providers;
- The views of the local community;
- The likely impact on development and employment patterns;
- The views of organized labour; and
- Feasibility studies per Section 11 of the MSA Amendment Act.

3.2.10 The Polokwane Waste Summit Declaration

During September 2001 a National Waste Summit at Polokwane set a vision and goals for waste management in South Africa:

Vision: To implement a waste management system, which contribute to sustainable development and a measurable improvement in the quality of life

by harnessing the energy and commitment of all South Africans for the effective reduction in waste

Goals: To reduce waste generation and disposal by 50% and 25% respectively by 2012 and develop a plan for zero waste by 2022.

This declaration has significant implications for local government as it directs the way forward in accordance with the waste hierarchy, and supplies time frames for specific goals to be achieved.

3.2.11 Northern Cape Integrated Waste Management Plan

The Northern Cape Province compiled an Integrated Waste Management Plan in 2008. This plan sets objectives to satisfy the needs for a coherent plan to address waste management shortfalls.

The specific objectives of the Provincial IWMP include:

- Provision of an integrated waste management strategy that combines and aligns all methods of waste management in terms of the National Waste Management Hierarchy;
- To ultimately reduce the amount of waste requiring landfill disposal;
- To minimise the adverse social and environmental impacts related to waste management;
- To identify the specific roles and responsibilities of Officials in the Provincial waste management plan;
- To identify and plan for future waste management needs including financial, infrastructural and human resource requirements;
- To assess the capacity of the Northern Cape Provincial Government to fulfil the requirements of a permitting authority for the development and operation of waste disposal sites and treatment facilities;
- To minimise waste management related costs;

- To identify gaps and assess the capacity for the implementation and management of a Provincial integrated waste management plan; and
- To influence decision making on waste related programs.

Targets that were set were prioritised and attached to specific timeframes. These targets reflect on:

- Implementation of policy and legislation;
- Institutional Arrangements;
- Financial Arrangements;
- · Waste Information, Generation and Recycling;
- · Waste Collection, Treatment and Disposal; and
- Education, Awareness and Capacity Building.

3.3 Municipal By-Laws - IDP Strategies and IWMP

3.3.1 Dikgatlong Local Municipality - By-Laws and IDP

Waste Management has been listed as the sixth priority in 2008-2009 and dropped to the eleventh priority in 2009-2010. Key issues that were identified included the upgrade of existing refuse sites, the expansion and improvement of refuse removal systems and the development of a by-law on waste management.

Objectives set by the IDP are:

- To upgrade all the refuse sites to the level required by legislation within 3 years;
- To improve the entire refuse removal system to be more consistent, better managed and cost effective within the next five years; and
- To ensure proper waste management controls and procedures.

Strategies:

- By systematically upgrading all refuse sites with long term capacities, with priority on high use urban sites;
- By ensuring that all sites are located and designed in a long term,
 cost effective and environmentally sustainable manner;
- By implementing capacity saving mechanisms (e.g. compactors & incinerators) at all refuse sites;
- By promoting community awareness and commitment to the reduction of waste generation;
- By establishing and implementing an operational and maintenance management plan;
- By improving local environmental and technical knowledge; and
- By developing and implementing the waste management by-law.

This municipality has not promulgated any by-laws referring to waste and this aspect is considered a priority in the current IDP.

3.3.2 Phokwane Local Municipality - By-Laws and IDP

Waste management in Phokwane Local Municipality is not considered a major concern. The last priority listing of waste management issues in the IDP was in 2003-2004.

However, waste does still form part of the municipality's key issues but is covered in terms of the environmental concerns. The listed issues include street corner waste dumping and lack of waste recycling awareness.

The core component of the IDP includes review of the IWMP that was developed as part of the District IWMP in 2004.

The strategies imposed include ensuring a sustainable and conducive environment through effective waste management, properly managed landfills and consistent refuse collection.

Although this municipality accepted the standard by-laws, they have not been implemented in any way, due to poor waste management in the municipal area in general.

3.3.3 Sol Plaatje Local Municipality - By-Laws and IDP

Waste management has not been considered a major concern in the IDP document of Sol Plaatje until recently. This document now acknowledges the development of the IWMP as a gap and financial assistance was requested to prepare this document.

In terms of Service Delivery objectives, this municipality aims to provide an additional 2 249 households with waste removal services, in addition to the 62 000 households that are currently being serviced.

Sol Plaatje Local Municipality compiled and promulgated waste by-laws in 2006. These by-laws make provision for the municipality to prescribe waste containers for collection, conduct at disposal sites, littering and dumping and tariff charges.

Although this by-law was promulgated only in 2006, it does not take into consideration the newly promulgated Waste Act. Due to poor management it is not currently enforced.

3.3.4 Magareng Local Municipality - By-Laws and IDP

The Magareng Local Municipality IDP acknowledges waste management as part of basic service provision. However, very little attention is given to waste management in the allocation of projects and priority listings.

Waste management in Magareng Local Municipality is listed as the 10th priority for 2010-2011. This IDP also gives a clear reflection of the ward's

priorities where waste management is listed as the seventh to ninth priority. It can therefore be assumed that waste removal and general street cleaning are not considered a major problem amongst the residents of Magareng.

This municipality also adopted the standard by-laws for waste management. This by-law is outdated, having been promulgated in 1985. This includes prescriptions in terms of waste containers, garden and bulky refuse, builders refuse, objectionable refuse, disposal sites and littering.

3.3.5 Frances Baard District Municipality - By-Laws and IDP

Solid waste disposal in the FBDM Management area is listed as the third priority for 2007-2008 and in 2008-2009, this drops to the 9th priority.

Issues listed in terms of environmental health include poor waste management with illegal dumping in open spaces in residential areas as the main concern.

The environmental objectives set include implementation of the IWMP by 2010 with the strategy of coordination and operation of recycling transfer stations.

The following projects emanated from the IWMP and were implemented between 2004 and 2007:

- Upgrading of the dumping sites in Jan Kempdorp, Hartswater, Barkly West and Windsorton (2004-2005);
- Environmental Impact Assessment for the landfill and sites in Koopmansfontein, Delportshoop, Barkly West, Windsorton and Warrenton (2005-2006);
- Construction of Recycling facilities in Warrenton and Barkly West; and
- Fencing the dumping site in Koopmansfontein (2006-2007).

4. WASTE MANAGEMENT STATUS QUO

Frances Baard District Municipality (FBDM) is the smallest of five districts in the Northern Cape Province. This district municipality is divided into four local municipalities, with an additional district management area. The capital of this area, as well as the capital for the province, is Kimberley which is renowned for its diamond mining history.

Although the district management area is geographically the largest, it contains the lowest population figures of the district. The total area for the District Management Area is approximately 13 568km².

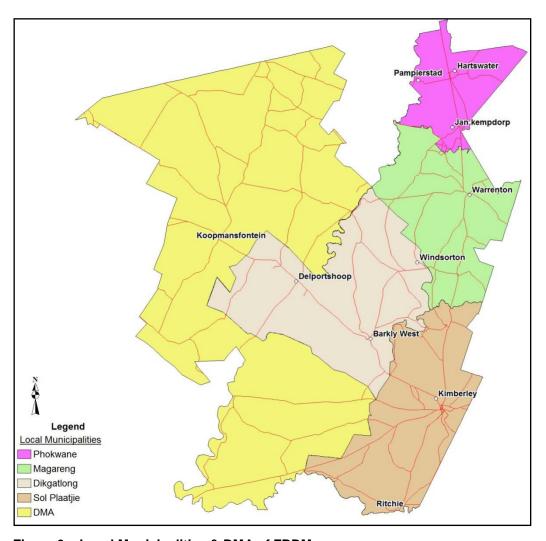


Figure 3 – Local Municipalities & DMA of FBDM

4.1 Frances Baard District Municipality

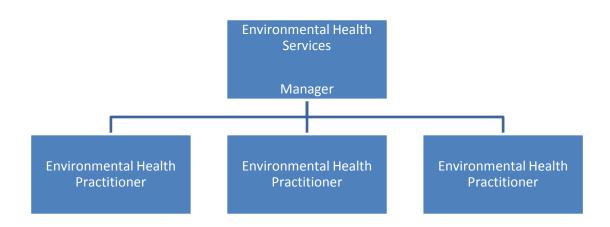


Figure 4 – Organogram of the FBDM Waste Section

4.1.1 IWMP

An Integrated Waste Management Plan was developed for FBDM in 2004. This plan was compiled by Kwezi V3 Engineers. This document identified key points that were seen as the weakest points in terms of waste management in the District. From this, various objectives, strategies and projects were derived.

Table 7 - FBDM IWMP 2008, Key Points

Category	Description		
Disposal Infrastructure Development	Main constraints experienced are the lack of waste generation data and lacking records of waste volumes collected per week. Another constraint is landfills being operational without permanent supervision and management from the local municipalities.		
	Uncontrolled dumping in and around the landfill sites are a common occurrence. This could be due to insufficient management on landfills.		
	Landfills do not have specified operating hours. Unlimited access to fenced landfill sites will result in illegal activities such as arson, theft and illegal dumping.		

Category	Description		
	No apparent operation method is used on landfills.		
Waste Collection	Access roads impassable and directional information signs are non-existent in many cases		
Infrastructure	Equipments used for waste collection is in a poor condition, with the exception of Sol Plaatje Local Municipality		
Institutional Capacity and Human Resources	There is a general shortage of staff at the landfill sites		
Financial Resources	The current billing system does not cover newly serviced areas. No income is therefore generated from these areas		
Dissemination of information/communication	No waste generation data is available		
Dissemination of	No waste generation data is available		
information/ communication	No information is available regarding neighbouring municipality's waste management. This hampers and relationships should be established		
Management of Illegal Activities	Illegal dumping in the municipal area that leads to pollution		
Waste Minimization	No strategies on waste minimization are implemented in any of the local municipalities		

4.1.2 Objectives, strategies and projects

For each of the eight specific focus areas discussed above, strategies to address the identified issues were developed. The strategies are as follows:

- Permitting of existing unlicensed disposal sites for closure or continued use;
- Upgrade or development of sites to conform to the minimum requirements for disposal by landfill sites;
- Improvement of operation and management to comply with minimum requirements;
- Investigation of future collection structures, equipment, maintenance and options to suit changing development;
- Maintenance of current collection fleet;
- Increase of human resources;
- Training of responsible personnel;
- Review of tariff structures to optimize resources;
- Introduction of record keeping system;

- Waste Information System;
- Development of strategies to minimize illegal dumping; and
- Formulation of waste minimization strategies.

The Plan further proposed a number of projects that may be implemented:

- Provision of landfill sites in four municipalities;
- Purchase of waste collection and waste disposal equipment;
- Provision of skips at strategic locations throughout the district;
- Provision of recycling containers at convenient and visible locations in the district;
- Appointment of consultant to develop and optimize collection routes;
- Provision of training to low level staff and specialized training for specialized positions;
- Preparation of waste management system for each municipality;
 and
- Appointment of private waste management company to manage larger landfill sites.

4.2 Dikgatlong Local Municipality



Dikgatlong Local Municipality is located centrally of the district and occupies an area of approximately 2 386km².

The Local Municipality consists of three towns, namely Barkly West, Delportshoop and Windsorton. The rural areas of the Local Municipality include Holpan, Longlands, Gong-Gong, Smitsmine, Stillwater, Pniel, Ulco and Gamagara. The Local Municipality has seven wards, five of which are the largest in terms of geographical area and ward 1 in terms of population size.

The head office of the municipality is situated in Barkly West. This town is situated approximately 35km north west of Kimberley.

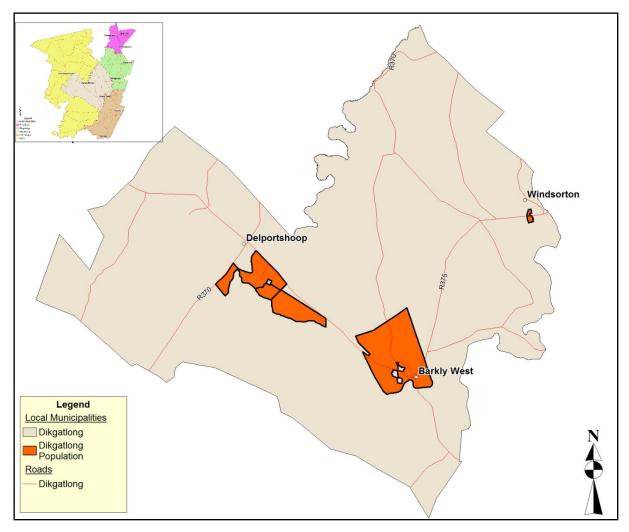


Figure 5 - Dikgatlong Local Municipality

4.2.1 <u>Department Structure</u>

Removal of residential and business refuse forms part of the Technical Services department. This department is divided into the three major towns of this local municipality, namely Barkly West, Delportshoop and Windsorton. The Technical Services Department is responsible for maintenance of all services. The Department Manager manages waste services and is responsible for waste removal and landfill management.

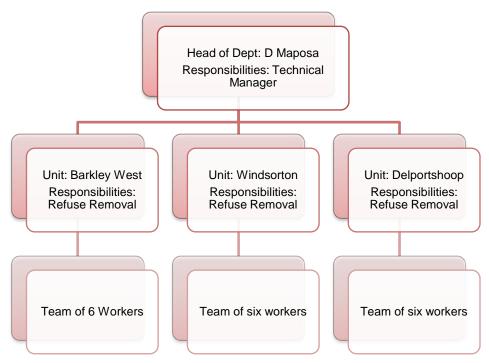


Figure 6 - Dikgatlong Local Municipality Organogram

4.2.2 Population

The population of Dikgatlong Local Municipality compiles the following areas: Barkly West, Delportshoop and Windsorton. These are further divided into smaller settlements.

The Community Survey Report (2007) reveals population growth between 2001 and 2007 as indicated in the table below.

Table 8 – Census Data (Community Survey, 2007)

Category	2001	2007
Persons	35 765	40 752
Households	9 439	10 015

Population growth in Dikgatlong Local Municipality is at a steady rate with none of the areas indicating a decrease in population. The average population growth rate for this municipality is 2% per year. This is considered a sustainable growth rate and will be used as such in determining the theoretical waste generation volumes. The table below provides population figures for the

various areas of the municipality, as well as population projections, based upon the growth rate above.

Table 9 - Projected Populations figures for Dikgatlong Local Municipality

Geographic Area	Town	2001	2007 (Estimated)	2010 (Estimated)	2015 (Estimated)
Barkly West	Barkly West	7 098	8 085	8 579	9 472
	Mataleng	6 972	7 941	8 427	9 304
Delportshoop	Delportshoop	2 826	3 219	3 416	3 771
	Tidimalo	5 838	6 649	7 056	7 791
	Sydney on Vaal	32	36	39	43
	Longlands	554	631	670	739
Ulco	Ulco	1 057	1 204	1 278	1 411
Windsorton	Windsorton	215	245	260	287
	Holpan	522	595	631	697
	Corn's Village	1 733	1 974	2 095	2 313
	Kutlwano	3 113	3 546	3 763	4 154
Rural Area	Dikgatlong	5 786	6 590	6 994	7 722
	TOTAL	35 746	40 715	43 207	47 704

From the above it is evident that population growth in this area is expected to be steady and that no major influx of people is expected, hence the gradual increase in waste generation shown in the theoretical waste generation volumes.

The percentage of the community that has access to waste disposal systems is indicated in Table 10 9. This table (derived from the Community Survey Report, 2007), indicates the type of refuse removal available to the community.

Table 10 – Types of Refuse Removal in Dikgatlong Local Municipality

Description	2001	2007
Refuse removal by local authority – once a week	59.7%	60.3%
Refuse removal by local authority – less often	4.1%	8.6%
Communal Refuse Dump	0.9%	5.5%
Own Refuse Dump	22.8%	18.1%
No Rubbish Disposal	12.6%	7.4%

Description	2001	2007
Other	-	-
TOTAL	100%	100%

This indicates that there has been an increase in waste removal services offered by the local municipality. Communal refuse dumps also increased dramatically between 2001 and 2007, with a rise of 4.6% in the community using this disposal mechanism.

Although there was only a small increase in refuse removal by local authorities on a weekly basis, this service increased by 4.5% at a lesser removal frequency. It is also evident from the above that less desirable waste disposal mechanisms, such as "own refuse dump" and "no refuse disposal" decreased between 2001 and 2007.

Income levels are considered an important aspect in determining waste generated by any given population. The population figures of each municipality were therefore investigated to determine the population percentage per income level.

Table 11 – Dikgatlong Local Municipality Income Levels

Household Income	2001 Population	% of Total
No Income	2 627	24.2
R1 – R4 800	988	9.1
R 4 801 – R9 600	2 498	23
R9 601 – R19 200	2 049	18.9
R19 201 – R38 400	1 231	11.3
R38 401 – R76 800	730	6.8
R76 801 – R153 600	491	4.5
R153 601 – R307 200	172	1.5
R307 201 – R614 400	28	0.3
R614 401 – R 1 228 800	26	0.3
R 1228 801 – R2 456 600	17	0.2
R2 457 601 and More	0	0
TOTAL	10 857	100

It is evident from the above that the largest portion of the population earns an income of less than R38 400 per annum, at approximately 76% of the total.

4.2.3 Service Areas and Equipment

Dikgatlong Municipality is divided into Residential, CBD and Industrial Collection service nodes. A waste collection service is rendered to the residential area weekly with 9 439 collection points, the CBD receives a daily service with 50 collection points and the industrial area receives a weekly service with 10 collection points. This municipality makes use of refuse bags as waste receptacles.

However, Dikgatlong Municipality stated that only 60% of this municipality's population has access to formal waste removal services. Areas that are serviced include Barkly West, Delportshoop and Windsorton. Areas that have larger populations and are not being serviced include Holpan, Stilwater, Pniel, Gong Gong and Longlands.

Hazardous waste is not collected by the municipality. All medical waste is collected by Psychem, a private collector responsible for medical waste collections in the Northern Cape.

Equipment that is owned by the municipality in the waste management division includes two trucks and six tractor and trailer combinations that are very old. Vehicles are in poor condition, but are roadworthy.

Bulk containers / skips that were used in Delportshoop for waste collection are no longer operational; the bases of containers started to collapse due to rust.

4.2.4 Waste Generation

Dikgatlong Local Municipality does not have any figures on the volumes of waste generated or collected in the area. Waste is collected haphazardly and

it can therefore not be used to make a calculated estimate on the amount of waste collected.

Hazardous waste is not collected by the municipality and there are no recycling plants in operation.

4.2.5 Waste Facilities and Disposal Sites

Dikgatlong Local Municipality has three formal waste disposal sites. These are located in Barkly West, Delportshoop and Windsorton. None of these sites are permitted.

Barkly West landfill is situated on the outskirts of the town and has an estimated size of 3 hectares. This site is fenced, but access to the site is not controlled. The site is not well managed and although a municipal representative is on site, haphazard dumping, including dumping outside the fence and on the entrance road, is allowed. Waste is not covered and burning of waste is a common occurrence.

There are several waste pickers operational on this site. Animals from nearby informal settlements are also allowed on site to forage.

Table 12 provides a summary of the most critical aspects evaluated at the Barkly West Landfill.

Table 12 - Barkly West Landfill Details

Waste Facilities and Disposal Sites							
Name of disposal site	Barkly West Landfill						
Geographic location of landfill	S: 28° 32' 02.9" E: 24° 29' 22.4"						
Permitted?	YES NO X						
Class	N/A						
Design disposal volume	N/A						
Remaining site life (Yrs)	No estimate concerning the life of the site.						
Annual disposal volume (m3)	Unknown						

Waste Facilities and Disposal Sites							
Equipment on site	None						
Access control	YES		NO	Х			
Disposal tariffs		None					
Onsite salvaging	YES	Х	NO				
Waste reclamation		Was	te Pickeı	s on site	but no formal waste reclamation		
Method of land filling (e.g. trench system)			N	o appare	ent land filling method		
How is drainage controlled?				ι	Jncontrolled		
Does adequate signage and		Yes, si	gnposts	are erec	ted at the entrance road to the site.		
proper access roads exist?							
Is this a co-disposal	No, this landfill should only accept general waste but due to limited control						
facility? If YES, explain	Dis	sposal i	s not ma	ınaged a	nd opens the possibility of co-disposal		
What management	None						
measures are applied for nuisance factors?							
How is leachate and gas				No man	agement measures		
managed?							
Rehabilitation				No reha	bilitation measures		
Final cover				1	No covering		
Expansion or closure plans	None						
Is hazardous waste accepted?	YES		NO	X	Although hazardous waste is not formally accepted, the limited control on landfill makes disposal of hazardous waste possible		



Plate 1 - Barkly West landfill, waste burning, uncontrolled dumping and animals on site



Plate 2 – Waste pickers sorting waste outside the fence

Delportshoop landfill is situated to the east of the town of Delportshoop. Access to the site is along a long, winding dirt road that passes a cemetery. The site is approximately 3 hectares in extent.

There is currently no fencing, since this has been stolen. A few waste pickers are on site. Dumping is conducted in an uncontrolled manner. There is no equipment on site and the waste is therefore not covered.

Table 13 is a summary of the most critical aspects evaluated at the Delportshoop Landfill.

Table 13 - Delportshoop Landfill Details

Table 13 – Delportshoop Landfill Details						
Waste Facilities and Disposal Sites						
Name of disposal site				Delpo	ortshoop Landfill	
Geographic location of landfill	S: 28° 25' 10.6" E: 24° 19' 40.3"					
Permitted?	YES		NO	Χ		
Class					N/A	
Design disposal volume					N/A	
Remaining site life (Yrs)			No esti	mate cor	ncerning the life of the site.	
Annual disposal volume (m3)					Unknown	
Equipment on site					None	
Access control	YES		NO	Х		
Disposal tariffs	None					
Onsite salvaging	YES	Х	NO			
Waste reclamation	Waste Pickers on site but no formal waste reclamation					
Method of land filling (e.g. trench system)	No apparent land filling method					
How is drainage controlled?	Uncontrolled					
Does adequate signage and		Yes, s	ignposts	are erec	ted at the entrance road to the site.	
proper access roads exist?						
Is this a co-disposal	No, this landfill should only accept general waste but due to limited control					
facility? If YES, explain	Disposal is not managed and opens the possibility of co-disposal					
What management	None					
measures are applied for nuisance factors?						
How is leachate and gas				No man	agement measures	

Waste Facilities and Disposal Sites						
managed?						
Rehabilitation	No rehabilitation measures					
Final cover	No covering					
Expansion or closure plans	None					
Is hazardous waste accepted?	YES		NO	X	Although hazardous waste is not formally accepted, the limited control on landfill makes disposal of hazardous waste possible	



Plate 3 – Tyre disposal and uncontrolled waste dumping



Plate 4 - Uncontrolled dumping, waste pickers visible on site

The Windsorton Landfill is situated west of the town centre. The site is approximately 2 hectares in extent and although the site is currently partially fenced, clear signs of removal of fencing are visible. Access to the site is not controlled.

A few waste pickers are present on site. No equipment is currently used on site. A waste sorting structure has been erected by FBDM. This facility is not being utilised or maintained but leaves open the possibility for waste separation if this can be properly managed.

Table 14 - Windsorton Landfill Details

Waste Facilities and Disposal Sites							
Name of disposal site	Windsorton Landfill						
Geographic location of landfill	S: 28° 20' 03.2" E: 24° 42' 07.2"						
Permitted?	YES NO X						
Class	N/A						
Design disposal volume	N/A						
Remaining site life (Yrs)	No estimate concerning the life of the site.						
Annual disposal volume (m3)	Unknown						

	Waste Facilities and Disposal Sites						
Equipment on site					None		
Access control	YES		NO	Х			
Disposal tariffs	None						
Onsite salvaging	YES	Х	NO				
Waste reclamation		Waste	Pickers	on site bu	ut no formal waste reclamation		
Method of land filling (e.g. trench system)			No	apparent	land filling method		
How is drainage controlled?	Uncontrolled						
Does adequate signage and	No						
proper access roads exist?							
Is this a co-disposal	No, this landfill should only accept general waste but due to limited control						
facility? If YES, explain	Disp	osal is	not mana	aged and	opens the possibility of co-disposal		
What management measures are applied for					None		
nuisance factors?							
How is leachate and gas			N	o manag	ement measures		
managed?							
Rehabilitation			N	o rehabil	itation measures		
Final cover				No	covering		
Expansion or closure plans	None						
Is hazardous waste accepted?	YES		NO	X	Although hazardous waste is not formally accepted, the limited control on landfill makes disposal of hazardous waste possible		



Plate 5 - Structure for waste sorting that is not utilised or maintained



Plate 6 - Uncontrolled dumping with the remaining fence structures visible in the background

4.2.6 Recycling and Reuse Initiatives

No recycling or re-use initiatives are currently driven by the municipality, nor are there any agreements in place with waste reclaimers. A few waste pickers

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are operational on site, with Barkly West having the most waste pickers and an apparently more systematic reclamation process.

Dikgatlong Local Municipality does have the necessary infrastructure for recycling and re-use on a bigger scale. A waste-sorting facility is present in Barkly West, however, this is not currently being utilised (see Plate 5 above). This facility was constructed by FBDM, but Dikgatlong Local Municipality does not have the capacity to operate or initiate recycling programmes. Another factor hampering recycling in this local municipality is the fact that so little recyclable waste is generated and that great distances exist between landfill sites and larger recycling companies, which appear to make it economically unviable.

Due to the fact that so little information is available on the amount of waste generated in each area, it is difficult to determine the amount of recyclables that can be retrieved from the waste stream.

4.2.7 Illegal Dumping and Disposal

Illegal disposal in this municipality is not considered a major problem. Small scale littering is mostly identifiable from this area. This is addressed by street cleaning. No known illegal dumping sites exist in Dikgatlong Local Municipality.

4.2.8 Finance

The Operational Budget for waste management is housed in the Environmental Management department. Waste management forms a line item in the overall budget. The amount budgeted for in the 2009/2010 financial year is R3 615 302.00.

Table 15 - Waste Removal Fees

Category	2008/2009 [R]	2009/2010 [R]
Residential	62.00	70.00
CBD	148.00	160.00
Industrial	117.00	130.00
Garden Waste (per load)	177.00	190.00
Building Rubble (per load)	298.00	330.00
Skips	224.00	250.00
Skips in Delportshoop	168.00	180.00

Although fines are set at specific tariffs, it was found that there is no enforcement of waste management and that fines are not imposed on anyone.

It was further stated that 8 452 accounts are being billed each month for waste collection. Of these bills only 10% are being paid. It is expected that this low figure can be attributed to low income levels and a large portion of the population being indigent.

The cashflow on the invoices is very low at 10%, generating an annual income of approximately R700 000. This is far below the budgeted amount of R3 615 302.00.

4.3 Phokwane Local Municipality



Phokwane Local Municipality is the most northerly local municipality in FBDM as well as geographically the smallest with an area of 837km².

The higher density population areas of Phokwane are situated in Hartswater, Jan Kempdorp, Pampierstad, Ganspan and Valspan.

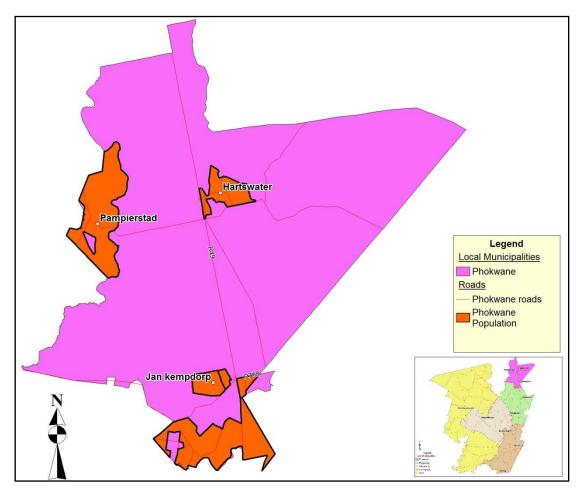


Figure 7 – Phokwane Local Municipality

4.3.1 <u>Department Structure</u>

Waste Management is a competency of the technical department of Phokwane Local Municipality.

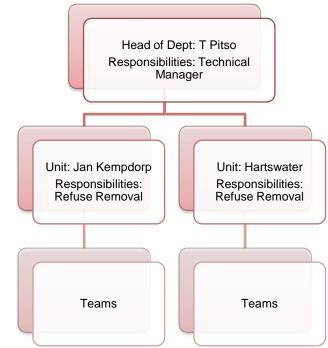


Figure 8 - Phokwane Local Municipality Organogram

The Technical Department of Phokwane Local Municipality is divided into two sections, namely the Technical Unit in Jan Kempdorp and the Technical Unit in Hartswater. These units have various teams that are jointly responsible for all service provision in the Phokwane Local Municipality.

4.3.2 Population

The Community Survey Report (2007) reveals a population increase in Phokwane Local Municipality between 2001 and 2007. This information is presented in Table 16.

Table 16 – Census Data (Community Survey, 2007)

Category	2001	2007
Persons	61 321	46 409
Households	16 807	13 770

Phokwane Local Municipality had the second largest population decrease in the district between 2001 and 2007. The estimated decline in population was determined at 4.5% per annum. Considering the relatively small site of the population, an annual decrease of 4.5% is not considered sustainable.

Therefore, the population growth rate that will be used in determining the theoretical volumes of waste generated later in the report, is 0%. This information is presented in Table 17.

Table 17 - Projected Population Figures for Phokwane Local Municipality

Geographical Area	Town	2001	2007 (Estimated)	2010 (Estimated)	2015 (Estimated)
	Andalusia Park	860	653	653	653
Jan Kempdorp	Ganspan	1 099	831	831	831
	Jan Kempdorp	16 791	12 712	12 712	12 712
Hartswater	Hartswater	5 262	3 983	3 983	3 983
панѕмацеі	Pampierstad	21 128	15 994	15 994	15 994
Rural Area	Phokwane	16 171	12 241	12 241	12 241
	TOTAL	61 314	46 415	46 415	46 415

The Community Survey Report (2007) is also useful in determining the level of waste removal services offered to the community. Table 18 provides a reflection of the waste removal services percentages in 2001 and 2007.

Table 18 - Types of Refuse Removal in Phokwane Local Municipality

Category	2001	2007
Removed by local authority weekly	39.9%	58.8%
Removed by local authority less often	6.1%	0.8%
Communal Refuse dump	10.3%	2.0%
Own Refuse Dump	35.4%	34.2%
No rubbish disposal	8.3%	4.2%
Other	-	-
TOTAL	100%	100%

From the above it is evident that the waste removal services offered by the municipality on a weekly basis increased. Most of this increase has been taken up from a decrease of the less frequent collection service. A worrying factor is the large portion of the community is still relying on their own waste disposal mechanisms. Waste disposal that is not dealt with in a controlled environment, such as through a municipal service, offers many threats to sustainable living such as pollution and vector breeding grounds.

Income levels of the population of this municipality are listed in Table 19. Population figures are evidently higher in the lower income groups with only 16% earning an income of more than R38 400 per annum.

Table 19 - Phokwane Local Municipality Income Levels

Household Income	2001 Population	% of Total
No Income	1 111	9.3
R1 – R4 800	2 308	19.4
R 4 801 – R9 600	3 119	26.2
R9 601 – R19 200	2 103	17.7
R19 201 – R38 400	1 338	11.3
R38 401 – R76 800	877	7.4
R76 801 – R153 600	681	5.7
R153 601 – R307 200	237	2
R307 201 – R614 400	60	0.5
R614 401 – R 1 228 800	25	0.2
R 1228 801 – R2 456 600	19	0.2
R2 457 601 and More	6	0.1
TOTAL	11 884	100

Fully 84% of the income earning population in the municipality earn less than R38 000 per annum.

4.3.3 Waste Generation

It was indicated by Phokwane Local Municipality that neither waste generation nor waste collection figures are available. This is due to a lack of control over the waste management and collection process.

This municipality does not have major industries or retail areas and the majority of waste is generated by households.

4.3.4 Service Areas and Equipment

Domestic waste is collected on a weekly basis and business waste collected twice weekly. Different waste receptacles are used for differing areas; refuse bags are used for household collection and in the CBD. In addition, skips are used in some of the larger volume areas of the CBD.

The municipality does not collect garden waste, unless it forms part of the domestic waste collected on a weekly basis. No measures are implemented to address garden waste if it is not packaged as part of the general waste steam.

The Phokwane waste services equipment is in poor condition. The equipment available is one TLB, 2005 model and one grader, 1995 model, both owned by the Phokwane Local Municipality. These are currently utilized in serving a 100% of the established township areas in Phokwane Local Municipality. There are also four refuse trucks carrying out collection duties for the local municipality. The specifications, age and condition of these vehicles was unknown at the time of writing.

4.3.5 Waste Facilities and Disposal Sites

Phokwane Local Municipality currently has three operational landfill sites. These sites are located in Hartswater, Jan Kempdorp and Pampierstad.

Hartswater landfill is not ideally situated since it is in very close proximity to residential areas. This facility is approximately 3 hectares in extent. Although a municipal representative is on site, this landfill is poorly managed. Fencing is lacking and no access control is being practised. A number of waste pickers are operational on site and domestic animals were also noted.

Nuisance factors on this site are particularly high because of high volumes of disposed waste and proximity to residential houses.

Feasibility investigations are currently being conducted for the location of a new landfill site for Hartswater. The proposed new site is located 2.5 kilometres to the south east of the existing Hartswater Landfill. The planned capital budget for the new site is R14 million, which is to be funded from a Municipal Infrastructure Grant allocation.

Table 20 is a summary of the most critical aspects evaluated for the Hartswater Landfill.

Table 20 - Hartswater Landfill Details

Waste Facilities and Disposal Sites						
Name of disposal site	Hartswater Landfill					
Geographic location of landfill					7° 45' 40.9" 4° 49' 09.1"	
Permitted?	YES		NO	Х		
Class					N/A	
Design disposal volume					N/A	
Remaining site life (Yrs)	No es	timate			e of the site. Investigations for a new being conducted.	
Annual disposal volume (m3)				U	Inknown	
Equipment on site	None					
Access control	YES		NO	Х		
Disposal tariffs	None					
Onsite salvaging	YES	Χ	NO			
Waste reclamation	Waste Pickers on site but no formal waste reclamation					
Method of land filling (e.g.	No apparent land filling method					
trench system)						
How is drainage controlled?	Uncontrolled					
Does adequate signage and	Yes, signposts are erected at the entrance road to the site.					
proper access roads exist?						
Is this a co-disposal	No, this landfill should only accept general waste but due to limited control					
facility? If YES, explain	Disposal is not managed and opens the possibility of co-disposa					
What management					None	

Waste Facilities and Disposal Sites						
measures are applied for nuisance factors?						
How is leachate and gas	No management measures					
managed?						
Rehabilitation	No rehabilitation measures					
Final cover	No covering					
Expansion or closure plans	No formal closure plans although feasibility investigations are conducted for a new site					
Is hazardous waste accepted?	YES	х	NO		Although hazardous waste is not formally accepted, the limited control on landfill makes disposal of hazardous waste possible	



Plate 7 – No Fencing, dumping on access roads



Plate 8 - Waste Pickers on site, uncontrolled dumping



Plate 9 - Proposed Hartswater landfill site under investigation

The Jan Kempdorp landfill site is the largest landfill of Phokwane Local Municipality. This landfill was developed on an apparent slimes dam. The site is approximately 5 hectares in extent and is situated east of town.

No management is being practised on this site and burning of waste is a frequent occurrence, due to waste not being covered. A small informal settlement is situated next to the site. Although the site is fenced, no access control is being applied.

Table 21 is a summary of the most important aspects evaluated from the Jan Kempdorp Landfill.

Table 21 - Jan Kempdorp Landfill Details

	Waste	Facilit	ies and	Disposa	Il Sites	
Name of disposal site	Jan Kempdorp Landfill					
Geographic location of landfill				_	7° 54' 37.73" 1° 52' 28.52"	
Permitted?	YES NO X					
Class					N/A	
Design disposal volume					N/A	
Remaining site life (Yrs)		ļ	No estim	ate cond	erning the life of the site.	
Annual disposal volume (m3)				ι	Jnknown	
Equipment on site	None					
Access control	YES		NO	X		
Disposal tariffs	None					
Onsite salvaging	YES	Х	NO			
Waste reclamation	Waste Pickers on site but no formal waste reclamation					
Method of land filling (e.g.	No apparent land filling method					
trench system)						
How is drainage controlled?	Uncontrolled					
Does adequate signage and	Y	es, sigr	nposts ar	e erecte	d at the entrance road to the site.	
proper access roads exist?						
ls this a co-disposal facility? If YES, explain	No. This facility was developed to only accept general waste but since there isn't any access control, co-disposal is possible.					
What management measures are applied for	None					
nuisance factors?						
How is leachate and gas			N	o mana(gement measures	

Waste Facilities and Disposal Sites						
Name of disposal site	Jan Kempdorp Landfill					
managed?						
Rehabilitation	No rehabilitation measures					
Final cover	No covering					
Expansion or closure plans	None					
Is hazardous waste accepted?	YES		NO	х	Although hazardous waste is not formally accepted, the limited control on landfill makes disposal of hazardous waste possible	



Plate 10 - Burning of garden waste dumped outside the property fence



Plate 11 - Uncontrolled dumping and waste not being covered.

Pampierstad Landfill is situated to the south of the residential area. This landfill exists in name only, but is merely an open piece of veld being used as a disposal area. The site is not fenced, there is no equipment and no management measures are applied.

Table 22 - Pampierstad Landfill Details

Waste Facilities and Disposal Sites							
Name of disposal site		Pampierstad Landfill					
Geographic location of landfill					7° 47'35.69" 4° 41'13.25"		
Permitted?	YES		NO	Х			
Class					N/A		
Design disposal volume	N/A						
Remaining site life (Yrs)	No estimate concerning the life of the site.						
Annual disposal volume (m3)	Unknown						
Equipment on site					None		
Access control	YES NO X						
Disposal tariffs	None						
Onsite salvaging	YES NO X						
Waste reclamation					No		

	Waste Facilities and Disposal Sites						
Method of land filling (e.g.	No apparent land filling method						
trench system)							
How is drainage controlled?	Uncontrolled						
Does adequate signage and					No		
proper access roads exist?							
Is this a co-disposal							
facility? If YES, explain							
What management	None						
measures are applied for nuisance factors?							
How is leachate and gas	No management measures						
managed?							
Rehabilitation	No rehabilitation measures						
Final cover	Soil						
Expansion or closure plans	None						
Is hazardous waste accepted?	YES		NO	Х			



Plate 12 - Pampierstad Landfill, no fencing and in close proximity to residential areas

4.3.6 Recycling and Reuse Initiatives

There are currently no waste recycling or reuse initiatives in place. It is expected that recycling is hampered by the relatively small population occupying this Municipal area, which thus reduces the amount of recyclable material being generated.

Waste pickers are present on landfill sites in Hartswater and Jan Kempdorp. These waste pickers are low in numbers, which serves as a further indication of the possible low levels of recyclable material present.

4.3.7 Illegal Dumping and Disposal

Illegal dumping is not considered a major problem in this municipality due to the high service area. Illegal dumping is more evident on the entrance roads to landfills and this could be brought under control through better waste management at landfill sites.

It is reported that there is one illegal dumping site on agricultural private property in Ganspan. Regardless of attempts to avoid, manage and control dumping, this site is still being utilised - causing a nuisance to the landowner.

4.3.8 Finance

The Operational Budget for waste management forms a line item in the overall budget. The amount budgeted for in the 2009/2010 financial year is R3 713 670. A budget of R300 000 is allocated to dumping sites.

Waste disposal fees invoiced per annum are R4 539 084. 100% of the service area is being billed but only 20% of waste bills are being paid, which equates to an income of R907 816 per annum. There are no other sources of income for waste management within the Phokwane Municipality.

Table 23 - Waste Removal Fees

Category	Monthly Fee [R]
Residential	R 41.40
CBD	R 64.44
Bulk containers	R 84.24
Schools	R 32.90
Garden / Building Rubble (per load or part thereof)	R 135.00

4.4 Sol Plaatje Local Municipality



Sol Plaatje is not geographically the largest local municipality in the district, with a size of approximately 1 883km², however, this municipality has the

largest economy, largest population and the highest population growth rate for the district.

The most significant population centres are located in Kimberley and Richie.

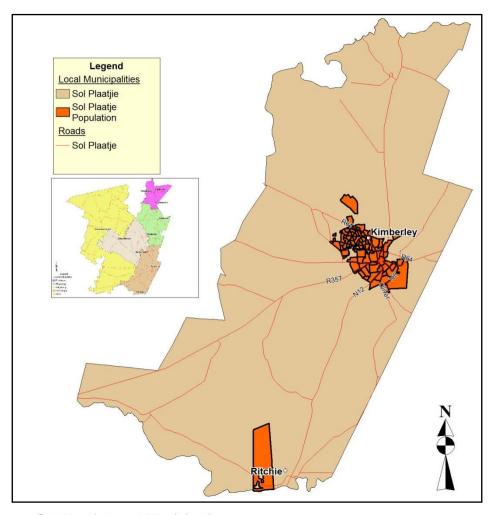


Figure 9 – Sol Plaatje Local Municipality

The figure above shows details of the Sol Plaatje Local Municipality.

4.4.1 Department Structure

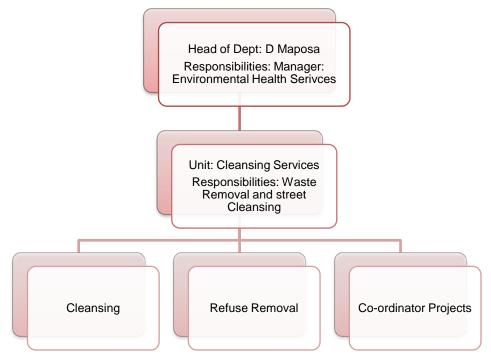


Figure 10 – Sol Plaatje Local Municipality Organogram

Waste Removal is housed in the Environmental Health Services of the Sol Plaatje Local Municipality. The unit currently responsible for waste services is housed in the Cleansing Services Unit. This Unit is divided into Cleansing, Refuse Removal and Co-ordinator Projects, which include projects such as community awareness.

It was indicated during an interview with the head of department that sufficient capacity exists to operate Waste Services, but that this competency was transferred to this department late in 2009 from the Technical Services Department. Management control should therefore be regained before this unit can be efficiently operated.

4.4.2 Population

The Community Survey Report reveals that the population of Sol Plaatje Local Municipality increased between 2001 and 2007.

Table 24 - Census Data (Community Survey, 2007)

Category	2001	2007
Persons	201 465	243 018
Households	50 249	52 120

Sol Plaatje Local Municipality has the most significant population growth in the district and has been calculated at 3% per annum between 2001 and 2007. Considering the decline in neighbouring local municipalities, it can be expected that migration from areas such as Phokwane Local Municipality and Magareng Local Municipality contributed towards this high growth rate.

From the above growth rate, population estimates were made for the current population as well as the projected population in Sol Plaatje to 2015. Table 25 is a summary of population figures expected if the annual growth rate is sustained.

Table 25 – Projected Population Figures for Sol Plaatje Local Municipality

	2001	2007 (Estimated)	2010 (Estimated)	2015 (Estimated)
Galeshewe	103 722	125 089	136 688	158 459
Kimberley	62 538	75 421	82 415	95 541
Motswedimosa	5 512	6 647	7 264	8 421
Ritchie	5 707	6 883	7 521	8 719
Roodepan	18 963	22 869	24 990	28 970
Sol Plaatje	5030	6 066	6 629	7 684
TOTAL	201 472	242 976	265 506	307 795

From the above it is evident that a growth rate of 3% over a period of 14 years will result in a population that is approximately 100 000 more than in 2001. Managing the additional waste generated by this increased population will have to be carefully planned so as to avoid many of the waste management challenges that exist in the municipality.

The Community Survey Report gave a summary of the expected percentage distribution of households by type of refuse disposal. This is summarised in Table 26 below.

Table 26 - Types of Refuse Removal in Sol Plaatje Local Municipality

Category	2001	2007
Removed by local authority weekly	91.2%	91.8%
Removed by local authority less often	0.4%	0.2%
Communal refuse dump	1.6%	0.2%
Own refuse dump	4.3%	5.5%
No rubbish disposal	2.5%	2.2%
Other	-	0.1%
Total	100%	100%

From the above it is evident that the waste removal service offered by the local municipality did not change dramatically between 2001 and 2007. The percentage of community that does have access to waste removal services is currently high. If capacity exists, investigations should be conducted to provide a more sustainable waste removal service to the community which is responsible for its own refuse removal.

Table 27 is a summary of the income levels of the population in 2001. It is not expected that the ratio of income between the various brackets would have changed dramatically between 2001 and 2010. Income levels are important in determining the expected waste generation volumes for the municipality.

Table 27 - Sol Plaatje Local Municipality Income Levels

Household Annual Income	2001 Population	% of Total
No Income	8 229	16.9
R1 – R4 800	2 430	5.0
R 4 801 – R9 600	8 642	17.7
R9 601 – R19 200	8 223	16.9
R19 201 – R38 400	7 831	16.0
R38 401 – R76 800	5 840	12.0
R76 801 – R153 600	4 396	9.0

Household Annual Income	2001 Population	% of Total
R153 601 – R307 200	2 329	4.8
R307 201 – R614 400	550	1.1
R614 401 – R 1 228 800	154	0.3
R1 228 801 – R2 456 600	118	0.2
R2 457 601 and More	50	0.1
TOTAL	48 792	100.0

From Table 27 it is evident that a very high percentage of the community (73%) earns less that R38 400 per annum. This is considered the low income group.

4.4.3 Waste Generation

No data is available on waste generation or waste collection in this municipality.

Waste collection trucks collect from specific routes, but the municipality does not know the capacity of waste being dumped and how often collection trucks visit the landfill. Since this facility does not have a weigh bridge or any recording system for waste being disposed of at the Kimberley Landfill, estimates cannot be made to determine the actual amount of waste disposed of monthly.

Garden waste is collected at a fee or disposed with domestic waste. A garden waste site was operational until recently in Kimberley, but due to the limited control on landfills, this waste was increasingly taken up in the general waste stream. With the existing management problems experienced, this facility is temporarily closed.

4.4.4 Service Areas and Equipment

Waste is collected on a weekly basis in residential areas and the frequency in CDB areas varies from twice a week to daily collections. All collection services use one of twelve rear end loading waste compactors, except for collection in the CBD, which is supplemented through two community waste contractors operating tractor-trailer combinations. Special collections, street cleaning and waste dumping cleanups are carried out using a variety of open topped vehicles. There are thirteen such specialised vehicles.

The population being served by residential waste collections is approximately 220 000 people. This figure excludes farming areas and informal settlements currently in this municipality and includes 100% of the areas that have undergone township establishment.

4.4.5 Waste Facilities and Disposal Sites

There are currently two landfill sites in the Sol Plaatje Local Municipality. These are the permitted site in Kimberley and the un-permitted site in Ritchie.

The Kimberley Landfill is in bad condition and urgent attention should be given to the management thereof. Waste is disposed of anywhere in the vicinity of the landfill (formal access roads, illegal access roads etc). Waste burning is a common practice; this is aggravated by the large number of tyres being disposed of.

No management is currently practised in terms of land filling systems, drainage control, nuisance factors, hazardous waste disposal, leachate or gas.

Table 28 is a summary of the most important aspects evaluated during this status quo analysis.

Table 28 - Kimberley Landfill Details

	Waste Facilities and Disposal Sites						
Name of disposal site		Kimberley Landfill					
Geographic location of landfill	S: 28° 44' 11.0" E: 24° 44' 20.4"						
Permitted?	YES	YES X NO					
Class							
Design disposal volume							
Remaining site life (Yrs)			6 yea	ırs – 20 y	ears if properly managed		
Annual disposal volume (m3)					Unknown		
Equipment on site					TLB		
Access control	YES		NO	Х			
Disposal tariffs		None					
Onsite salvaging	YES	Х	NO				
Waste reclamation		Was	te Picke	rs on site	but no formal waste reclamation		
Method of land filling (e.g. trench system)	No apparent land filling method						
How is drainage controlled?	Uncontrolled						
Do adequate signage and proper access roads exist?	Yes, signposts are erected at the entrance road to the site.						
Is this a co-disposal facility? If YES, explain	No. T				d to only accept general waste but since ss control, co-disposal occurs.		
What management measures are applied for nuisance factors?	No management currently, vector control every second week when landfill is managed						
How is leachate and gas managed?	No management measures						
Rehabilitation				No rehal	bilitation measures		
Final cover	No covering						
Expansion or closure plans					No		
Is hazardous waste accepted?	YES	Х	NO		Medical waste, carcasses and possible others – No access control on site		



Plate 13 – Landfill Compactor Operational on site



Plate 14 – Uncontrolled dumping



Plate 15 - Dumping on access road to landfill

The Ritchie landfill started as a communal dump outside the small town of Ritchie. This probably occurred due to the distance between Ritchie and the Kimberley landfill.

Ritchie landfill is currently not fenced and there is no equipment on site to assist with waste management. An informal settlement is located in close proximity to the landfill.

Table 29 - Richie Landfill Details

Waste Facilities and Disposal Sites								
Name of disposal site	Ritchie Landfill							
Geographic location of landfill	S: 29° 01' 08.2" E: 24° 35' 23.2"							
Permitted?	YES		NO	Х				
Class	N/A							
Design disposal volume	N/A							
Remaining site life (Yrs)	No estimate concerning the life of the site.							
Annual disposal volume (m3)	Unknown							
Equipment on site	None							
Access control	YES		NO	Х				

Waste Facilities and Disposal Sites									
Disposal tariffs	None								
Onsite salvaging	YES	Х	NO						
Waste reclamation	Waste Pickers on site but no formal waste reclamation								
Method of land filling (e.g. trench system)	No apparent land filling method								
How is drainage controlled?	Uncontrolled								
Does adequate signage and proper access roads exist?	Yes, signposts are erected at the entrance road to the site.								
Is this a co-disposal facility? If YES, explain	No. This facility developed as communal dump site and is expected to only accept general waste but since there isn't any access control, codisposal is possible.								
What management measures are applied for nuisance factors?	None								
How is leachate and gas managed?	No management measures								
Rehabilitation	No rehabilitation measures								
Final cover	No covering								
Expansion or closure plans	Once the site is fenced, permitting will be applied for.								
Is hazardous waste accepted?	YES		NO	Х	The likelihood of hazardous waste is low				



Plate 16 - Disposal in possible old borrowpit



Plate 17 - Informal settlement approximately 200m from site

4.4.6 Recycling and Reuse Initiatives

There are currently no recycling or reuse facilities in this local municipality. Although a garden composing site was operational until very recently, this facility has been temporarily closed. The decision to close this facility was in

order to free up resources to get general waste management under control. Furthermore, garden waste was increasingly taken up in the general waste stream and this reduced the efficiency of the garden waste disposal site.

4.4.7 Illegal Dumping and Disposal

Sol Plaatje indicated that illegal dumping is not considered a major concern. Illegal dumping is occurring near the landfill site but no other areas of concern were mentioned. It was indicated that all types of waste are currently accepted at the Kimberley landfill until this aspect can be better regulated to avoid illegal dumping.

Waste cleaning is not done in a scheduled manner but is conducted as the need arises.

Illegal dumping was noticed on a large scale around the boundaries of Galeshewe, west of Kimberley.

4.4.8 Waste Characterisation

No information on waste characterisation exists in any municipality in the District. To gain some insight into the nature of the waste stream in the district, a waste characterisation study was carried out in the Sol Plaatje Local Municipality. This municipality was selected as it generates the greatest waste volumes of all the municipalities in the district.

The waste characterisation, as conducted in the week of 21 - 25 June 2010, involved collecting refuse bags from outside houses. The refuse was brought back to the depot and weighed. Each household's waste was then split into the broad recyclable components and each component weighted. A total of 20 household's refuse was collected over the week, with an even distribution of waste from four household income categories: very low, low, middle and high.

Income categories as presented in Section 6 are a combination of very low and low income groups.

The table below shows the average percentage, by mass, of each waste fraction present.

Table 30 - Average Percentage, by mass, of the Waste Stream

	Very Low Income	Low Income	Middle Income	High Income	Overall Composition
No. Of Households	5	2	8	5	20
Paper	24.8%	18.5%	9.0%	36.7%	20.8%
Plastic	15.3%	15.9%	13.1%	29.7%	18.1%
Metal	1.7%	7.2%	1.8%	3.1%	2.6%
Cans	0.5%	0.0%	0.3%	0.8%	0.5%
Glass	8.7%	6.1%	15.2%	2.5%	9.5%
Garden	5.4%	19.4%	16.1%	0.0%	9.7%
Other	43.6%	32.9%	44.3%	27.2%	38.7%

The table demonstrates that 48.5% of the waste stream was either garden waste or other waste. Other waste was generally household putrescibles. Neither one of these waste streams is recyclable.

This implies that the remaining 51.5% of the waste stream is potentially recyclable. Caution should be applied when using this figure since paper wastes are only recyclable when they are dry and thin plastic is generally not recyclable. As an estimate, 50% of this waste fraction would be recyclable, given an overall recyclable fraction of 25% of the waste stream in the local municipality.

The average mass values of the households surveyed are shown in the table below.

Table 31 - Average Waste Fraction Masses

	Very Low Income	Low Income	Middle Income	High Income	Overall Average
No. Of Households	5	2	8	5	20
Paper [kg]	2.2	2.8	1.9	9.0	3.9
Plastic [kg]	1.7	2.4	2.6	4.9	2.9
Metal [kg]	0.2	1.0	0.3	0.5	0.4
Cans [kg]	0.0	0.0	0.1	0.2	0.1
Glass [kg]	0.2	1.0	3.9	3.2	2.5
Garden [kg]	0.0	3.5	4.9	2.2	2.9
Other [kg]	2.2	4.9	10.3	13.6	8.5
Overall Average [kg]	6.5	15.5	24.1	33.5	21.2

The survey showed an average disposed of waste mass of 21.2kg per household per week.

The study has the following limitations. The first is that the survey was conducted during one winter week of the year. During summer months the percentage garden waste increases dramatically, according to anecdotal evidence at the Kimberley Cleansing unit. Verbal discussions have resulted in waste masses that could be double what they are in winter, largely due to the extra garden waste that is collected from households. Thus the average waste mass is an under-estimate.

Other limiting factors include the low number of samples, the limited sampling period and sorting accuracy. All of these factors introduce variance into the results.

With regards to sewerage sludge and its disposal, all the sludge is treated on site at the sewer plants, and no sludge reaches the municipal landfills.

4.4.9 Medical Wastes

Health are risk waste is the responsibility of the Provincial Department of Health. The majority of the health care risk waste in the district is generated in the Sol Plaatje Local Municipality. The single Northern Cape provincial hospital is in Kimberley. Clinics are located in every large population centre in the district, with SPLM having three provincial clinics and 6 municipality run clinics. Large clinics are also located in Warrenton, Hartswater, Jan Kempdorp, Pampierstad and Barkly West. As an example of volumes, the SPLM-run clinics treat 36 000 patients per month.

The current management system for healthcare risk waste in the district is that medical facilities package the waste in approved containers, which are collected for disposal in Gauteng. The collection and disposal contractor is currently Psychem Waste Solutions. This healthcare risk waste process is managed by the provincial Department of Health and should cover private health facilities.

Evidence collected during visits to landfill sites and to municipal officials, indicates that the system is currently not working, owing mainly to a lack of approved medical waste containers. This leads to a diversion of heathcare risk waste to municipal waste streams. The problem appears to be most acute in the SPLM.

4.4.10 Finance

The waste budget allocated for Waste Management in the annual budget of Sol Plaatje was R31.2 million in 2009. This was increased to R33.7 million to be appropriated in the 2010 budget.

Sol Plaatje Local Municipality is also in the privileged position of relatively high payment rates generated by household collection. Approximately 42 000 accounts are being issued each month and the average pay rate is 75%.

Waste tariffs are being charged as follows:

Table 32 - Sol Plaatje Waste Removal Fees

Category	2009 (R/month)	2010 (R/month)	
Households	56.30	63.47	
Flats	28.35	31.95	
Business and Industrial	330.00	372.00	

Projected revenue for the waste service, in 2009/10, was:

- Refuse Service Charges R28.99 million;
- Hire of Containers R2.25 million;
- Refuse Removal Charges R30 000.

Thus total projected revenue was R31.27 million, some R6.87 million higher than the operational costs for the waste service. This figure is some R500 000 more than the total service provision costs, including project costs.

4.5 Magareng Local Municipality



Magareng lies within the FBDM and is bordered by Phokwane, Dikgatlong and Sol Plaatje. Warrenton, the administrative centre of Magareng, is situated approximately 77 kilometres north of Kimberley.

The urban nodes of Magareng include Warrenton, Warrenvale and Ikhutseng, Majeng and Bullhill

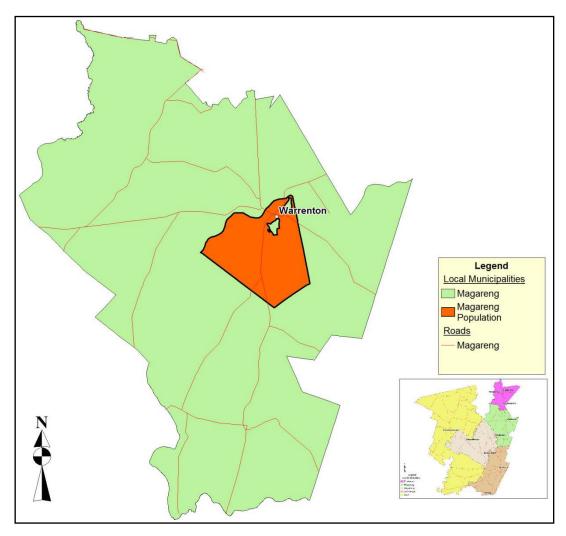


Figure 11 – Magareng Local Municipality

4.5.1 Department Structure

Waste Management in the Magareng Local Municipality is housed in the Technical Services Department.

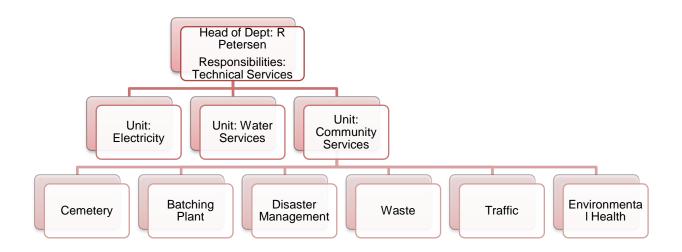


Figure 12 - Magareng Local Municipality Organogram

As indicated above, the Community Services Unit, which falls under the head of Technical Services, is responsible for cemeteries, batching plant, disaster management, traffic, environmental health and waste removal services.

Waste removal services include management of landfills, waste removal and cleaning.

4.5.2 Population

The population of Magareng Local Municipality between 2001 and 2007 is indicated in Table 33 below as derived from the Community Survey Report (2007).

Table 33 - Census Data (Community Survey, 2007)

Category	2001	2007
Persons	21 733	20 433
Households	5 726	5 669

Between 2001 and 2007, the total population of Magareng Local Municipality declined by 1% annually. This can possibly be ascribed to the fact that Phokwane Local Municipality and Sol Plaatje Local Municipality are the two

neighbouring local municipalities that offer greater job opportunities than Magareng Local Municipality.

An annual decline of 1% is considered as sustainable and population estimates will be made according to this decline. Taking this into account the following projections are made with regards to population size in the various areas of Magareng Local Municipality.

Table 34 – Projected Population figures for Magareng Local Municipality

Town	2001	2007 (Estimated)	2010 (Estimated)	2015 (Estimated)
Ikutseng	10 216	9 603	9 317	8 861
Magareng	3 557	3 343	3 244	3 085
Warrenton	7 963	7 485	7 262	6 906
TOTAL	21 733	20 431	19 822	18 850

From the above, it is estimated that the current population is approximately 19 800 and that this figure will roughly decrease by 1 000 in the next five years.

The Community Survey Report (2007) gives an indication of waste removal types practised by each local municipality. This indicates the municipality's performance in improving the collection service.

Table 35 – Types of Refuse Removal in Magareng Local Municipality

Category	2001	2007
Removed by local authority weekly	34.7%	71.8%
Removed by local authority less often	22.7%	0.9%
Communal Refuse Dump	1.7%	1.0%
Own Refuse Dump	31.0%	12.6%
No rubbish disposal	9.9%	12.9%
Other	-	0.8%
Total	100%	100%

From Table 35 it is evident that the Magareng Local Municipality made substantial progress in providing a weekly waste removal service to the

residents of Magareng. The only concern is that a quarter of the population is still without any form of waste removal and has to rely on its own devices. This could result in unacceptable waste disposal measures leading to pollution and vector breeding grounds.

Table 36 - Magareng Local Municipality Income Levels

Household Annual Income	2001 Population	% of Total
No Income	1 321	23.1
R1 – R4 800	730	12.7
R 4 801 – R9 600	1 487	26
R9 601 – R19 200	987	17.2
R19 201 – R38 400	566	9.9
R38 401 – R76 800	371	6.5
R76 801 – R153 600	167	2.9
R153 601 – R307 200	63	1.1
R307 201 – R614 400	16	0.3
R614 401 – R 1 228 800	3	0.1
R 1228 801 – R2 456 600	15	0.2
R2 457 601 and More	0	0
TOTAL	5 726	100

The table above provides the percentage of the population that falls in each of the population brackets. The table shows that 89% of the population earned less than R38 000 per year in 2001. The percentages used in this table will be used in the theoretical waste generation rate calculation in Section 5 of this report.

4.5.3 Service Areas and Equipment

Waste collection is done on a weekly basis in Warrenton, Warrenvale and Ikhutseng. The total number of service points is 4 153. Warrenton makes use of refuse bags as waste receptacle, but all of the other areas do not have any prescribed waste receptacles; any available container is used for removal by the municipality.

Currently a waste removal service is not rendered to the rural areas, private land, Windsorton Station and Molekos Farm.

The municipality uses a six cubic meter rear end loading compactor and a tractor and trailer combination for waste collection. The condition of both these vehicles is poor. A TLB is available for use on the landfill, this vehicle is borrowed from the municipality roads department. However its use is not ideal with a high incidence of punctures keeping the vehicle's service availability low.

4.5.4 Waste Generation

There is no data available on waste generation in this municipality or waste collection by this municipality.

4.5.5 Waste Facilities and Disposal Sites

The Warrenton landfill is the only landfill for the Magareng Local Municipality. This landfill is situated to the east of town, in Ikhutseng.

This landfill is in a very poor state. Illegal dumping is being practised to such an extent outside the fence that the entrance to the landfill can hardly be reached. No access control or management systems are in place regardless of the site being fenced. The guardhouse has been vandalised and the fence is slowly being removed.

Cattle are grazing freely and a number of waste pickers are on site. An informal settlement has been established outside the boundary of the landfill.

Table 37 is a summary of the most important aspects evaluated on the Warrenton Landfill.

Table 37 - Warrenton Landfill Details

	Was	te Faci	lities an	d Dispos	sal Sites
Name of disposal site		Warrenton Landfill			
Geographic location of landfill	S: 28° 07' 29.4" E: 24° 52' 41.2"				
Permitted?	YES		NO	Х	
Class					N/A
Design disposal volume					N/A
Remaining site life (Yrs)			No est	imate cor	ncerning the life of the site.
Annual disposal volume (m3)					Unknown
Equipment on site		T			None
Access control	YES		NO	Х	
Disposal tariffs					None
Onsite salvaging	YES	Χ	NO		
Waste reclamation		Was	te Picke	rs on site	but no formal waste reclamation
Method of land filling (e.g. trench system)	No apparent land filling method				nt land filling method
How is drainage controlled?	Uncontrolled				
Does adequate signage and proper access roads exist?	Yes, signposts are erected at the entrance road to the site.				ed at the entrance road to the site.
Is this a co-disposal facility? If YES, explain	No. T				d to only accept general waste but since control, co-disposal is possible.
What management					None
measures are applied for nuisance factors?					
How is leachate and gas managed?	No management measures				
Rehabilitation				No reha	bilitation measures
Final cover				N	No covering
Expansion or closure plans				No for	mal closure plans
Is hazardous waste accepted?	YES		NO	х	Although hazardous waste is not formally accepted, the limited control on landfill makes disposal of hazardous waste possible



Plate 18 - Sheep grazing between waste dumped on the entrance road



Plate 19 – Evidence of waste burning outside landfill fence



Plate 20 - Tractor and trailer dumping outside landfill area



Plate 21 - Informal settlements nearby

4.5.6 Recycling and Reuse Initiatives

No recycling and reuse initiatives are currently operational in this local municipality.

4.5.7 Illegal Dumping and Disposal

Illegal dumping was raised as a concern by Magareng Local Municipality in the areas of Ikhutseng, Warrenvale and Warrenton. These are areas that are currently being serviced.

Garden waste was specifically flagged as a concern. This is not collected as part of the municipal service.

Clean-ups of littering are conducted as the need arises. Waste illegally disposed of is not in very large quantities, ranging in size from wheelbarrow loads to bakkie loads of waste. Street sweeping has been part of the municipal service but has been stopped due to high costs to perform this operation. Cleaning is therefore not scheduled but conducted as the need arises.

4.5.8 Finance

The waste budget for 2009 was R4 947 600. This decreased in the 2010 budget to R3 730 136.

Waste income is generated on a flat rate of R49.52 per month. This amount is billed for households, businesses and industrial areas. Approximately 5 200 accounts are sent out each month, of which approximately 45% are paid in full. This implies a monthly waste income of R115 877, equivalent to an annual income of R1 390 521.

4.6 Frances Baard District Management Area



The Frances Baard District Management area forms the western boundary of the district. Although this area is geographically the largest management area in the district, the population is the smallest. The District Management Area is approximately 573 415 hectares.

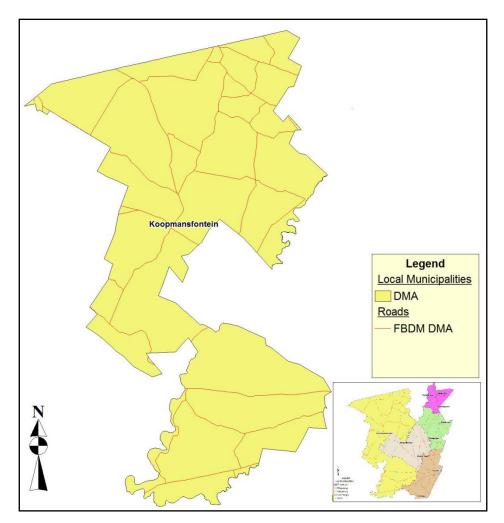


Figure 13 - FBDM Management Area

4.6.1 <u>Department Structure</u>

Waste removal in the FDBD DMA is housed in the Environmental Health department. Figure 14 is a summarised organogram of this department.

FBDM IWMP – August 2010

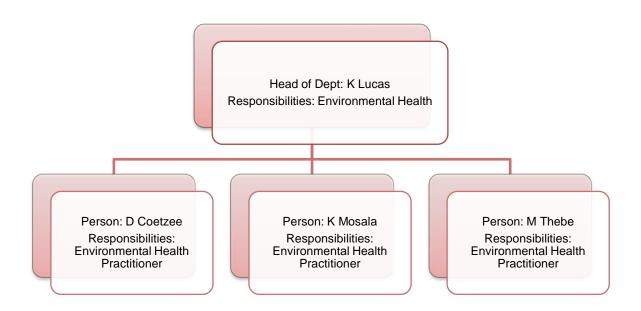


Figure 14 – FBDM Management Area Organogram

Waste removal from residential, school and community centres forms part of this Department's functions.

The other, non-waste, priorities of the Department are:

- 1. Water quality monitoring;
- 2. Food control;
- 3. Health surveillance of premises;
- 4. Surveillance and prevention of communicable diseases;
- 5. Vector control;
- 6. Environmental pollution control; and
- 7. Chemical safety.

4.6.2 Population

The population of FBDM Management Area is very low in comparison to the rest of the district and contributes approximately 1.4% to the total population. The Community Survey Report was used to determine the population growth rate and to estimate the population figures expected in 2010 and 2015. This is presented in Table 38 below.

Table 38 – Population Projections for FBDM Management Area

Category	2001	2007	2010 (Estimated)	2015 (Estimated)
Persons	5 218	2 588	2588	2588
Households	1 636	1 314	1314	1314

The population of the Frances Baard District Management Area drastically decreased between 2001 and 2007. The rate of decline has been determined at 11% per annum. Due to this extremely high figure and consideration of the small population size, this rate of decline is not considered sustainable. It is therefore assumed that the population of FDBM Management Area will stay constant between 2007 and 2015.

The Community Survey Report (2007) summarised the percentage distribution of households by type of refuse disposal. This information is presented in Table 39.

Table 39 – Refuse Removal Types in FBDM Management Area

Category	2001	2007
Removed by local authority weekly	3.1%	5.9%
Removed by local authority less often	0.9%	4.9%
Communal Refuse Dump	3.8%	8.3%
Own Refuse Dump	82.8%	70.7%
No rubbish disposal	9.5%	9.3%
Other	-	1.0%
TOTAL	100%	100%

The figures presented in Table 39 do not reveal an acceptable picture in terms of waste removal mechanisms used. Only 10.8% of the population receives a service from the local authority. However, it should be considered that the population of the FBDM DMA is very small and distributed over a very large area. Waste removal is therefore unlikely to be highly problematic given the rural nature of the population.

Income level is the single most important factor in determining waste generated by a given population group. Table 40 gives an indication of income generated by individuals in 2001.

Table 40 - Population Income Levels in FBDM DMA

Household Annual Income	2001 Population	% of Total
No Income	45	3.2
R1 – R4 800	169	11.9
R 4 801 – R9 600	476	33.4
R9 601 – R19 200	427	30
R19 201 – R38 400	140	9.8
R38 401 – R76 800	66	4.6
R76 801 – R153 600	58	4.1
R153 601 – R307 200	37	2.6
R307 201 – R614 400	6	0.4
R614 401 – R 1 228 800	0	0
R 1228 801 – R2 456 600	0	0
R2 457 601 and More	0	0
TOTAL	1 424	100

From Table 40 it is concluded that the majority of the population falls within the low income group, with 88.3% earning incomes of less than R38 400 per annum.

4.6.3 Waste Generation

Frances Baard Municipality is divided into residential, school and community centres service areas. Black refuse bags are collected from residential, school and community areas every second week. No hazardous waste is disposed of on the landfill site and none is accepted. The total domestic waste generated is ±4 ton per annum.

The only landfill site is situated in Koopmanshoop. This landfill has been operational since March 2010 and it is unlikely to have sufficient data to draw comparison figures from.

4.6.4 Service Areas and Equipment

No hazardous waste is disposed of on the landfill site. Frances Baard District Municipality is responsible for waste services in Koopmansfontein. The total of population services is ± 200 and the number of households serviced is 38.

The other areas in the District Management Area consist of farms and rural land where the owners are responsible for waste services. The population in FBDM Management Area is spread over a very large area and settlements are very small. It is therefore not economically viable to render services to such areas.

Waste collection is carried out by a service provider on a short-term contract; all equipment is owned by the service provider, Mabonga Trading Company. The equipment in question is detailed in the table below.

Table 41 – FBDM DMA Equipment

Туре	Model	Year	Condition	Ownership	Number off
Bakkie	Ford	2001	Good condition	Mabonga Trading Company	1
Trailer	Venter	2000	Good condition	Mabonga Trading Company	1

4.6.5 Waste Facilities and Disposal Sites

The only disposal site in the FBDM Management Area is the new Koopmansfontein Landfill site. This site has an expected remaining site life of ± 30 years. Access to the site is controlled and associated infrastructure includes fencing, locked gates and a guardhouse.

Geology of this site does not support trenching and cover material has to be imported. Waste is covered daily. No hazardous waste is accepted.

There is currently no equipment on site.

Table 42 - Koopmansfontein Landfill Details

Table 42 – Koopmansfontein Landfill Details											
Waste Facilities and Disposal Sites											
Name of disposal site				Koopma	ansfontein Landfill						
Geographic location of landfill	S: 28° 14' 10.4" E: 24° 02' 08.4"										
Permitted?	YES		NO	X							
Class	N/A										
Design disposal volume	N/A										
Remaining site life (Yrs)	± 30 years										
Annual disposal volume (m3)	Unknown										
Equipment on site	None										
Access control	YES	Х	NO								
Disposal tariffs	None										
Onsite salvaging	YES		NO	X							
Waste reclamation	None										
Method of land filling (e.g. trench system)	Land building										
How is drainage controlled?	Uncontrolled										
Does adequate signage and proper access roads exist?	None										
Is this a co-disposal facility? If YES, explain	No.										
What management measures are applied for	Waste is covered on disposal to reduce risk of fires, odours and vectors.										
nuisance factors?											
How is leachate and gas managed?	No management measures										
Rehabilitation	No rehabilitation measures										
Final cover	Soil										
Expansion or closure plans	None										
Is hazardous waste accepted?	YES		NO	Х							



Plate 22 - Guardhouse and entrance to landfill



Plate 23 – Proper fencing with the site almost unused



Plate 24 - The community being served by this landfill

4.6.6 Recycling and Reuse Initiatives

The amount of waste generated in the FBDM Management Area is insufficient to initiate recycling programmes. FBDM supports the establishment of recycling facilities (buyback centres) in Warrenton and Barkly West. It is expected that these facilities will become operational during 2010.

4.6.7 Illegal Dumping and Disposal

Illegal dumping and disposal are not considered a major concern. Each rural community or landowner not receiving a waste removal service from FDBM is responsible for its own waste removal systems. Communities in the DMA are so small and widely spread that this is not considered problematic.

The possibility exists of extending a municipal service to the community of Olierivier. This is the highest concentration of people in the DMA, but this

community is so far from major towns that the economic factors make this prohibitive.

4.6.8 Finance

The budget amount in the 2009/2010 financial year is R24 000.00. This amount was to pay Mabonga Trading Company, the waste contractor, to deliver the service for four months. Waste service in Koopmansfontein was implemented from 01 March 2010. No income is currently generated from the service. Income will be generated only at the start of the new financial year - July 2010.

5. IDENTIFICATION AND PRIORITIZATION OF NEEDS

The Status Quo analysis has highlighted the status of waste management in the District. In many cases, waste management is not as effective as it could be, and in these cases there are clear needs that should be addressed. Once these needs have been addressed, it follows that overall waste management will improve, benefiting all the residents and businesses within the District's boundaries.

5.1 **NEMWA Principles**

The needs will be addressed in terms of the waste management principles established in terms of NEMWA. These principles include:

- Waste Prevention and Minimisation as far as possible waste should be prevented in the first place. Implementation of this aspect depends to a large extent on the approval of the new national waste management strategy, the passing of enabling legislation and commitment from industry bodies.
- Waste Collection and Transportation Once the waste has been generated, efficient collection procedures should be established and control over this transportation of waste ensured;
- Waste Recycling wherever possible waste should be re-used and recycled. This reduces the volumes of waste going to landfill and reduces the waste of natural resources:
- Waste Treatment Facilities this include the treatment of waste prior to final disposal. The aim of waste treatment is to reduce the volumes of waste going to landfill and to make the waste less harmful to the environment. Particular areas of focus include health care waste and tyres;
- Waste Disposal Facilities this aspect covers the final disposal of waste. The aim is to ensure that waste is finally disposed of in an acceptable manner with the minimum of nuisance during disposal

- with as low an impact upon the receiving environment as possible. This includes the reduction of health risks;
- Information Requirements in order to plan for future waste types and volumes, it is necessary to collect sufficient information, with sufficient accuracy, to enable this planning. Having the necessary equipment and procedures in place to gather this information is one of the first steps towards achieving accurate planning outcomes;
- Institutional Arrangements Waste Management is a local government responsibility and, as such, should be managed and controlled in a manner that ensures optimal economic and environment outcomes. Any institutional arrangements to enhance this goal are to be encouraged;
- Financial Arrangements Waste management should be economically viable. Without this essential viability, waste management will depend upon subsidies for its effectiveness. These act as a tax upon sources of the subsidy. Waste management is a local government function and should be controlled and paid for by the residents of local government; and
- Monitoring and Compliance Arrangements without overseeing
 of waste management, it is likely not to adhere to both legal
 standards and to acceptable norms and standards. It is also likely
 to rise in cost and reduce its overall efficiency. None of these
 outcomes is desirable and a monitoring and compliance
 enforcement aspect should be built into all waste management
 programmes.

5.2 General Prioritization of Needs

The general priorities and needs of each local municipality are listed below:

 Waste collection is generally working in each of the local municipalities and DMA. None of the municipalities have a 100% service area due to various inefficiencies and cost constraints. The causes of these inefficiencies and cost constraints should be addressed. Waste collection should be further investigated in smaller communities and farm land to communicate sustainable waste removal systems that could be applied to these communities where waste removal services cannot be rendered;

- Little or no effort is made to reduce or recycle waste in the municipalities of FBDM. Recycling centres are available at some landfills but these are not being utilised. There is however a need for recycling stations when the large numbers of waste pickers on landfill sites are taken into consideration;
- Due to the distances in the municipalities, waste transportation is an area of concern. This implies that small, often inefficient, landfills are developed in each town. Transportation vehicles are in most cases not in good condition and in need of repair or replacement;
- Waste Disposal Facilities are generally in a poor state. None of the landfill sites are managed in accordance with their permit conditions and, although most landfill sites have municipal representatives on site, there is no control in terms of the dumping face or access control. Landfill equipment is a major constraint on all landfill sites;
- None of the municipalities has any record keeping or information on waste that goes to landfills. This is a matter of concern because proper landfill planning cannot be conducted without an indication of waste volumes. A record-keeping system is therefore needed. This does not necessarily require major management input but could be initiated by recording of waste disposal by waste collectors. Registration with SAWIS in considered a good starting point;
- Relationships between local municipalities could be improved to assist in dealing with issues fast and effectively. It is therefore suggested that a waste management forum be established amongst municipal representatives.

- Financial viability should be investigated in providing efficient
 waste management services to all areas. Current financial
 arrangements make the waste management function
 unsustainable even when taking into account operational costs.
 All municipalities are not aware of the need to recover the full cost
 of the service. Financial assistance might be required to increase
 and improve the vehicle and equipment fleet of each municipality;
- Each municipality should have a defined waste management system. This will reduce the burden on managers if proper systems are in place and responsibilities can be delegated to lower order managers.

5.3 Heath and Environmental Impacts of Poor Waste Management

The impacts of poor waste management on human health and the environment are well known and documented. A summary of these impacts, in the context of the Frances Baard District Municipality is provided in this section.

Waste disposal is often a neglected area in many developing countries, and improper waste management is a major environmental health hazard. Escalating quantities of waste and their changing composition are some of the major challenges facing municipal governments.

Waste management originated due to its impacts on human health. As human settlements densified, health impacts from waste intensified and it became necessary to manage them. Waste, left unprocessed or made inert, attracts insects and rodents, which in turn cause gastrointestinal parasites to develop in human beings. This leads to diseases such as intestinal disease, yellow fever and the plague.

Hazardous wastes, such as health care wastes and industrial wastes can contain carcinogens (cancer causing substances). Typical hazardous waste sources include dry cleaners, vehicle repair facilities, hospitals, electroplating

companies, mining concerns, metals recycling centres and agriculture pesticide suppliers.

Proper solid waste disposal is an important component of environmental sanitation and sustainability. Aside from the associated health risks of poor waste management, creating a sustainable environment and improving waste management offer opportunities for income generation, health improvements and reduced vulnerability¹.

Waste quantities are increasing at an alarming rate. By this year alone, the 7 billion people in the world will be producing more than 2.5 billion tonnes of waste annually. The situation is exacerbated by the inability of many local governments to process these large quantities of waste, in part due to the lack of facilities for safe disposal. This leads to uncontrolled dumping and illegal dumpsites. Additional risks can occur from direct contact with toxins from poorly managed wastes, including batteries and vehicle tyres. Of particular concern is scavenging in waste disposal sites. This involves manual sorting of waste to recover sellable or reusable components, and the handling of waste from health care facilities, which carries risks of needle-stick injuries and exposure to toxic or infectious materials (IMCHE, 2008).

Poorly managed waste poses a great risk to the health and well-being of communities, particularly those living adjacent to dumpsites, given the potential of the waste to pollute water, food sources, land, air and vegetation (UNEP, 2007). This is primarily because untreated waste and waste that remains uncollected or improperly disposed of can be a source of contaminants and breeding sites. Such wastes contribute to diarrhoea, vector-borne diseases, and the contamination of drinking water and other water resources (IMCHE, 2008). The poor disposal and handling of waste leads to environmental degradation, destruction of the ecosystem and poses great risks to public health (UNEP, unknown). In 2002, 23% (2.4 million) of all deaths in Africa were attributed to environmental risks factors (WHO, 2006).

¹ http://www.lboro.ac.uk/well/resources/fact-sheets/fact-sheets-htm/waste.htm

It is estimated that the total amount of urban waste (domestic waste) in South Africa is 15 million tons a year. Industries alone contribute approximately 25 million tons a year to the waste stream. It is imperative that this waste be managed properly if it is to be prevented from having negative environmental and health consequences².

In South Africa, local authorities are primarily responsible for waste collection. Given the higher cost of cleaning litter left on streets and in public spaces, as opposed to collecting waste from formal household waste collection systems, the public has to accept co-responsibility for the cleanliness of their towns and cities, ensuring that litter and waste is disposed of in allocated bins. However, it has also long been recognised that traditional waste collection systems are inappropriate, inefficient and costly when applied to informal settlements. As such, illegal and uncontrolled dumping of waste seems almost inevitable. Waste creates problems in a number of ways:

- It is aesthetically unattractive and impacts on tourism by creating unsightly regions in South Africa's scenic landscape.
- It pollutes air, soil, rivers and precious groundwater.
- It creates major health hazards to humans, particularly in areas where large amounts of waste are dumped and not cleaned up, e.g. in informal settlements.

Leachate production is the main source of pollution of landfill sites. Where it is produced in significant quantities, it must be managed through an appropriate leachate collection and treatment system. Such systems are difficult to apply to illegal dumpsites, and their impacts remained uncurbed. Pollutants associated with landfills include heavy metals, polychlorinated biphenyls and pesticides, all of which are known to affect human health.

² http://www.environment.gov.za/enviro-info/env/wmanag.htm

An applicable case study (UNEP, unknown) surveyed an informal school located adjacent to a dumpsite. The study involved laboratory testing of the children, including blood and urine sampling. From the environmental evaluation conducted, it was determined that the dumpsite exposes the residents around it to unacceptable levels of environmental pollutants (including both heavy metals and organic pollutants), resulting in adverse health impacts. A high number of children and adolescents living around the dumping site had illnesses related to the respiratory, gastrointestinal and dermatological systems such as upper respiratory tract infections, chronic bronchitis. asthma, fungal infections, allergic and unspecified dermatitis/pruritis (inflammation and itchiness of the skin).

Heavy metals, by definition, are metallic elements that are present in both natural and contaminated environments. In natural environments, they occur at low concentrations. However, at higher concentrations – as is the case in contaminated environments – they result in public health impacts. Heavy metals may be released into the environment from metal smelting and refining industries, scrap metal, plastic and rubber industries, various consumer products and from burning of waste containing these elements. When released into the air, these elements cover large distances and are deposited onto the soil, vegetation and water. Once deposited, these metals are not degraded and persist in the environment for many years, poisoning humans through inhalation, ingestion and skin absorption. Acute exposure leads to nausea, weight loss, vomiting, gastrointestinal abnormalities and dermatitis.

Persistent organic pollutants are long-lasting, non-biodegradable organic compounds that accumulate in the food chain, especially in fish and livestock, and pose serious health risks to humans. They dissolve poorly in water and are readily stored in fatty tissue; hence they may be passed to infants through breast milk.

Below is a summary of the link between the environmental pollutants generated by dumpsites and the public health impacts on adjacent communities.

The environmental pollutants occurring at dumpsites may include:

- Heavy Metals e.g., lead, mercury, cadmium, arsenic, chromium, zinc, nickel and copper; and
- Persistent Organic Pollutants e.g. aldrin, dieldrin, dichlorodiphenyltrichloroethane (DDT), endrin, heptachlor, toxaphene, chlordane, hexachlorobenzene, mirex (organochlorines, organophosphates, carbamates) and polychlorinated biphenyls (PCBs).

These toxicants may be found in air, water and soil and could find their way into the human body through:

- Inhalation movement of air from the external environment through the airways during breathing;
- Ingestion the consumption of a substance by an organism, either man or animals; and
- Absorption the movement and uptake of substances into cells or across tissues such as skin by way of diffusion or osmosis.

The public health effects of these pollutants include the following:

- Skin Disorders Fungal infection, allergic dermatitis, pruritis and skin cancer;
- Respiratory Abnormalities bacterial upper respiratory tract infections (pharyngitis, laryngitis and rhinitis), chronic bronchitis and asthma;
- Abdominal and Intestinal Problems bacterial enteritis, helminthiasis, amoebiasis, liver cancer, kidney and renal failure;
- Dental Disorders dental carries and dental pain;
- Ear Infections otitis media and bacterial infections;
- Skeletal Muscular Systems back pain;
- Central Nervous System impairment of neurological development, peripheral nerve damage and headaches;
- Eye Infections allergic conjunctivitis, bacterial eye infections;
- Blood Disorders Iron deficiency anaemia; and

 Others – malaria, chicken pox, septic wounds and congenital abnormalities, cardiovascular diseases and lung cancer.

Direct exposure to waste landfills, in the case of scavenging by individuals (made possible through the lack of access control to landfills), including children (as observed at landfills in the FBDM) is likely to show an accelerated decrease in health.

6. THEORETICAL WASTE GENERATION VOLUMES

No formal measurement of waste generation has been conducted in any of the local municipalities that fall under the jurisdiction of FBDM. This is a limiting factor in determining waste generation rates for this area.

Waste volumes have been estimated for each local municipality and these estimations were mainly made from income levels and population figures. A waste generation model was created with the aim to estimate the likely amount of waste generated within each area and to compare results to reported amounts. The purpose of the waste generation model is to estimate waste generation rates up to 2015. Estimations will be based on population figures and waste generation for 2001 and 2007. This data will then be escalated to 2015 to obtain estimates for the next five years.

This model was also created to estimate waste generated in areas where no information was available as recorded in the Status Quo and to provide a consistent set of estimated waste generation data for FBDM.

Population figures have been used as the first variable in the creation of this model. Waste is generated by people, whether in industry or domestic waste generation and therefore population is considered the most important factor in creating this model. The model was compiled with the initial Census 2001 data, obtained from StatisticsSA. Estimated population figures were further used in this model that was obtained from the Community Survey 2007.

From these two sources, the population growth rate of each area has been determined and the estimated population figures determined for 2015. It remains to be seen if population growth trends as used in this model will continue.

Although waste generation per area depend on various factors such as population size, commercial sources of the area, seasonality and cultural

aspects, to name a few, it has been established that income levels are the greatest determinant in waste generation rates.

Income levels have therefore been used as opposing variable in this model. Income groups were classified as Low, Medium and High income groups.

Waste generation of various industries have also been taken into account, since the contribution of waste generated by these sectors cannot be ignored.

6.1 Population

Population data was used from Census 2001 data, conducted by the National Census Bureau and Statistics South Africa, to determine the latest formally determined population figures. A community survey was conducted by Statistics SA in 2007. The count of the Community Survey is measured in terms of number of persons and/or number of households. The extent of the Community Survey covers the persons and households that were sampled within all different enumeration areas as demarcated in the 2001 Census, excluding those classified as institutions and recreational areas. In order to have new estimates, the past censuses are considered as the best available sources of data that give information at lower geographical level. Therefore, the new Community Survey estimates are an adjustment to the projected information from these data sets.

Population growth rates were determined for each local municipality by comparing Census 2001 data with information presented in the Community Survey of 2007. Growth rates varied from -11% in the FBDM Management Area, which indicates a decline, to 3% increase for Sol Plaatje Local Municipality.

Table 43 - Population growth rates

Local Municipality	2001	2007	% Annual Growth Rate (Actual)	% Annual Growth Rate Applied
Phokwane Local Municipality	61 321	46 409	-4.5%	0%
Magareng Local Municipality	21 733	20 433	-1.0%	-1%
Sol Plaatje Local Municipality	201 465	243 018	3.2%	3%
Dikgatlong Local Municipality	35 765	40 752	2.2%	2%
FBDM Management Area	5 218	2 588	-11%	0%
FBDM TOTAL	325 502	353 200	1.4%	

Above is a summary of the population figures from 2001 and 2007. Growth percentages were determined from the difference in population between the specified periods.

Population figures were then estimated for 2015, using the initial census figures and growth rates for each region.

The following equation has been used to determine population growth rates between 2007 and 2015:

$$P_n = CP (1+I)^n$$

Where:

P - Estimated Population Figure for the specified time

CP - Population at start

I – Growth rate as decimal degree of percentage

n – Years over which growth is determined.

Population growth rates as presented in Table 44, vary over a large range and the likelihood of continuation of these trends up to 2015 were questioned. Growth rates were therefore adjusted based on development trends, population growth and comparison of similar local municipalities elsewhere, where these apply. The growth rates applied in the table below are shown in

Table 43 above.

The following Table indicates the population figures used in the model between 2001 and 2015:

Table 44 - Population Estimates between 2001 and 2015

Municipality	2001	2007	2010	2015
Phokwane Local Municipality	61 321	46 420	46 420	46 420
Dikgatlong Local Municipality	35 765	40 736	43 230	47 729
Magareng Local Municipality	21 732	20 428	19 821	18 850
Sol Plaatje Local Municipality	201 465	242 961	265 497	307 784
FBDM DMA	5 128	2 588	2 588	2 588
FBDM Total	325 501	353 133	377 556	423 371

From the above table it is evident that the population in FBDM is expected to increase between 2001 and 2015. This is expected because the municipalities with declining populations have been considered unsustainable and a conservative approach has been adopted where high population declines have been moderated to be at or near zero, see Table 43 above. The growth rates of Sol Plaatje Local Municipality and Dikgatlong Local Municipality remained the same as those indicated by the period between 2001 and 2007 because it is expected that people would continue to migrate to these areas from other districts or provinces due to economic and social opportunities.

Phokwane Local Municipality indicated a decline in population, the highest in the District, between 2001 and 2007. This is expected to be unsustainable and the population is expected to have stabilised between 2007 and 2010. A zero percent population growth rate is therefore assumed.

Dikgatlong Local Municipality had a steady increase of 2.2% per annum between 2001 and 2007. This growth rate is higher than the national average of 1.07% but is considered sustainable.

Magareng Local Municipality also indicated a decline between 2001 and 2007 but is lower than that of Phokwane Local Municipality. This decline in

population has been adopted for waste modelling purposes but is expected to stabilise at some point.

Sol Plaatje Local Municipality had the most significant population growth rates between 2001 and 2007 at 3.2%. This high rate can be expected since Kimberley is the largest city in the Northern Cape, therefore offering more job opportunities than any other local municipality in the district. This growth rate has been adopted for waste modelling purposes until 2015.

FBDM DMA indicated the most significant decline in population figures between 2001 and 2007 at 11%. Considering the relatively small community and the high migration figure, it is expected that the population of FDBM DMA would stabilise from 2007 and not decline further. A 0% growth rate was therefore assumed.

Given that a period of lower economic growth is currently being experienced, it is reasonable to assume that these population growth rates will not be exceeded. This is due to a relative lack of incentive for further inward migration towards the district based upon high levels of economic activity. Thus these figures are likely to be conservative from a waste management perspective and will be used in subsequent analysis.

6.2 Per Capita Waste Generation Rates

Waste generation rates vary in many aspects and waste generation rates for the various socio-economic groups, commercial and industrial centres and institutions have been presented in the National Framework Guidelines for Integrated Waste Management Plans (DEAT, 2006). These figures are presented in

Table 45.

Table 45 - Typical Waste Generated per Land Use/Activity

Land use type / activity	Typical Waste Generated	Typical generation rates	
Residential Houses o Low Income o Medium Income o High Income	Kitchen / Food, Packaging, Clothing, Furniture, Electronic, Ash, Garden Waste	(Rate: Kg/person/day) o Low: 0.2 – 0.7 o Medium: 0.7 – 1.9 o High: 1.5 – 3.0	
Residential Flats	Kitchen / Food, Packaging, Clothing, Furniture, Electronic	(Rate: kg/person/day) 0.5 – 2.2	
Schools, hostels, educational centres and other institutions	Office paper and books, Packaging, Electronic, Furniture, Kitchen / Food, Plants and grass cuttings	(Rate: kg/occupant/day) 0.5 – 1.3	
Suburban business centre / office park	Old office material, Packaging, Furniture, Electronic, Food, Plant and grass cuttings	(Rate: kg/employee/day) 0.8 – 1.7	
Central business area / office buildings and towers	Old office material, Packaging, Furniture, Electronic, Food, Street sweepings / litter	(Rate: kg/employee/day) 0.7 – 2.0	
Restaurants, hotels and fast food outlets	Food, Packaging, Cutlery, Electronic, Textiles	(Rate: kg/client/day) 0.5 – 1.5	
Industrial: o Light o Heavy o Services / Garages o Chemical o Allied	Packaging / crates, Used chemicals, Old lubricants, Used spares, Old tyres, Old office material	(Rate: kg/employee/day) 0.5 – 3.0	
Building / Construction	Demolished buildings, wood, concrete, tiles, roof sheeting, bricks, pipes, packaging, old paint, used chemicals	(Rate: kg/employee/day) 10 – 1000	
Hospitals, clinics, doctors, dentists and healthcare facilities	Old medicines, food, human organs/ tissue, textiles, syringes, needles and sharps, packaging, bloodstained bandages/ material	(Rate: kg/patient/day) 1.0 – 3.0	

From Table 45 above it is evident that waste is not only generated within residential areas but also within different industries. Waste generation rates will therefore be discussed in two sections – household waste generation and industry waste generation.

6.2.1 Industry contribution to waste streams

From Table 45 it is evident that per capita waste generation rates should account for sector-related waste generation as well. A detailed analysis on the land use / activities listed in

Table 45 cannot be quantified for FBDM due to unavailability of information. An example of the information required is waste generated by restaurants, hotels and fast-food outlets. For this information to be used in the model, a database with all restaurants will be needed, along with the average daily clientele for the entire Frances Baard District Municipality. This type of information is not currently available.

Therefore, the following activities will be excluded and waste generated by these activities will be accounted for in daily household waste generation:

- Residential flats:
- Schools, hostels, educational centres and other institutions;
- Restaurants, hotels and fast food outlets; and
- Hospitals, clinics, doctors, dentists and healthcare facilities.

However, information regarding the following landuses/activities is available and will provide an overview of typical waste generation per sector per day. Waste generation rates from this table have wide ranges that make the selection of a suitable rate a matter of experience and judgement.

Table 46 - Land use activity and waste generation rates

Landuse / Activity	Typical generation rates (DEAT)	Average
Suburban business centre	0.8 – 1.7	1.3
Central Business area / office park	0.7 – 2.0	1.4
Industrial	0.5 - 3.0	1.8
Building / Construction	10 – 1 000	505

Census 2001 data divided industrial employment into twelve categories. Some of these categories match categories in

Table 45 while others such as "Undetermined" cannot be classified according to

Table 45. Each category has therefore been assigned an estimated waste generation rate according to

Table 45 but at the discretion of the writer.

The waste generation of some fields of industry is accounted for as part of normal household waste and due to the uncertainty of the percentage waste generated it has been accounted for as part of normal residential waste.

The industry sectors in Table 47 that have been highlighted are therefore assumed to be accounted for as part of the residential waste generation stream.

Table 47 - Land use activity and typical waste generation rates

Industry	Typical waste generation rates	Average
Agriculture; hunting; forestry and fishing	0.2 - 3.0	0
Mining and quarrying	10 – 1000	1.7
Manufacturing	10 – 1000	1.7
Electricity; gas and water supply	0.5 - 3.0	1.8
Construction	10 – 1000	1.7
Wholesale and retail trade	0.8 – 1.7	1.3
Transport; Storage and communication	0.8 - 1.7	1.3
Financial; insurance; real estate and business services	0.7 – 2.0	1.4
Community; social and personal services	0.8 – 1.7	1.3
Other and not adequately defined	0.2 - 3.0	0
Private Households	0.2 - 3.0	0
Undetermined	0.2 - 3.0	0

Mining and quarrying has been adjusted to use the industrial waste generation rate of 1.7 kg/employee/day. The justification for this decision is that the majority of the waste created by employees in a mine consists of the results of

mining, which is not formally classified as waste. Using the industrial waste generation rate accepts that a small portion of all the waste generated by the sector will be general waste.

The construction waste figure of 10 - 1~000~kg/company/day is too wide a range to be used in the model. The range itself has three orders of magnitude, whilst no indication is given of the size of company contemplated in the figure. To substitute for this rate, the industrial waste generation figure of 1.7 kg/employee/day is used as a proxy. The same applies to the waste generation figure for manufacturing.

6.2.2 Household contributions to the waste stream

Waste generation rates are influenced by income levels that are directly proportional to the amount of waste generated by a particular individual.

The following waste generation rates were defined and a discussion will follow Table 48.

Table 48 - Waste generation rates per income group (kg/person/day)

Income Group	DEAT	GDACEL NW PIWMP		Average
Very Low	-	0.2 – 0.4 (0.3)	-	0.3
Low	0.2 - 0.7 (0.45)	0.4 - 0.7 (0.55)	0.45	0.45
Medium	0.7 – 1.9 (1.3)	0.7 – 1.1 (0.9)	1.10	1.10
High	1.5 – 3.0 (2.25)	1.1 – 1.2 (1.15)	1.85	1.77
Very High	-	1.2 – 2.5 (1.85)	-	1.85

Waste generation rates were obtained from four different sources. Sources that were considered include DEAT (national level), GDACEL (provincial level) and NW IWMP (provincial level). Each of these sources indicated typical waste generation in terms of income group.

For the purposes of this study, the model will only account for three different income levels; - low, medium and high. Only one source differentiated between very low and very high-income groups whereas the other studies included these groups in the main model.

Averages of waste generation per income group were determined and will depict the typical waste generation rates expected from the various income groups.

Table 49 - Income levels and residential waste generation rates

Income level	Waste generated (kg/c/d)
Low income (R0 – R38 600)	0.45
Medium income (R38 601 - R153 600)	1.1
High income (R 153 601 and above)	1.85

None of the literature specified above defines income levels with the exception of the North West Provincial Integrated Waste Management Plan. Income levels are used to determine household figures for the different municipalities in 2001. Income levels used in this model have therefore been adopted from the NWIWMP and divide income levels as specified in Table 49.

6.3 Assumptions and Limitations of the Model

Although the model represents the most accurate analysis that can be carried out with the data available, it is important to treat the results with caution for the following reasons:

- The possible waste generation rates are subject to wide ranges –
 the implication is that the final figures for waste generated is
 highly sensitive to the waste generation rate selected in the
 model. Since the range of possible rates that could be selected is
 wide, the model is unduly sensitive to what is essentially a
 subjective selection of a waste generation rate;
- The assumption is made that the proportions of people in each income group will not change over time. This assumption has

been made for simplicity, but a more natural result would find people moving up the income ladder, thereby increasing their waste generation as their wealth increases. Thus, for the same population, waste generation will increase. This "wealth effect" has not been captured in the model;

- A further assumption is made that the proportion of the total population able to find employment will remain the same until 2015. The additional assumption is made that the proportion of the working population employed in each of the industrial categories will remain the same. This assumption will be challenged should the economic profile of the District change or the District suffer a severe economic downturn which will decrease the working population, in total, as well as within industrial categories; and
- There is a lack of information to calibrate the model accurately. This limitation takes on two dimensions. The first is that there are no systematic measurements of the waste being disposed of in any of the local municipalities within the District. Even if the measurements were to exist, and be perfectly accurate, this measure would capture only the amount of waste being disposed of, not the amounts being generated. A detailed waste generation survey would have to be conducted to obtain better waste calibration data.

These assumptions, especially the lack of calibration information, demonstrate that the results of the model are likely to have a relatively high level of divergence from reality.

6.4 Model Results

The residential waste generation model used population and income levels as the independent variables. Population growth figures were derived using Census 2001 and the 2007 Community survey figures. Population figures were then escalated to 2015.

Waste generation per day was multiplied to obtain waste generation in tonnes per annum. This was done for the three broad income levels in each local municipality and a total estimated mass of waste generated was obtained.

The same principles were followed for waste generation in industry sectors. Employee data was obtained from the Census 2001 survey and assigned to the different industry sectors. Employee growth was applied in each sector in line with the overall population growth in the local municipality.

Estimated waste generation per sector per day was used and the total waste generation per sector in each municipality presented in tonnes per annum.

6.4.1 Residential Results

The estimated population figures for 2001 to 2015 are presented in Table 44. This has been used in the determination of the expected waste generation rates assumed for 2001 and 2007 as well as the expected waste generation rates for 2010 and 2015. These results are presented in Table 50 below.

Table 50 – Residential Waste Generation Rates (t/a)

Municipality	2001	2007	2010	2015
Phokwane Local Municipality	12 918	9 779	9 779	9 779
Dikgatlong Local Municipality	6 946	7 912	8 396	9 270
Sol Plaatje Local Municipality	49 820	60 083	65 654	76 111
Magareng Local Municipality	4 243	3 988	3 877	3 680
FBDM DMA	1 045	518	518	518
FBDM Total	74 972	82 280	88 217	99 358

The results of the waste generation rates should be read as follows: Data presented in the second column is based upon expected waste generation per population for each local municipality. The third column is based on the

population figures derived from the community survey report. The fourth and fifth columns are expected waste generation rates for 2010 up to 2015, considering the population estimates discussed above.

6.4.2 Industry Results

Table 51 reflects on the increase in each industry's workforce figures.

Table 51 – Population in Industry

Municipality	2001	2007	2010	2015
Phokwane Local Municipality	11 813	9 247	9 247	9 247
Dikgatlong Local Municipality	9 512	10 712	11 368	12 551
Sol Plaatje Local Municipality	46 375	55 374	60 509	70 146
Magareng Local Municipality	3 429	3 288	3 132	2 777
FBDM DMA	2 098	1 043	1 043	1 043
FBDM Total	73 604	79 604	85 298	95 764

This indicates that almost 22 000 additional people are expected to be in the workforce, contributing to industrial waste, by 2015.

Table 52 reflects on the waste generation volumes that can be expected from industry in the various local municipalities between 2001 and 2015.

Table 52 – Industry Waste Generation (t/a)

Municipality	2001	2007	2010	2015
Phokwane Local Municipality	2 446	1 915	1 915	1 915
Dikgatlong Local Municipality	2 016	2 270	2 409	2 660
Sol Plaatje Local Municipality	20 200	24 120	26 356	30 554
Magareng Local Municipality	1 024	964	935	764
FBDM DMA	260	129	129	129
FBDM Total	25 946	29 398	31 744	36 022

Waste generation in Sol Plaatje Local Municipality is expected to have the most significant growth of all the local municipalities. This is as result of the expected continuation of a 3% growth rate. It is expected that this will flow to waste generated by industry.

6.4.3 Total Model Results

The results of waste generation from residential areas were added to industry waste generation rates to get an estimate of waste generation to be expected in each municipality. This is presented in Table 53 below

Table 53 – Combined Waste Generation Volumes (t/a)

Municipality	2001	2007	2010	2015
Phokwane Local Municipality	8 962	10 182	10 805	11 930
Dikgatlong Local Municipality	15 365	11 694	11 694	11 694
Sol Plaatje Local Municipality	70 020	84 202	92 010	106 665
Magareng Local Municipality	5 266	4 952	4 805	4 444
FBDM DMA	1 305	647	647	647
FBDM Total	100 918	111 678	119 962	135 381

The total waste generation rate expected for Frances Baard District Municipality in 2015 is approximately 135 000 tons per annum. This is a substantial amount of waste that should be carefully planned for to ensure sufficient resources are available.

6.5 Model Calibration and Conclusions

No model calibration data is available for the district. This implies that the model results cannot be tested against reality to determine its accuracy.

The only comparison that can be made is against the 2004 district IWMP, which was in itself an estimate of waste generation.

The 2004 IWMP estimated waste generation, using a similar model to the above, was 66 000 tons for 2003. This is 35% lower than the 101 000 tons, for 2001, provided using the model above.

When these two figures weighed against each other it appears as if the current IWMP estimate would be the upper limit of waste generation.

Given the above, it is therefore likely that the 2010 waste generation presented above may be the upper limit of possibility.

The divergence in values demonstrates that the lack of accurate waste management information hampers forward-planning in the district. This is however not a problem unique to the FBDM; it is a nation-wide issue and is one of the main motivations for the NEMWA mandating the establishment of a national Waste Information System. Once this system is operational, the resultant data can be analysed and used in waste management planning.

6.6 Waste Characterisation

A waste characterisation study was carried out as part of the IWMP process. The primary intention of the study was to understand the nature of the waste stream with a view to the recyclable component. The sampling methodology was sufficient to ensure that this task was achieved. The waste characterisation was carried out in the Sol Plaatje Local Municipality.

A secondary result was that the study could be used to estimate waste volumes, but the sampling methodology makes the conclusions from this use subject to wide variance.

The waste characterisation, as conducted in the week of 21 - 25 June 2010, involved collecting refuse bags from outside houses. The refuse was brought back to the depot and weighed. Each household's waste was then split into the broad recyclable components and each component weighted. A total of 20 household's refuse was collected over the week, with an even distribution of waste from the three income categories.



Plate 25 - Sorting the Recyclable Fractions

The table below shows the average percentage, by mass, of the total household refuse volume, of each waste fraction present. For example, the average percentage composition of paper for very low income households was 24.8% and for low income households it was 18.5%. Overall, the paper contributed 20.8% of the mass of the waste stream for the households analysed.

Table 54 - Average Percentage, by mass, of the Waste Stream

l unio en marcago	Very Low	Low	Middle	High	Overall
	Income	Income	Income	Income	Composition
No. Of Households	5	2	8	5	20
Paper	24.8%	18.5%	9.0%	36.7%	20.8%
Plastic	15.3%	15.9%	13.1%	29.7%	18.1%
Metal	1.7%	7.2%	1.8%	3.1%	2.6%
Cans	0.5%	0.0%	0.3%	0.8%	0.5%
Glass	8.7%	6.1%	15.2%	2.5%	9.5%

	Very Low Income	Low Income	Middle Income	High Income	Overall Composition
Garden	5.4%	19.4%	16.1%	0.0%	9.7%
Other	43.6%	32.9%	44.3%	27.2%	38.7%

The table demonstrates that 48.5% of the waste stream was either garden waste or other waste. Other waste was generally household putrescibles. Neither of these two waste streams is recyclable.

This implies that the remaining 51.5% of the waste stream is potentially recyclable. Caution should be applied when using this figure since paper wastes are only recyclable when they are dry and thin plastic is generally not recyclable. As an estimate, 50% of this waste fraction would be recyclable.

The average mass values of the households surveyed are shown in the Table below.

Table 55 - Average Waste Fraction Masses

	Very Low Income	Low Income	Middle Income	High Income	Overall Average
No. Of Households	5	2	8	5	20
Paper [kg]	2.2	2.8	1.9	9.0	3.9
Plastic [kg]	1.7	2.4	2.6	4.9	2.9
Metal [kg]	0.2	1.0	0.3	0.5	0.4
Cans [kg]	0.0	0.0	0.1	0.2	0.1
Glass [kg]	0.2	1.0	3.9	3.2	2.5
Garden [kg]	0.0	3.5	4.9	2.2	2.9
Other [kg]	2.2	4.9	10.3	13.6	8.5
Overall Average [kg]	6.5	15.5	24.1	33.5	21.2

The survey showed an average disposed of, waste mass of 21.2kg per household per week.

The study has the following limitations, which should be borne in mind by the waste planner. The first is that the survey was conducted during one winter week of the year. During summer months the percentage garden waste increases dramatically, according to anecdotal evidence at the Kimberley Cleansing unit. Verbal discussions have resulted in waste masses that could be double what they are in winter, solely due to the extra garden waste that is collected from households. Thus the average waste mass is an underestimate.

Other limiting factors include the low number of samples, the limited sampling period and sorting accuracy. All of these factors introduce variance into the results.

These results can be compared to the results of a study conducted by Borlänge Energi Global Connection of Sweden in 2000. The results of the study were found in a file in the cleansing section and the status of the report from which they were taken are unknown. The results of this study are summarised in the table below.

Table 56 - Borlänge Energi Waste Characterisation

IWMP Category	Waste Fraction	Mass %	Density (kg/m³)
Paper	Cardboard	3.81	21.8
	Corrugated Cardboard	1.18	18.81
	Newsprint	2.47	59.69
Plastic	HDPE	2.73	22.48
	PET Bottles	0.62	16.95
Paper and Plastic	Energy Fraction	16.71	47.28
Metal	Metals	2.11	55.5
Cans	Aluminium Cans	0.94	35.91
Glass	Glass	4.36	171.06
Other	Compostable Waste	57.97	220.94

Hazardous Waste	0.41	88.31
Miscellaneous	1.94	30.98
Residue to Landfill	1.35	105.36
Ash	3.4	227.96

The waste characterisation, conducted with a view to recycling, shows that the recyclable paper fraction is a total of 7% by mass and for plastic 3.4% by mass. The recyclable fractions for metal, glass and aluminium cans are 2%, 1% and 4% respectively. Compostable waste, comprising mainly of garden waste, is 58% by mass. The volumes in this survey are un-compacted volumes.

With regards to sewerage sludge and its disposal, all the sludge is treated on site at the sewer plants, and no sludge reaches the municipal landfills

7. STRATEGIC WASTE PLANNING

The aim of strategic waste planning is to develop and establish waste management objectives that should be adhered to by each municipality in the district.

The strategic objective is developed taking into account the NEMWA as well as the Northern Cape Provincial Integrated Waste Management Plan. It also takes into account the draft National Waste Management Strategy, published in June 2010.

The strategic objectives are described using timeframes for implementation. Short-term are objectives that should be achieved within years 1 and 2 of the adoption of this IWMP, medium-term objectives should be achieved between years 3 and 4, and long-term objectives should be achieved within 5 years of the IWMP. Urgent objectives are those that should be achieved within the first three months of the IWMP, whilst visionary objectives are those that should be achieved once all of the other objectives set in the IWMP have been met.

The aim of strategic waste planning is to develop and establish high-level waste management objectives that should be adhered to by the District Municipality and by all of the four local municipalities within the District.

7.1 Collection and Transportation

The objective for this aspect of waste management is to achieve universal general waste collection, in an affordable, sustainable and efficient manner, for all of the residents of the district municipality. The goal is to achieve a service standard of weekly collection, using standardised waste receptacles, provided by the municipality.

To achieve this goal in areas of low population density, community collection initiatives should be considered, which will allow costs to be reduced to make the collection sustainable. Universal collection is a long-term objective.

A short-term objective is thus to achieve full collection in all urban areas of the District, including collection from informal settlements.

The table below summarises the current collection coverage and collection modality in each of the local municipalities.

Table 57 - Collection Coverage, 2007

Area	Households with Weekly Refuse Removal [%]	Main Collection Modality
Phokwane Local Municipality	58.8	Open Top Vehicles
Dikgatlong Local Municipality	60.3	Open Top Vehicles
Sol Plaatje Local Municipality	91.8	Waste Compactors
Magareng Local Municipality	71.8	Open Top Vehicles
FBDM DMA	5.9	Open Top Vehicles
FBDM Total	79.8	

There are various alternatives for the realisation of the collection. One extreme case is to outsource all aspects of municipal waste collection to a private contractor. The other extreme is to carry out all collection using municipality-owned and controlled resources. Between these two extremes, options exist to sub-let portions of the function to third parties, whilst the bulk of the work remains under the direct control of the municipality.

Current performance of the collection and transportation function indicates that the service is being provided to the majority of residents. The collection service tends to be the strongest of the waste management functions carried out by the municipalities. There are gaps, and these can be mainly attributed to management of the municipal waste function. Gaps are generally in the form of monitoring and tracking, the need for efficiency improvements and equipment management.

Consideration should be given to letting out community entrepreneur level contracts for collection in specific areas. Community initiatives could be as simple as arranging for a contractor in each informal settlement to transport all the refuse bags to the nearest accessible road for compactors to collect. Equally, community contractors could collect and transport the waste to the nearest landfill or transfer station.

It should be borne in mind that sub-letting services place a supervisory burden on the municipality. Every third party contractor should be monitored for service-quality and tonnages removed. Capacity for identifying service deviations should be maintained by the municipality. Supervision is an additional cost of sub-letting that is often neglected by municipalities who expect the service provider to adhere to the service level agreements as a matter of course. This is most often not the case and the municipality should protect itself from service breakdowns and reputational damage by ensuring that adequate supervision is in place.

With this background, the wholesale outsourcing model is rejected, but in the name of efficiency improvements, focus upon a collection model that allows a degree of sub-letting of contracts should be considered. However it is suggested that the bulk of municipal waste collection should be carried out using municipal resources, outsourcing of collection should occur only once the municipality has the capacity to manage its own operations efficiently.

In this regard, the status quo indicate that the collection and transport domains has the following key priority areas:

- Extending the collection service to all areas;
- Refining the collection load to ensure that it is balanced against available capacity;
- Implementing a vehicle renewal and expansion programme where necessary; and
- Monitoring and tracking the performance of the collection function.

Extending collection areas can be achieved by a review of the waste collection routes that all vehicles use. This should be done by identifying the areas that require servicing and allocating vehicles to cover each area. The routes that each vehicle should take can then be established to ensure 100% coverage.

In cases where the collection area is deemed to be too far away from a landfill, consideration should be given to the establishment of transfer stations, which will reduce the long distance transport burden on the municipality.

The key measure for a waste collection fleet is fleet availability, coupled with the costs of maintaining high availability. It is crucial to maintain a very high fleet availability, in the order of 98%. Fleet management costs should then be collected on a vehicle-by-vehicle basis. Replacement should occur when vehicle service histories and costing per individual vehicle indicate inordinate periods of downtime, or when they are becoming more costly than their peers to run. In the absence of such record keeping, a rule of thumb that could be used to indicate the need for fleet replacement is to replace vehicles when spare parts are no longer being supported by the vehicle manufacturer.

Fleet renewal should be carried out as a multi-year programme to spread the budgetary burden.

Balancing of waste collection capacity against waste collection demand should be carried out taking into account disposal arrangement as well as distances and costs involved. This IWMP recommends closing many of the small landfills currently in the district, and this will require the procurement of vehicles necessary to effect this change.

The current waste collection vehicle fleet in the district is focused on the task of residential and business collection. During implementation of this IWMP, municipalities will have to add long-distance, modular waste transport capacity to move waste between transfer stations and the few remaining landfills.

Collection of waste in outlying and unserviced areas should be considered where the demand for such a service exists. It should be carried out in the most cost effective manner and should take local conditions into account. Appropriate collection technology may include using one ton flatbed vehicles or by contracting local entrepreneurs to carry out the task.

Vehicle maintenance can either be carried out by the municipal workshops or via the vehicle's agent. Generally, the service durations at the municipal workshops are unacceptably long, whilst the costs of servicing through the vehicles agent may be perceived to be too high. Measures that can be taken to improve vehicle availability is to either sign a Service Level Agreement with the municipal workshops regarding the acceptable durations of a vehicle being out of service, or to contract out-servicing to the vehicle's agent. The waste manager should balance vehicle availability with the costs of servicing and make an appropriate decision.

Monitoring and tracking waste collection performance should be handled by management in the waste units. Every vehicle should follow a designated route every day. Spot checks should be done on the vehicle crews to ensure that collections are made from every house along the route, that there are no spillages and that the service is reliable. The results of these checks should be formalised and reported upon. Compliance with the requirements should be enforced through performance reviews with vehicle crews and through publishing the results to create competition between the crews.

Efficient collection goes a long way to addressing incidences of illegal dumping.

A further medium-term objective would be to raise the level of awareness within communities regarding waste management and the need to pay for the service.

These two steps are essential in achieving the long-term goal of 100% collection from residences in the district.

More formal knowledge and control of other waste transporters is desirable. To this end a district-wide waste transporter database should be established. This database will increase knowledge with regards to the volumes, sources and destinations of the waste being transported in the district and will allow better emergency response. It will also be the first step towards eliminating any disposal practices that are not in terms of waste management laws.

The collection of waste from a variety of waste receptacles is undesirable for several reasons: it slows the collection process down as crews handle containers of varying sizes and weights; it increases the chances of spillages as the containers are often not covered with lids, which represents health hazards for the community, and such receptacles are often unaffordable for poorer members of the community.

For these reasons, every municipality should collect only standard waste receptacles. At residential level these should be standard refuse bags. At a minimum, every municipality should supply two refuse bags to every indigent household per week. The bags should be distributed during the collection process, or a community contractor could be appointed to ensure distribution. To ensure that community members use the bags for refuse, the municipality should not collect refuse placed in non-standard containers.

Enforcement of illegal dumping should be in place to ensure that refuse that is not placed in refuse bags is not illegally dumped.

7.2 Waste Prevention, Minimisation and Recycling

The strategic objective of this section of the planning is to ensure that waste being generated is prevented in the first place and reduced where absolute prevention is not possible. Recycling should be adopted widely in the District. These efforts are part of a wider effort to introduce cleaner production into the District.

In this regard, status quo and the needs analysis indicates the following key priority areas:

- Recycling or processing garden waste into compost and diverting this waste stream from landfills;
- Establishing recycling drop-off centres to divert recyclables from landfills;
- Controlling and formalising recycling at the landfills; and
- Implementing cleaner production within the district.

Garden waste is an important waste fraction and could contribute as much as 50% of the waste stream during the summer months. If this waste is diverted from landfills into garden centres which process the waste into compost, valuable air space and transport costs will be saved by the municipalities in the district. To take advantage of this potential cost saving, all municipalities should have at least one garden centre where garden waste can be dropped off. Each garden centre should have composting equipment and be able to generate bagged compost for use by local residents. It is suggested that this compost is sold at well below market rates, to encourage compost uptake amongst local residents.

As full cost accounting for waste services is implemented (discussed in a later section), the financial benefits of this diversion will be clear and immediate. They will also provide the financial incentive to keep the garden centre running.

Where transfer stations are to be developed, garden centres should be established at the same facility.

The waste characterisation conducted in the Sol Plaatje Local Municipality for this IWMP demonstrates that the recyclable fraction of waste is approximately 25% of the total waste stream, and should be taken advantage of. These include recyclable fractions such as metals, glass, paper and plastics.

Recycling programmes should be encouraged in every municipality. This would include the establishment of buy-back centres. These centres would collect and accept waste from all salvagers operating in the municipalities. This would encourage an increased number of community recyclers by providing a secure market for the fruits of their collection efforts and benefit the municipalities by increasing overall recyclable yield and by reducing the volume of waste reaching the landfill. These benefits provide the incentive for the municipality to keep the buy-back centre operating.

Other recyclable collection methods that should be considered are recyclable drop-off schemes, targeted at residential waste generators. These schemes include establishing drop off centres at large schools, community centres and suitable shopping centres.

Recycling efforts should be improved such that the total tonnage of district waste collected reaches its full potential of between approximately 33 000 and 45 000 tons per annum. Given the large waste volumes in the Sol Plaatje Local Municipality, it follows that recycling efforts should start and be focussed upon this municipality to obtain the largest benefit.

An important part of the recycling objective is to formalise recycling at the landfills and to eliminate landfill salvaging completely in the long-term. This is due to health concerns of the salvagers and due to safety considerations at the landfill. Current salvaging operations could be moved into recycling sheds at landfills or transfer stations. The recycling shed should be designed such that the waste vehicles dump the waste onto sorting tables, from where the recyclables are manually removed. The remaining waste is then landfilled. The manner of operating will increase the recyclable yield, provide alternative employment for the current waste pickers and reduce the volumes of waste being landfilled.

National policy with regards to cleaner production should be adopted. This policy will be adopted as an end point to the development of the new National Waste Management Strategy. It is submitted that such policy creation, with the necessary legislative tools, is not within the ambit of the district.

Once the policy and legislative instruments have been enacted however, the district should have sufficient resources in place to enforce the nationally adopted policy effectively.

The enforcement efforts should be matched with suitable economic and financial instruments to encourage cleaner production. In this regard every municipality in the district should implement measures to discourage waste disposal. These measures include improving controls over landfill disposal and increasing the rates for disposal so as to encourage cleaner production techniques.

Consideration should also be given to the establishment of a central wasteclearing database, where companies can register their waste types. This will allow manufacturers to check the database for wastes that can be used as inputs to other manufacturing processes, thereby encouraging waste re-use and consequently, cleaner production.

Awareness should be carried out amongst the commercial sector as to the benefits of cleaner production. These benefits include cost reduction through the use of less input materials, cost reduction through the use of re-useable material from other processes, efficiency improvements through the use of smarter manufacturing processes, and the need for compliance with evolving laws on waste manufacturing.

7.3 Waste Treatment

Waste treatment is a sophistication in the waste stream that reduces the volume of waste requiring final disposal and/or rendering the waste that is finally disposed of inert and less damaging to the environment.

Waste treatment, in the context of the FBDM, is most commonly associated with the destruction of medical wastes, but these technologies can be used on a wide variety of wastes. There are currently no waste treatment facilities in the district.

Given the evidence collected during the status quo stage, it is urgent to intervene to address the management of healthcare risk waste. The formal health care risk waste system does not seem to be functioning due to a lack of approved containers. Although healthcare risk waste is managed by the provincial Department of Health, district level intervention is appropriate.

Such intervention should take the form of district waste officials querying the system and assisting where possible. Urgent assistance in the procurement and distribution of approved medical waste containers to all clinics in the district would be a welcome first step.

Subsequent to this intervention, regular co-ordination meetings should be established with the Department of Health to ensure that the system is working effectively.

The treatment of tyres should be a medium term goal. Currently tyres are burnt at the landfills to recover the steel. This practice should be discouraged and instead the tyres should be shredded prior to disposal. Shredding is not a desirable long term solution, but is a better short-to-medium term solution than burning. Long-term solutions include granulating the tyres for road surfaces, using whole tyres in landfill engineering or using them as fuel in cement kilns.

All of these aspects should be sub-let by the municipality to third party contractors.

This last option depends upon the conversion of existing cement kilns to accept tyres as fuel as well as the required environmental permitting.

Further waste treatment in the district is long-term to visionary in nature, given that the current waste management challenges in the District are not of a sophisticated nature, and improved waste management at the basic level should be achieved before sophistication, and complication, is brought into the system. The SPLM will be the first local municipality to address waste treatment, followed by the remaining three municipalities.

The overall visionary goal of this objective is to ensure that all waste treatment facilities in the District comply with the relevant legislation and policy and that all legislation and policy with regards to waste treatment facilities are enforced.

A further visionary objective is to ensure that all waste that needs to be treated should have systems set up for its effective treatment and disposal.

7.4 Waste Disposal

The long-term objective of waste disposal strategic planning would be to ensure that all waste reaches final disposal and is disposed of in waste facilities that are operated and managed in terms of the Minimum Requirements for Waste Disposal and in terms of environmental law.

In this regard, a Short-Term goal will be to ensure that all disposal sites are licensed and operated in terms of the licence conditions.

Aligned with this goal is the need to identify disposal sites which should be closed. Sites with the potential for closure are those that handle low waste

volumes and which are not designed or operated in accordance with the Minimum Requirements for Waste Disposal.

The advantages of closure would be to reduce the management and regulatory burden required to keep a landfill site open, to reduce the environmental impacts of the sites and to increase operational efficiency. The costs of upgrading these sites would generally exceed the costs to transfer and dispose of waste at landfills, which are managed in accordance with the applicable legislation. These sites should be marked for closure and alternative disposal arrangements made.

There are ten sites in the district in which waste is being disposed of. The table below summarises the status of these sites.

Table 58 - Waste Disposal Sites, District Status

Landfill Name	Status	Nearest Larger Site	Distance to Nearest Large Site
Hartswater	Small site, low control	Jan Kempdorp	25
Jan Kempdorp	Small site, low control	-	-
Pampierstad	Communal site, no control	Jan Kempdorp	22 km
Warrenton	Communal site, low control	Jan Kempdorp	25 km
Windsorton	Communal site, no control	Barkly West	38 km
Kimberley	Medium Site, low control	Not Applicable	-
Ritchie	Communal site, no control	Kimberley	47 km
Barkly West	Small site, low control	Not Applicable	-
Delpoortshoop	Communal site, no control	Barkly West	28 km
Koopmansfontein	Communal site, high control	Not Applicable	-

From the table it becomes clear that the number of landfill sites could be reduced to four: Jan Kempdorp, Kimberley, Barkly West and Koopmansfontein.

The Jan Kempdorp Landfill should remain open since it is the largest site in the PLM, this municipality also has the second largest population and size of economy in the district. The Jan Kempdorp geographic area had a population of 18 750 in 2001, excluding rural areas closest to the town. It is the fastest growing population centre in the PLM. Although a new landfill site is planned for Hartswater, Jan Kempdorp is more centrally located to perform the function of a regional site and sufficient land is available for the planning of such a site. It is not the purpose of a district-level IWMP to impose upon detailed local-level planning.

The 2010 waste generation estimate for the entire municipality is approximately 12 000 tons per annum, or 48 tons per working day. Using a 6 ton load for a full 12m³ mobile waste compactor, this is equivalent to the capacity of 8 vehicle loads per day.

The Hartswater Landfill should be closed since the distance to the Jan Kempdorp Landfill is 25 kilometres, which is feasible using mobile compactor vehicles. The choice between closing the Hartswater Landfill or the Jan Kempdorp Landfill has been made at local level and is manifested through the location and land availability in Jan Kempdorp, taking cognisance of the preliminary planning stages of the proposed Hartswater Landfill.

The Pampierstad Landfill should be closed since the distance to the Jan Kempdorp Landfill is 22 kilometres, which is feasible using mobile compactor vehicles. This landfill is no more than an open dumping area and is located close to an informal settlement.

The Warrenton Landfill should be closed. The distance to the nearest suitable landfill, Jan Kempdorp, is 25 kilometres. The Warrenton geographic area had a population of 18 178, in 2001 and the 2010 waste generation estimate for the municipality is approximately 5 000 tons per annum, or 20 tons per working day. Using a 6 ton load for a full 12m³ mobile waste compactor, this is equivalent to the capacity of less than 4 vehicle loads per day. It is therefore possible to transport the waste to Jan Kempdorp using a transfer station and high capacity Roll-on-Roll-Off vehicles.

The Barkly West Landfill should remain open since it is the largest site in the DLM and situated in the main population centre of the municipality. The Barkly West geographic area had a population of 14 070 in 2001, divided between 9 250 for Delpoortshoop and 5 603 for Windsorton. These figures exclude the population in the rural areas of the municipality.

The Windsorton Landfill should be closed. The distance to the nearest suitable landfill, Barkly West, is 38 kilometres. The distance to the Warrenton Landfill from Windsorton is further than the distance to Barkly West. The Windsorton geographic area has a very small waste generation capacity, with the population being 5 603.

The Delpoortshoop Landfill should be closed. The distance to the nearest suitable landfill, Barkly West, is 28 kilometres. The Delportshoop geographic area has a small waste generation capacity, with the population being 9 250 people.

The entire municipality has a low population and the 2010 waste generation estimate for the municipality is approximately 11 000 tons per annum, or 44 tons per working day. Using a 6 ton load for a full 12m³ mobile waste compactor, this is equivalent to the capacity of 7 vehicle loads per day. It is therefore possible to transport waste to the centrally located Barkly West Landfill using mobile waste compactors.

The Kimberley Landfill should remain open since it is the largest site in the district and closest to the largest population centre in the district. Almost the entire municipality's population is centred around Kimberley and the 2010 waste generation estimate for the municipality is approximately 92 000 tons per annum, or 370 tons per working day. Using a 6 ton load for a full 12m³ mobile waste compactor, this is equivalent to the capacity of 61 vehicle loads per day.

The Ritchie Landfill should be closed. The distance to the nearest suitable landfill, Kimberley, is 47 kilometres. The Ritchie area geographic area has a small waste generation capacity, with the population being 5 708 people. Thus it will be possible to transport the 3 - 5 tons per day on one load of a mobile waste compactor to the Kimberley Landfill.

The Koopmansfontein Landfill should remain open. It is a well-managed, communal site, which serves the rural area of the District Management Area.

Closing a site has the following implications:

- Incurring once-off closure costs;
- Arranging for transporting to the larger site; and
- Disposal at the larger site.

Two methods could be used for transporting waste to landfill sites. The first is collection in mobile refuse compactor and discharging the waste onto the designated landfill. This option requires the use and support of relatively expensive waste compactors at each of the areas where landfills have been closed.

The second option is to establish transfer stations at the old landfill sites. Collection vehicles bring the waste to the transfer station. It is then sorted into a garden component, a recyclable component and the remaining waste fraction. This remaining waste fraction is then loaded into a fixed waste compactor, with a removable bin. This bin is collected periodically by a roll-on-roll-off truck and disposed of on the designated landfill.

This system is used successfully in the Free State Province. An example is the Virginia Transfer Station, in Virginia, Matjhabeng Local Municipality.



Plate 26 - Transfer Station Ramp and Compactor Bins

The transfer station operations are shown in the photograph above. In this case, open topped collection vehicles are used, which increases the recyclable yield from the waste. Previous landfill waste pickers could be employed at the site to sort through the recyclable waste.

The photograph below shows the recycling shed at the transfer station. All waste can be sorted in the shed, with the remaining fraction compacted into the transfer station bins.



Plate 27 - Recycling Shed

Roll-on-Roll-Off trucks should be used to transport the waste to the designated landfill.

Depending upon the current vehicle configuration in each local municipality, either of the two options can be chosen. Over the long-term, the transfer station option should be chosen and the vehicle fleets configured to support these transfer stations.

The use of high capacity bins for the fixed compactor units is recommended. Such bins, $27m^3$ in capacity, will be able to hold about 13 tons of waste. This will be several days waste for the smaller transfer stations. The advantage of the large bins is that they are able to copy with wide fluctuations in waste collection volumes, plus they will reduce the requirement for roll-on-roll-off trucks. In this manner, one such truck may be able to serve two municipalities.

An additional facility that should be added to each transfer station is a composting yard, where the garden waste fraction should be chipped, composted and bagged for sale.

The remaining four landfills should be permitted and operated in accordance with their permit conditions. Aspects of the three unpermitted landfills (Kimberley, Jan Kempdorp and Barkly West) that need addressing include:

- Engineering the landfill so that cell operation can take place in accordance with the minimum requirements. Amongst others, this includes the establishment of a formal, lined cell, with all weather access roads, access controls and a weighbridge;
- Full time, skilled, municipal supervision is essential on each of the landfills;
- The establishment of wet weather cells is a requirement that should be undertaken after the main cells have constructed;
- Interim measures that should be undertaken include providing buildings on site, fencing and installing gate controls;
- Creating a buffer zone as part of the town planning scheme. Purchase
 the land if necessary and make sure the buffer is established. Although
 the width of the buffer zone is not prescribed in the minimum
 requirements, it should be determined based upon specialist studies
 and done by an expert. As a working rule of thumb, a buffer of 800m
 would be a starting point; and
- Establishing a capital and operational budget for each of the landfills.

The Frances Baard District Municipality should play a facilitation role to ensure that the landfills are closed and that alternative disposal arrangements area found. District level co-ordination of this kind will ensure that the transfer station are designed for the anticipated waste volumes, the inter-municipal disposal charges are established and paid and that vehicle co-ordination is carried out minimise the number of vehicles operational in the district.

As a basic principle, municipalities should own the transfer stations, landfills and vehicles in accordance with their requirements. Additional vehicles obtained by a municipality should be used for the benefit of other municipalities, subject to charges being levied by the owning municipality. Examples of such charges include waste transport costs (from a transfer station) and disposal charges.

7.5 Waste Information

Waste information, of all types, is lacking in the District. A focus upon accurate waste information will allow better planning for waste management. It will also allow better performance monitoring of waste management at local municipal level.

The long-term goal in this regard is thus to have each local municipality collecting accurate information with regards to disposal volumes, the types and volumes of waste being disposed of and weaknesses and failures with regards to waste management. Waste generation information, at every level, is also required.

A medium-term goal is to conduct sample waste analysis in each local municipality twice a year, or whenever necessary. This will improve the state of knowledge about the volumes of waste being generated, the volumes of recyclables and the types of wastes being disposed of.

Waste Information System

In terms of the Draft Waste Information Regulations (due for promulgation shortly), all local municipalities will need to register their existing landfills within 60 days of promulgation, and commence reporting on quantities of waste disposed.

The estimated weight of waste disposed of must be reported within a period of 2 years (in terms of guidelines published on www.sawic.org.za); thereafter, it must be based on actual weight. To achieve this, a weighbridge needs to be installed within approximately 2 years.

Registration consists of filling in a form available from www.sawic.org.za and submitting it to national DEA. Reporting will consist of submitting waste data electronically to the South African Waste Information System (SAWIS) database. This information will need to be verified by the provincial authority (or a third party) before acceptance and inclusion into the database. The LM has access to all public domain information on the SAWIS database, and all its own information.

In line with the requirements of the SAWIS, the urgent goal is to log each vehicle visiting the landfills and transfer stations and thus estimate the volumes of waste that have been disposed of on a daily basis.

A short-term goal is to equip each disposal facility with a weighbridge that is manned at all times. As far as possible electronic systems should used to ensure that the information being gathered from weighbridges reflect reality.

Fleet Information

GPS tracking devices are to be installed in every waste collection vehicle to monitor movements and to gather information used for gauging waste collection efficiency and vehicle costs.

Waste Sampling

The medium-term goal is to conduct waste categorisation in each local municipality twice a year.

Third Party Waste Information

A database and procedures for registration should be established in order to register waste recyclers in the district municipality and to register waste transporters who operate from the district.

This information will provide waste managers with details on the private generation and disposal of waste in the district and assist with emergency response.

The database should be established at district level and then implemented at local level. This will ensure that the information collected by each local municipality is the same and is comparable across the district.

7.6 Institutional Arrangements

Institutional arrangements refer to strategic objectives that cover the waste departments that are carrying out waste management tasks. This aspect, along with financial sustainability, is arguably the most important shortfall in waste management in the District, and the most attention should be applied to achieve the strategic goals stated below.

The long-term goal is to have adequately staffed waste management units established in each local municipality. These units should be separate and distinct from other operational units, be headed by the municipal Waste Management Officer, have their own budgets and be allocated income that has been generated through the provision of the service. They should be empowered to carry out their own procurement.

Human Resource Management within these units should ensure that staff is sufficiently well trained and motivated to carry out their work. There should also be active succession planning to ensure that the loss of key officials does not cripple the waste management function in the local municipality.

A small waste management unit should be established at the FBDM. This should be led by the Municipal Waste Management Officer and include a staffing level that allows adequate support levels to local municipalities to be maintained. This unit would also be responsible for the waste management forum and the monitoring of health care waste in the district.

A public complaints line should be established in every local municipality to allow members of the public to register their concerns at service delivery standards. This complaints line should be advertised in the local media and brought to the attention of all councillors in the local municipality. A log should be kept of the complaints registered through the line and the responses to the complaints.

The table below presents the service coverage of each of the local municipalities in the district.

Table 59 - District Waste Management Service Coverage

Financial Area	No. Households	Service Coverage ¹	Households Served	Unserviced Households
Dikgatlong LM	10 015	60.3%	6 039	3 976
Phokwane LM	13 770	58.8%	8 097	5 673
Sol Plaatje LM	52 120	91.8%	47 846	4 274
Magareng LM	5 669	71.8%	4 070	1 599
DMA	1 314	5.9%	78	1 236 ²

¹ Taken from CS2007

2 Since CS2007, the FBDM has started to serve the DMA, this survey figure is longer valid

The highest service coverage in the District is in the Sol Plaatje Local Municipality. The lowest, excluding the DMA, is Phokwane and Dikgatlong. In all cases service coverage should be improved from current levels.

Rural servicing options that could be considered include community contractors servicing using open topped one ton LDVs, community-level waste aggregators who prepare waste for collection by municipal mobile waste compactors and waste exchange programmes in deep rural villages.

Members of the municipal councils should be addressed with regards to waste management, its scope, standard norms and practices and modes of financing. In order to impart this information effectively it should be done in a series of sessions, by an external waste management official of sufficient seniority. This is a short-term goal that would contribute towards the achievement of the long-term goal.

A medium term goal is to have modern waste management by-laws in each local municipality.

A short-term goal would be the establishment of an agenda item for waste management related issues at the Inter-governmental Relations meetings. This would be led by the District Municipality.

7.7 Financial Arrangements

The table below presents a summary of the financial information gathered from the local municipalities.

Table 60 - District Financial Summary

Financial Area	Dikgatlong LM	Phokwane LM	Sol Plaatje LM	Magareng LM	DMA
Waste Management Budget 2009/2010 ¹	R3 600 000	R3 700 000	R30 800 000	R3 700 000	R24 000
Waste Management Income 2009/2010 ¹	R700 000	R4 500 000	R31 300 000	R1 400 000	R0
Surplus/Deficit ¹	(R2 900 000)	R500 000	R500 000	(R2 300 000)	R24 000
Cost per household ²	R599	R459	R510	R916	R310
Municipal Accounts Sent Out	8 452	Unknown	42 000	5 200	0
Recovery Rate	10%	20%	75%	45%	n/a
No. Households	10 015	13 770	52 120	5 669	1 314
No. Households to be billed ³	6 039	8 097	47 846	4 070	78
No. Households who should be billed	(2 413)	Unknown	5 848	(1 130)	

¹ Budgets has been rounded to the nearest R100 000

² Based on service coverage as noted in the Community Survey 2007, rounded to the nearest R1

³ Calculated from CS2007 households and current service coverage rates

The financial stability of the waste management functions differs in the various municipalities of the district. Sol Plaatje LM, having the largest population, has the largest waste budget and the largest income. Here income exceeds costs by some R500 000. The municipality has a high payment rate and is generally financially sound.

This summary masks the fact that the full cost accounting is not practised and that the depreciation of equipment and facilities is not included in the annual waste budget. The addition of these costs would ensure the waste service would remove the waste management financial surplus. In addition, the municipality under-budgets for landfill operation. Allocation of additional costs for this important aspect will move the waste management service into a deficit situation.

The municipality's per household cost is R510, which is reasonable in the light of similar municipal experience. It is the second lowest in the district and demonstrates the power of scale in waste management.

The Phokwane LM financial situation is similar to that of Sol Plaatje, where the service is sustainable, the budgets underestimate the costs due to a lack of full cost accounting and under-spend on the operational aspects of landfilling. A concern with this municipality is the 20% recovery rate from municipal accounts. Costs recovery efforts should therefore be improved.

Dikgatlong and Magareng Local Municipalities both have similar financial statuses. The waste service is unsustainable due to the high deficits being run. These deficits are due to a lack of cost recovery in the municipality and this aspect requires urgent attention. Similar to the PLM and SPLM, full cost accounting is not practised and underspending on the operational aspects of landfilling would worsen the budget outlook.

The costs per household in the DLM is R599, which is reasonable considering the distances involved in waste management in the municipality. The cost per serviced household in Magareng, at R916, is very high, especially when taking into account the poor state of the Warrenton Landfill and the concentrated nature of the population. The cause of this high figure should be investigated and brought down closer to the district average of R500 – R600 per household.

With regards the number of households who received municipal accounts for waste management services, SPLM has a billing shortfall of some 5 800 households who receive a service, but who isn't billed for this service. In PLM, this shortfall is unknown due to lack of information. The Dikgatlong and Magareng Municipalities send municipal accounts to more households than receive a service, 2 400 and 1 100 households respectively. This is a partial explanation for the low payment rates in these municipalities and should be investigated and rectified.

The long-term goal with regards to waste management financing is to provide a service, which covers all the residents of the District, in a manner where the costs of providing the service are lower than the income generated by the service.

Costs, in this context, include all the costs for provision of the service. This includes the amortisation of capital costs across their useful lives and it includes the costs of operating and maintaining the waste management service.

Too often, the cost of the waste management service is understood by municipal officials as being only the costs of operation. Since funding for capital items such as disposal facilities or transfer stations are often grantfunded through the Municipal Infrastructure Grant, this is not seen as a cost of the service. This is an error that will lead to the waste management service being under-funded should the MIG grant become unavailable in the future.

Thus, a medium-term goal is to implement full-cost accounting of the waste management service in each local municipality. This will place in stark focus the need for additional income to fund waste management.

Additional income can be achieved either by increasing the number of people who pay for waste management, by increasing the tariff for existing users, or by a combination of both. Since there are many households in the District who are receiving a service but do not pay for it, this IMWP recommends that the expansion of cost recovery efforts to these households will be the most effective way of making waste management financially sustainable.

The essential elements to cost recovery are the political will to carry this out, and the administrative efficiency to bill and collect monies from serviced households.

A further costs recovery (and waste management) mechanism that should be used in the district in the implementation of charges for landfilling. Charging for waste disposal should be implemented at district landfills. This is part of the minimum requirements and has the effect of imposing a cost on waste generators. This cost will encourage behaviour change with regards to cleaner production or increased recycling and re-use. It will also allow additional financial resources for management of the landfill.

It should be noted that municipal waste enforcement infrastructure should be improved prior to implementation of landfill charges. This will reduce the opportunity to avoid the charge by dumping waste illegally.

7.8 Monitoring and Compliance

Monitoring and compliance of the waste management function in the district encompasses several aspects.

The first is to ensure that waste management services are being effectively delivered throughout the district. Monitoring and compliance actions that should be undertaken in this regard are the establishment of a complaints hotline for use by the public and the recording of public complaints in a complaints register. This hotline should be advertised so that the public are aware of the service.

The Waste Management Officer will then use these complaints to make adjustments to the operations of the waste management service. This can also be used as the basis for disciplinary action against non-performing waste management staff.

The second action is to monitor that waste management in the district is being delivered cost effectively. This is to be done through the development of financial measures covering all facets of waste management. These measures should be used by the Waste Management Officer to adjust service delivery to ensure cost effective delivery. These same measures should also be used by Waste Management Officers during their reports to the IGR meetings.

The third action is to monitor and ensure public compliance with waste management by-laws and other environmental laws. For this purpose it is suggested that by-law enforcement be carried out by local enforcement officials or that a peace officer be trained specifically for waste management enforcement. Enforcement should be carried out amongst generators (both residential and business) as well as with transporters, recyclers and disposers. Allied to this action is the need to raise awareness amongst local magistrates regarding the seriousness of waste management infractions. This will ensure a higher conviction rate and thus a higher level of compliance by the public.

The fourth action is to have adequate waste management data. Such data includes waste volumes being generated, waste types, the volumes of waste

disposal and the locations of disposal. These measures should be used by the Waste Management Officer to adjust service delivery to ensure cost effective delivery. These same measures should also be used by Waste Management Officers during their reports to the IGR meetings.

The information gathered above should be used along with the district-wide waste transporter and recycler database to check on the activities of large generators and disposers. In particular, check the sources of the wastes and their final disposal. Disposal should be legal and verification of this should be obtained.

Local municipalities are responsible for monitoring and compliance in their own areas. The FBDM has a responsibility to use this data to provide oversight of the effectiveness and efficiency of waste management in each local municipality.

An annual waste services audit of the achievement of the goals of this IWMP, and for compliance to the NEMWA, should be carried out by the FBDM. The audit should take place in February of every year to allow time for discussion and setting of budgets prior to the new financial year. This audit should be discussed in the IGR Meeting and steps taken to address non-compliance.

8. ACTION PLANNING

Following on from the strategic waste planning and the status quo information, action plans for each municipality in the district have been developed.

Action plans are developed in the following areas of waste management:

- Collection and Transportation;
- Waste Prevention, Minimisation and Recycling;
- Waste Treatment:
- Waste Disposal, including Regionalisation;
- Waste Information;
- Institutional Arrangements;
- Financial Arrangements; and
- Monitoring and Compliance.

8.1 Dikgatlong Local Municipality



8.1.1 Collection and Transportation

The LM has a waste collection service using its own vehicles. Coverage is not universal and standard waste receptacles are not used. Vehicle and crew efficiencies are low, given numerous areas of illegal dumping and poor condition of the vehicles.

Universal collection from urban and peri-urban areas should be planned and implemented.

The waste collection service must be extended to rural areas where the demand is clear. This should involve the sub-letting of collection out to a community entrepreneur who would use a suitable vehicle, probably a 1 to 3 ton high-sided truck, to collect and dispose of waste at the municipal landfill.

Vehicle serviceability should be improved by signing a Service Level Agreement with the municipal workshops to ensure that vehicles' uptime is acceptable.

Waste management vehicles should be fitted with GPS trackers and a fleet management suite be used to monitor their movements. This package should be sophisticated enough to show the routes taken by vehicles and the stopping locations. Monitoring reports for each truck should be used in monthly progress meetings with truck crews to improve collection efficiency.

Collection efficiency, per household, should be monitored on a random basis by having a supervisor follow waste compactors along their routes. A log should be kept of the households serviced during the route. This should be done for each vehicle at least twice yearly.

A transport investigation should be carried out to determine the need for additional waste collection vehicles.

Two refuse bags per week should be provided to households in very poor areas. This should be done during the waste collection round or by a community entrepreneur contracted to the municipality to provide this service.

A capital programme of fleet renewal should be implemented. The capital programme should be spread over five years to ensure that the overall costs of the vehicle fleet are minimised.

8.1.2 Waste Prevention, Minimisation and Recycling

It is recommended that the results of other studies into the practicality and economics of issues such as buy-back centres, drop-off centres and separation at source be used to plan for municipal waste recycling. Other studies include those to be conducted at the Frances Baard District Municipality and the Sol Plaatje Local Municipality. Once the planning has

been completed, a recycling centre should be established in the municipality. This could take the form of a drop-off or a buy-back centre.

Landfill waste picking should be eliminated. The feasibility of recovering waste using a sorting centre at the municipal landfills/transfer stations should be investigated. This would involve manually processing all waste through the centres, prior to disposal. Employment at these facilities would be used to move waste pickers off the landfill.

A garden centre/composting yard should be established in Barkly West to divert garden waste from the landfill. This yard should be part of the landfill complex, alongside the recycling shed. The compost product should be bagged and sold into the market at ten percent less than the market price, or at the cost price. Garden centres should also be established at the Delpoortshoop and Windsorton Landfills/Transfer Stations, with the same aims as that at Barkly West. These two garden centres should follow the successful implementation of the Barkly West garden centre.

Advertising of the recycling and garden centre/composting initiatives should be carried out by the municipality. This will ensure that source material is brought in and that the market for the compost is developed. Councillor awareness sessions should also be held to ensure that the community is aware of the recycling opportunities that exist in the municipality.

8.1.3 Waste Treatment

Waste treatment at the municipality should start with the processing of tyres. Whole tyres should not be accepted at any landfill/transfer station. Shredded tyres would be acceptable and the municipality should install a tyre shredder for this purpose. Charges should be levied to shred tyres at the landfill/transfer station.

Disposal of shredded tyres is not an acceptable long-term solution and other alternatives, such as the use of tyres as fuel in cement kilns should be investigated.

Tyres should not be burnt at the landfill/transfer stations.

8.1.4 Waste Disposal, including Regionalisation

All Landfills/Transfer Stations in the DLM need to be effectively managed. The landfill or transfer station should be operated in terms of the minimum requirements of waste disposal through landfilling or any other application legislation. A capital and operational budget should be sourced to ensure that this is the case.

An investigation into the feasibility of closing the Delpoortshoop and Windsorton Landfills should be conducted. If necessary a transfer station should be established in Delpoortshoop. Waste could be transported directly from Windsorton to Barkly West. In the light of the relatively short distances involved, the low volumes of waste generated and the state of the current landfill, these options are strongly recommended as it will remove significant environmental and safety risk from the municipality.

8.1.5 Waste Information

An urgent goal is to log each vehicle visiting the landfills/transfer stations and thus estimate the volumes of waste that have been disposed of on a daily basis.

The short-term goal will be to equip the landfills/transfer stations with a weighbridge that is manned at all times. As far as possible electronic systems should be used to ensure that the information gathered from weighbridges reflects reality.

In terms of the Draft Waste Information Regulations (due for promulgation shortly), the LMM will need to register the existing Delpoortshoop, Windsorton and Barkly West Landfills and commence reporting on quantities of waste disposed.

The DLM is not registered with the national Waste Information System. A short-term goal is to register and for regular reports to be submitted to the Waste Information System.

GPS tracking devices are to be installed in every waste collection vehicle.

The medium-term goal is to conduct sample waste analysis in the local municipality twice a year, or whenever necessary.

A database and procedures for registration should be established in order to register waste recyclers in the municipality and to register waste transporters who either operate from Barkly West or regularly travel through the municipality.

8.1.6 Institutional Arrangements

While staffing levels appear adequate for the collection function of the municipality, it is apparent that insufficient provision has been made for staff at the landfill/transfer station. Staffing in all divisions would have to be increased to service a greater percentage of the local municipality.

The Waste Management Officer should be formally appointed.

Capacity and waste management training at operational levels could be improved. IWMSA Training should be undertaken for all waste management employees, including the relevant sections for Councillors.

Succession planning should be carried out to cover for the loss through resignation or promotion of the existing waste management team members.

Waste managers should establish and use systems, such as timesheets, GPS data logging and patrols to the work areas to measure and track the performance of all staff members. Control over staff actions should be significantly improved to advance quality levels.

Waste management by-laws, which are fully compliant with the requirements of the NEMWA, should be promulgated in the local municipality.

Local law enforcement officials, or alternatively peace officers, should be trained in waste management enforcement. These officers should be empowered to trace offenders, issue fines or to call in higher levels of enforcement such as the network of Environmental Management Inspectors, the so-called Green Scorpions, or the South African Police Service.

Local magistrates should be made aware of the importance of the waste management laws. This will ensure that the courts do not treat environmental offences of this nature too leniently.

A toll-free, public waste management hotline should be established in the local municipality. The complaints line should be advertised in the local media and brought to the attention of all councillors in the local municipality. A log should be kept of the complaints registered through the line and the responses to the complaints.

8.1.7 Financial Arrangements

Full cost accounting of the waste management function should be implemented. Budgets should include provisions for amortization and depreciation of capital items. The satisfactory financial performance of the waste management function should be measured against these full costs.

A reconciliation should be conducted to resolve the billing problems. Currently 2 400 households received bills but do not receive a service. These households should be identified and the billing halted until they receive a service.

Currently 90% of the municipal accounts are not paid. Action should be taken to reduce this figure, either by covering the accounts from the Indigent Fund (if the non-payers are indigent) or by instituting credit control actions.

Charges for waste disposal at the landfill/transfer station should be implemented. This would be implemented in conjunction with the construction of security and gate control at the landfill/transfer station and the establishment of enforcement capacity at the waste management unit.

Financial measures regarding the waste-management function should be developed. These measures are to be used to determine the efficiency of waste-management in the municipality, allowing for adjustments to the service to be made by the waste management Officer.

8.1.8 Monitoring and Compliance

The waste management Officer should monitor the public complaints hotline to ensure that service delivery failures have been logged and rectified. A summary of the complaints and the rectification thereof should be made every three months.

The waste management Officer should monitor the financial measures of waste management efficiency to ensure that service delivery constantly improves. A summary of the financial measures, and the steps taken to rectify the underlying negative causes, should be made every three months.

Corrective actions arising from the annual waste services audit carried out by the FBDM should be implemented to ensure that the municipal audit score rises each year.

The waste management Officer should monitor the waste information data to ensure waste management efficiency and to ensure that service delivery constantly improves. A summary of the waste management information, and the steps taken to rectify any deviations or to adjust service delivery in the light of this information, should be made every three months.

Checks should be made on the large waste transporter and waste generators in the municipality every six months. This check should involve a site visit to determine the status of waste management at the premises. A record should be kept of every visit. Corrective actions should be taken, using the by-laws and NEMWA as a guide, to ensure that large waste transporters and generators are managing their waste effectively.

8.1.9 Action Plan

Table 61 – Dikgatlong Local Municipality - Action Plan

Goal		Target	Action	Indicator	Priority	Responsibility	Est. Budget
Waste	Collection		% Either use municipal collection		Medium Term	Waste	R360/serviced
and Tran	nsportation	collection		population		Management	household per year
			community entrepreneur to			Officer	(total cost, including
			carry out the collection task in	service			personnel shown
			the remaining areas				below)
		Reduce veh	cle Sign an SLA with the	Days vehicle	Short Term	Waste	Not higher than
		service lead times	municipal workshop, or failing	spent out of		Management	current expenditure
			this tender the servicing of	service per event		Officer	
			vehicles out to a third party	,			
			provider				
		To control vehi	cle Install GPS logging devices in	No. of vehicles	Short-Term	Waste	R10 000 per vehicle
		movements and	to all vehicles. Setup a	with GPS tracking		Management	One administrator
		derive managem	ent management system to	installed		Officer	post per year.
		data from vehi	cle monitor the devices and				
		movements	produce monthly management				
			reports				
		Random ro	ite A waste supervisor should	No. of route	Short-Term	Waste	Nominal

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
	monitoring to	follow every collection truck	monitoring logs		Management	
	improve service	once a year, logs of the			Officer	
	quality	households visited and				
		service efficiency should be				
		made				
	Collection capacity	Waste managers should use	Fleet size report	Short-Term	Waste	Nominal
	analysis to	gathered data to determine if			Management	
	determine ideal fleet	the current fleet size is			Officer	
	size	adequate or not				
	Refuse bag use in	Provide two refuse bags per	Number of poor	Short-Term	Waste	R75c/week/household
	all areas	household in very poor areas.	households		Management	@ 4 000 households
		The use of a community	receiving two		Officer	= R156 000 per year
		entrepreneur to carry out this	refuse bags per			
		task should be considered	week			
	Serviceable and	Institute a fleet renewal	Age of fleet	Long-Term	Waste	2 RELs over five
	cost effective	programme to be completed			Management	years, average price
	vehicle fleet	over five years			Officer	of R1.1 million =
						R440 000 per year. 6
						Tractor Trailor
						combinations
						@R400 000 each =

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
						R480 000 per year
Recycling	Reduction in waste to disposal	Implement .findings of other studies to establish drop off or buy-back centres.		Short term	Waste Management Officer	R250 000
	Eliminate landfill waste picking	Control and then remove all landfill waste pickers. Put in alternative reclamation measures at the landfills	pickers on the	Medium-Term	Waste Management Officer	R100 000 per year
	Functional garden centres/composting yards	Ensure that a functioning garden centres/composting yards generates compost and diverts garden waste from the landfills	•	Short-Term	Waste Management Officer	R750 000 for three centres, two would only be constructed once the concept was proven on the first centre.
	Awareness regarding compost yard and recycling	Advertise the composting yard. Councillor awareness sessions on recycling.	No. of users of the compost yard	Short-Term	Waste Management Officer	R25 000 per year
Waste Treatment	Treat whole tyres at the landfill	All tyres should be shredded at the landfill. Charges should be levied for this service	•	Long-Term	Waste Management Officer	R350 000 capital cost

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
Waste Disposal, including	J	Carry out detailed cost investigation and implement	Implemented recommendation	Short-Term	Waste Management	Costs to be determined
Regionalisation	Delpoortshoop and, Windsorton Landfills and transport waste to Barkly West				Officer	
	Landfills/Transfer Stations in terms of the Minimum	Source a capital and operational budget in order to operate the landfills/transfer stations in accordance with the law.	Successful external audit	Medium-Term	Waste Management Officer	At least R400 000 operational cost, per landfill, R100 000 per annum for transfer stations
Waste Information		To create manual logs of the volumes that are disposed of in the local landfills/transfer stations	Weekly logsheets	Urgent	Waste Management Officer	Nominal
	To install weighbridges operational landfills/transfer	To install weighbridges, measurement systems and staffing	Detailed disposal masses	Short-Term	Waste Management Officer	R500 000 capital cost

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
	stations					
		submit regular monthly reports	Registration certificate and monthly reports	Short-Term	Waste Management Officer	Nominal
	annual waste	To sample waste volumes and categorisation twice a year at fixed, representative, sample points	Sample reports	Short-Term	Waste Management Officer	Nominal
		To establish the database, to survey all waste recyclers in the municipality and to collect information using a survey form. This database should be updated annually		Short-Term	Waste Management Officer	R25 000 per year
		To establish the database, to survey all waste transporters in the municipality and to collect information using a		Short-Term	Waste Management Officer	R25 000 per year

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
		survey form. This database should be updated annually				
Institutional	Expand	Ensure that adequate staff is		Short Term	Waste	R150 per additional
Arrangements	employment as service coverage increases	in place at the collection and landfill/transfer stations to ensure compliance with NEMWA and this IWMP	suitable staff		Management Officer	serviced household per year
	Appoint a Waste Management Officer	A suitably skilled and knowledgeable person should be appointed into this position.		Urgent	Municipal Manager	To be obtained from existing budgets
	Capacity Building	1) Waste Management training courses with IWMSA 2) Training on SAWIS	Informed and capable staff	Short to Medium Term - ongoing	Municipal Manager/Waste Management Officer	To be obtained from existing budgets
		Positive management systems should be established to ensure that all staff actions and monitored and controlled	Management Systems Outputs (Log-sheets, timesheets, GPS readouts, task orders)	Short-Term	Waste Management Officer	Nominal

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
	Establish posts and	Employ and train one	Employment of	Short Term	Waste	To be obtained from
	budget for staff at	enforcement officer	suitable staff in		Management	existing budgets
	the enforcement		the enforcement		Officer	
	section		section			
	Waste Management	Promulgate by-laws to fully	Promulgated	Long-Term	Waste	Nominal
	By-Laws	take into account NEMWA	Waste		Management	
			Management By-		Officer	
			Laws			
	Members of Council	To conduct awareness	Aware councillors	Short Term	Waste	Nominal
	to be fully aware of	sessions with members of			Management	
	waste management,	council regarding waste			Officer	
	its function, legal	management. Specific				
	aspects and	emphasis should be placed on				
	resource	councillors who are members				
	requirements.	of the mayoral committee				
		dealing with waste.				
		Awareness to be conducted				
		by a suitably senior politician				
		or external official				
	Operational Public	A toll free waste hotline should	Advertised	Medium-Term	Waste	To be obtained from
	Hotline	be established and advertised	telephone number		Management	existing budgets

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
		throughout the municipality. The line should be answered 100% of the time during business hours.	complaints		Officer	
	100% attendance at IGR Meetings	All senior waste managers to attend the IGR Meetings	Attendance register	Short-Term	Waste Management officer	Nominal
Financial Arrangements	accounting for	Establish procedures and values in conjunction with the finance department. Create appropriate monthly reports		Short-Term	Waste Management Officer	Nominal
	who are incorrectly	Carry out a reconciliation to determine which households have been overbilled and credit their accounts	in municipal bills	Short-Term	Waste Management Officer/Financial Officer	Nominal
	100% billing	Ensure that, as service coverage expands, that billing for the service keep pace.		Medium-Term	Waste Management Officer/Financial Officer	Nominal

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
	Institute waste	Setting tariffs and establish	Value received in	Short-Term	Waste	Nominal, capital costs
	charges for	procedures for these waste	waste disposal		Management	included elsewhere
	landfill/transfer	charges	charges per year		Officer	
	station disposal					
	Establishment of	A set of appropriate financial	Use of the	Short-Term	Waste	Nominal
	monthly financial	measures should be	monthly financial		Management	
	performance	developed which describe	measures		Officer	
	measures	waste management efficiency.				
Monitoring and	Monitor waste	Three monthly summary of	3 monthly hotline	Medium Term	Waste	Nominal
Compliance	hotline	complaints made and actions	summaries		Management	
		taken			Officer	
	Monitor financial	Three monthly summary of	3 monthly	Medium Term	Waste	Nominal
	measures	financial measures and the	financial		Management	
		actions taken to improve them	measures		Officer	
			summaries			
	Corrective	All corrective measures	Successful	Short-Term	Waste	Nominal or as
	measures from the	recommended by the annual	Implementation as		Management	required
	annual waste audit	district waste audit should be	per district WMO		Officer	
		implemented	reports			
	Monitor waste	Three monthly summary of	3 monthly waste	Medium Term	Waste	Nominal

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
	information	waste management data	information		Management	
		collected from various sources	summaries		Officer	
		(GPS, weighbridges, SAWIS				
		etc) and actions taken to				
		improve/address issues raised				
		in the data				
	Check on large	Site visits to the organisation's	6 monthly site visit	Medium Term	Waste	Nominal
	waste transporters	premises to determine	reports		Management	
	and generators	compliance with legislation			Officer	

8.2 Phokwane Local Municipality



8.2.1 Collection and Transportation

The LM has a waste collection service using its own vehicles. Coverage is not universal and standard waste receptacles are not used. Vehicle and crew efficiencies are low, given numerous areas of illegal dumping and poor condition of the vehicles.

Universal collection from urban and peri-urban areas should be planned and implemented.

The waste collection service should be extended to rural areas where the demand is clear should be implemented. This should involve the sub-letting of collection out to a community entrepreneur who would use a suitable vehicle, probably a 1 to 3 ton high-sided truck, to collect and dispose of waste at the municipal landfill.

Vehicle serviceability should be improved by signing a Service Level Agreement with the municipal workshops to ensure that vehicles uptime is acceptable.

Waste management vehicles should be fitted with GPS trackers and a fleet management suite used to monitor their movements. This package should be sophisticated enough to show the routes taken by vehicles and the stopping locations. Monitoring reports for each truck should be used in monthly progress meetings with truck crews to improve collection efficiency.

Collection efficiency, per household, should be monitored on a random basis by having a supervisor follow waste compactors along their routes. A log should be kept of the households serviced during the route. This should be done for each vehicle at least twice yearly.

A transport investigation should be carried out to determine the need for additional waste collection vehicles.

Two refuse bags per week should be provided to households in very poor areas; this should be done during the waste collection round or by a community entrepreneur contracted to the municipality to provide this service.

A capital programme of fleet renewal should be implemented. The capital programme should be spread over five years to ensure that the overall costs of the vehicle fleet are minimised.

8.2.2 Waste Prevention, Minimisation and Recycling

It is recommended that the results of other studies into the practicality and economics of issues such as buy-back centres, drop-off centres and separation at source should be used to plan for municipal waste recycling. Other studies include those to be conducted at the Frances Baard District Municipality and the Sol Plaatje Local Municipality. Once the planning has been completed, a recycling centre should be established in the municipality. This could take the form of drop-off or a buy-back centre.

Landfill waste picking should be eliminated. The feasibility of recovering waste using a sorting centre at the municipal landfills should be investigated. This would involve manually processing all waste through the centres, prior to disposal. Employment at this facility would be used to move waste pickers off the landfills.

A garden centre/composting yard should be established in Jan Kempdorp to divert garden waste from the landfill. This yard should be part of the landfill complex, alongside the recycling shed. The compost product should be bagged and sold into the market at ten percent less than the market price, or at the cost price. Garden centres should also be established at the Hartswater Landfill/Transfer Station, with the same aims as that at Jan Kempdorp. This

garden centre should follow successful implementation of the Barkly West garden centre. Should demand for a garden centre be proven at Pampierstad, once should be constructed near the area of greatest demand.

Advertising the recycling and garden centre/composting initiatives should be carried out by the municipality. This will ensure that source material is brought in and that the market for the compost is developed. Councillor awareness sessions should also be held to ensure that the community is aware of the recycling opportunities that exist in the municipality.

8.2.3 Waste Treatment

Waste treatment at the municipality should start with the processing of tyres. Whole tyres should not be accepted at the landfill/transfer station. Shredded tyres would be acceptable and the municipality should install a tyre shredder for this purpose. Charges should be levied to shred tyres at the landfill/transfer station.

Tyres should be accepted only at the Jan Kempdorp Landfill, since this would reduce the capital required to establish tyre shredding in the municipality. This requirement forces the municipality to implement gate controls at other disposal facilities and to create waste enforcement capacity.

Disposal of shredded tyres is not an acceptable long-term solution and other alternatives, such as the use of tyres as fuel in cement kilns, should be investigated.

Tyres should not be burnt at the landfill/transfer station.

8.2.4 Waste Disposal, including Regionalisation

All Landfills/Transfer Stations in the PLM need to be effectively managed. The landfill or transfer station should be operated in terms of the minimum

requirements of waste disposal through landfilling or any other application legislation. A capital and operational budget should be sourced to ensure that this is the case.

An investigation into the feasibility of closing the Jan Kempdorp and Pampierstad Landfills should be conducted. If necessary a transfer station should be established in both centres. In the light of the relatively short distances involved, the low volumes of waste generated and the state of the current landfills, this option is strongly recommended as it will remove significant environmental and safety risk from the municipality.

8.2.5 Waste Information

An urgent goal is to log each vehicle visiting the landfill/transfer station and thus estimate the volumes of waste that are disposed of on a daily basis.

The short-term goal will be to equip the landfill/transfer station with a weighbridge that is manned at all times. As far as possible, electronic systems should be used to ensure that the information gathered from weighbridges reflects reality.

In terms of the Draft Waste Information Regulations (due for promulgation shortly), the LMM will need to register the existing Hartswater, Jan Kempdorp and Pampierstad Landfills and commence reporting on quantities of waste disposed.

The PLM is not registered with the national Waste Information System. A short-term goal is to register and for regular reports to be submitted to the Waste Information System.

GPS tracking devices are to be installed in every waste collection vehicle.

The medium-term goal is to conduct sample waste analysis in the local municipality twice a year, or whenever necessary.

A database and procedures for registration should be established in order to register waste recyclers in the municipality and to register waste transporters who either operate from Hartswater or Jan Kempdorp or regularly travel through the municipality.

8.2.6 Institutional Arrangements

While staffing levels appear adequate for the collection function of the municipality, it is apparent that insufficient provision has been made for staff at the landfill/transfer station. Staffing in all divisions would have to be increased to service a greater percentage of the local municipality.

The Waste Management Officer should be formally appointed.

Capacity and waste-management training at operational levels could be improved. IWMSA Training should be undertaken for all waste-management employees, including the relevant sections for Councillors.

Succession planning should be carried out to cover for the loss through resignation or promotion of the existing waste management team members.

Waste managers should establish and use systems, such as timesheets, GPS data logging and patrols to the work areas to measure and track the performance of all staff members. Control over staff actions should be significantly improved to advance quality levels.

Waste management by-laws which are fully compliant with the requirements of the NEMWA should be promulgated in the local municipality.

Local law enforcement officials, or alternatively, peace officers, should be trained in waste management enforcement. These officers should be empowered to trace offenders, issue fines or to call in higher levels of enforcement such as the network of Environmental Management Inspectors, the so-called Green Scorpions, or the South African Police Service.

Local magistrates should be made aware of the importance of the waste management laws. This will ensure that the courts do not treat environmental offences of this nature too leniently.

A toll free, public, waste-management hotline should be established in the local municipality. The complaints line should be advertised in the local media and brought to the attention of all councillors in the local municipality. A log should be kept of the complaints registered through the line and the responses to the complaints.

8.2.7 Financial Arrangements

Full cost accounting of the waste management function should be implemented. Budgets should include provisions for amortization and depreciation of capital items. The satisfactory financial performance of the waste management function should be measured against these full costs.

Currently 80% of the municipal accounts are not paid. Action should be taken to reduce this figure, either by covering the accounts from the Indigent Fund (if the non-payers are indigent) or by instituting credit control actions.

Charges for waste disposal at the landfills/transfer stations should be implemented. This should be implemented in conjunction with the construction of security and gate control at the landfills/transfer stations and the establishment of enforcement capacity at the waste management unit.

Financial measures regarding the waste management function should be developed. These measures are to be used to determine the efficiency of waste management in the municipality, allowing for adjustments to the service to be made by the Waste Management Officer.

8.2.8 Monitoring and Compliance

The waste management Officer should monitor the public complaints hotline to ensure that service delivery failures have been logged and rectified. A summary of the complaints and the rectification thereof should be made every three months.

The waste management Officer should monitor the financial measures of waste management efficiency, to ensure that service delivery constantly improves. A summary of the financial measures, and the steps taken to rectify the underlying negative causes should be made every three months.

Corrective actions arising from the annual waste services audit carried out by the FBDM should be implemented to ensure that the municipal audit score rises each year.

The waste management Officer should monitor the waste information data to ensure waste-management efficiency and to ensure that service delivery constantly improves. A summary of the waste-management information, and the steps taken to rectify any deviations or to adjust service delivery in the light of this information, should be made every three months.

Checks should be made on the large waste transporter and waste generators in the municipality every six months. This check should involve a site visit to determine the status of waste-management at the premises. A record should be kept of every visit. Corrective actions should be taken, using the by-laws and NEMWA as a guide, to ensure that large waste transporters and generators are managing their waste effectively.

8.2.9 Action Plan

Table 62 - Phokwane Local Municipality - Action Plan

Goal		Target	Action	Indicator	Priority	Responsibility	Est. Budget
Waste	Collection	Ensure 100%	Either use municipal collection	Percentage of the	Medium Term	Waste	R360/serviced
and Tran	nsportation	collection.	vehicles or sub-let a	population		Management	household per year
			community entrepreneur to	receiving a		Officer	(total cost, including
			carry out the collection task in	service			personnel shown
			the remaining areas				below)
		Reduce vehicle	Sign an SLA with the	Days vehicle	Short Term	Waste	Not higher than
		service lead times	municipal workshop, or failing	spent out of		Management	current expenditure
			this tender the servicing of	service per event		Officer	
			vehicles out to a third party				
			provider				
		To control vehicle	Install GPS logging devices in	No. of vehicles	Short-Term	Waste	R10 000 per vehicle
		movements and to	all vehicles. Setup a	with GPS tracking		Management	One administrator
		derive managemen	management system to	installed		Officer	post per year.
		data from vehicle	monitor the devices and				
		movements	produce monthly management				
			reports				
		Random route	A waste supervisor should	No. of route	Short-Term	Waste	Nominal

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
	monitoring to	follow every collection truck	monitoring logs		Management	
	improve service	once a year, logs of the			Officer	
	quality	households visited and				
		service efficiency should be				
		made				
	Collection capacity	Waste managers should use	Fleet size report	Short-Term	Waste	Nominal
	analysis to	gathered data to determine if			Management	
	determine ideal fleet	the current fleet size is			Officer	
	size	adequate or not				
	Refuse bag use in	Provide two refuse bags per	Number of poor	Short-Term	Waste	R75c/week/household
	all areas	household in very poor areas.	households		Management	@ 5 000 households
		The use of a community	receiving two		Officer	= R195 000 per year
		entrepreneur to carry out this	refuse bags per			
		task should be considered	week			
	Serviceable and	Institute a fleet renewal	Age of fleet	Long-Term	Waste	4 RELs over five
	cost effective	programme to be completed			Management	years, average price
	vehicle fleet	over five years.			Officer	of R1.1 million =
						R880 000 per year
Recycling	Reduction in waste	Implement .findings of other	Establishment of	Short term	Waste	R350 000
	to disposal	studies to establish drop off or	recycling facility		Management	

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
		buy-back centres.			Officer	
	Eliminate landfill	Control and then remove all	No. Of waste	Medium-Term	Waste	R100 000 per year
	waste picking	landfill waste pickers. Put in	•		Management	
		alternative reclamation measures at the landfills	landfills		Officer	
	Functional garden	Ensure that a functioning	Tons of compost	Short-Term	Waste	R500 000 for two
	centres/composting	garden centre/composting	produced per year		Management	centres, the last one
	yards	yard generates compost and			Officer	would only be
		diverts garden waste from the				constructed once the
		landfills				concept was proven
						on the first centre.
	Awareness	Advertise the composting	No. of users of the	Short-Term	Waste	R50 000 per year
	regarding compost	yard. Councillor awareness	compost yard		Management	
	yard and recycling	sessions on recycling.			Officer	
Waste Treatment	Treat whole tyres at	All tyres should be shredded	Tons of tyres	Medium-Term	Waste	R350 000 capital cost
	the Jan Kempdorp	at the landfill. Charges should	shredded		Management	
	landfill	be levied for this service			Officer	
Waste Disposal,	Investigate closure	Carry out detailed cost	Implemented	Short-Term	Waste	Costs to be
including	of the Hartswater	investigation and implement	recommendation		Management	determined
Regionalisation	and Pampierstad	recommendations			Officer	

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
	Landfills and					
	transport waste to					
	Jan Kempdorp					
	Landfill					
	Operate all	Source a capital and	Successful	Medium-Term	Waste	At least R400 000
	Landfills/Transfer	operational budget in order to	external audit		Management	operational cost, per
	Stations in terms of	operate the landfills/transfer			Officer	landfill, R100 000 per
	the Minimum	stations in accordance with				annum for transfer
	Requirements or	the law.				stations
	other legislation					
Waste Information	To log all vehicle	To create manual logs of the	Weekly logsheets	Urgent	Waste	Nominal
	visits to	volumes that are disposed of			Management	
	landfills/transfer	in the local landfills/transfer			Officer	
	stations	stations				
	To install	To install weighbridges,	Detailed disposal	Short-Term	Waste	R500 000 capital cost
	weighbridges	measurement systems and	masses		Management	
	operational	staffing			Officer	
	landfills/transfer					
	stations					
	To register and	Register the landfill and	Registration	Short-Term	Waste	Nominal

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
	submit regular	submit regular monthly reports	certificate and		Management	
	monthly reports to		monthly reports		Officer	
	the national WIS					
	To conduct bi-	To sample waste volumes and	Sample reports	Short-Term	Waste	Nominal
	annual waste	categorisation twice a year at			Management	
	sampling, or	fixed, representative, sample			Officer	
	whenever	points				
	necessary					
	To establish a	To establish the database, to	Complete and up	Short-Term	Waste	R25 000 per year
	waste recycler	survey all waste recyclers in	to date database		Management	
	database.	the municipality and to collect			Officer	
		information using a survey				
		form. This database should be				
		updated annually				
	To establish a	To establish the database, to	Complete and up	Short-Term	Waste	R25 000 per year
	waste transporter	survey all waste transporters	to date database		Management	
	database.	in the municipality and to			Officer	
		collect information using a				
		survey form. This database				
		should be updated annually				

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
Institutional	Expand	Ensure that adequate staff is	Employment of	Short Term	Waste	R150 per additional
Arrangements	employment as	in place at the collection and	suitable staff		Management	serviced household
	service coverage	landfills/transfer stations to			Officer	per year
	increases	ensure compliance with				
		NEMWA and this IWMP				
	Appoint a Waste	A suitably skilled and	Employment of	Urgent	Municipal Manager	To be obtained from
	Management Officer	knowledgeable person should	suitable staff			existing budgets
		be appointed into this position.				
	Capacity Building	3) Waste Management	Informed and	Short to Medium	Municipal	To be obtained from
		training courses with	capable staff	Term - ongoing	Manager/Waste	existing budgets
		IWMSA			Management	
		4) Training on SAWIS			Officer	
	Control over daily	Positive management systems	Management	Short-Term	Waste	Nominal
	actions of waste	should be established to	Systems Outputs		Management	
	management staff	ensure that all staff actions	(Log-sheets,		Officer	
		and monitored and controlled	timesheets, GPS			
			readouts, task			
			orders)			
	Establish posts and	Employ and train one	Employment of	Short Term	Waste	To be obtained from
	budget for staff at	enforcement officer	suitable staff in		Management	existing budgets

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
	the enforcement		the enforcement		Officer	
	section		section			
	Waste Management	Promulgate by-laws to fully	Promulgated	Long-Term	Waste	Nominal
	By-Laws	take into account NEMWA	Waste		Management	
			Management By-		Officer	
			Laws			
	Members of Council	To conduct awareness	Aware councillors	Short Term	Waste	Nominal
	to be fully aware of	sessions with members of			Management	
	waste management,	council regarding waste			Officer	
	its function, legal	management. Specific				
	aspects and	emphasis should be placed on				
	resource	councillors who are members				
	requirements.	of the mayoral committee				
		dealing with waste.				
		Awareness to be conducted				
		by a suitably senior politician				
		or external official				
	Operational Public	A toll free waste hotline should	Advertised	Medium-Term	Waste	To be obtained from
	Hotline	be established and advertised	telephone number		Management	existing budgets
		throughout the municipality.	and monthly		Officer	
		The line should be answered	complaints			

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
		100% of the time during business hours.	register			
	100% attendance at IGR meetings	All senior waste managers to attend the IGR meetings	Attendance register	Short-Term	Waste Management officer	Nominal
Financial Arrangements	accounting for	Establish procedures and values in conjunction with the finance department. Create appropriate monthly reports		Short-Term	Waste Management Officer	Nominal
	who are incorrectly	Carry out a reconciliation to determine which households have been overbilled and credit their accounts	in municipal bills	Short-Term	Waste Management Officer/Financial Officer	Nominal
	100% billing	Ensure that, as service coverage expands, that billing for the service keep pace.		Medium-Term	Waste Management Officer/Financial Officer	Nominal
	Institute waste charges for	Setting tariffs and establish procedures for these waste		Short-Term	Waste Management	Nominal, capital costs included elsewhere

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
	landfill/transfer station disposal	charges	charges per year		Officer	
		A set of appropriate financial measures should be developed which describe waste management efficiency.	monthly financial	Short-Term	Waste Management Officer	Nominal
Monitoring and Compliance	Monitor waste hotline	Three monthly summary of complaints made and actions taken	•	Medium Term	Waste Management Officer	Nominal
	Monitor financial measures	Three monthly summary of financial measures and the actions taken to improve them	financial	Medium Term	Waste Management Officer	Nominal
		All corrective measures recommended by the annual district waste audit should be implemented	·	Short-Term	Waste Management Officer	Nominal or as required
	Monitor waste information	Three monthly summary of waste management data collected from various sources	information	Medium Term	Waste Management Officer	Nominal

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
		(GPS, weighbridges, SAWIS				
		etc) and actions taken to				
		improve/address issues raised				
		in the data				
	Check on large	Site visits to the organisation's	6 monthly site visit	Medium Term	Waste	Nominal
	waste transporters	premises to determine	reports		Management	
	and generators	compliance with legislation			Officer	
	waste transporters	Site visits to the organisation's premises to determine	_		Management	Nominal

8.3 Sol Plaatje Local Municipality



8.3.1 Collection and Transportation

The LM has a relatively well-organised waste collection service using its own vehicles. Coverage is not universal and standard waste receptacles are not used.

Sub-letting of collection in informal settlements should be investigated. The simplest method would be to contract a community entrepreneur to move refuse bags from outside the houses on an appointed day to a location more accessible to waste compactors.

The waste collection service should be extended to rural areas where the demand is clear should be implemented. This should involve the sub-letting of collection out to a community entrepreneur who would use a suitable vehicle, probably a 1 to 3 ton high-sided truck, to collect and dispose of waste at the municipal landfill.

Vehicle serviceability should be improved by signing a Service Level Agreement with the municipal workshops to ensure that vehicles uptime is acceptable.

Waste compactors and street cleaning vehicles should be fitted with GPS trackers and a fleet management suite used to monitor their movements. This package should be sophisticated enough to show the routes taken by vehicles and the stopping locations. Monitoring reports for each truck should be used in monthly progress meetings with truck crews to improve collection efficiency.

Collection efficiency, per household, should be monitored on a random basis by having a supervisor follow waste compactors along their routes. A log should be kept of the households serviced during the route. This should be done for each vehicle at least twice yearly.

A transport investigation should be carried out to determine the need for additional waste collection vehicles.

Two refuse bags per week should be provided to households in very poor areas. This should be done during the waste collection round or by a community entrepreneur contracted to the municipality to provide this service.

A capital programme of fleet renewal should be implemented. The capital programme should be spread over five years to ensure that the overall costs of the vehicle fleet are minimised.

8.3.2 Waste Prevention, Minimisation and Recycling

It is recommended that the practicality and economics of issues such as buyback centres, drop-off centres and separation at source be investigated. Once the review has been conducted, recycling centres should be established in the municipality. These could take the form of drop-off or buy-back centres.

A residential separation at source pilot project should be initiated and monitored by SPLM. This pilot project should evaluate the efficiency and effectiveness of such schemes when compared to other recycling methods. Alternative methods include recyclable drop-off schemes and improved salvaging at landfills.

Landfill waste picking should be eliminated. The feasibility of recovering waste using a sorting centre at the municipal landfill should be investigated. This would involve manually processing all waste through the centre, prior to disposal. Employment at this facility would be used to move waste pickers off the landfill.

A composting yard should be re-established to divert garden waste from the landfill. The compost yard should be managed by a municipal employee and

be accountable for volumes of compost produced. The compost product should be bagged and sold into the market at ten percent less than the market price, or at the cost price.

Advertising the recycling and garden centre/composting initiatives should be carried out by the municipality. This will ensure that source material is brought in and that the market for the compost is developed. Councillor awareness sessions should also be held to ensure that the community is aware of the recycling opportunities that exist in the municipality.

The municipality should monitor cleaner production developments mandated by the National Waste Management Strategy and higher spheres of government. Implementation of these requirements should occur once they are clear.

8.3.3 Waste Treatment

Waste treatment at the municipality should start with the processing of tyres. Whole tyres should not be accepted at the landfill. Shredded tyres would be acceptable and the municipality should install a tyres shredder for this purpose. Charges should be levied to shred tyres at the landfill.

Disposal of shredded tyres is not an acceptable long-term solution and other alternatives, such as the use of tyres as fuel in cement kilns, should be investigated.

Tyres should not be burnt at the landfill.

The municipality should monitor health care waste information. This is a management effort to ensure that the primary generators have an operational system in place to dispose of this waste correctly. Under no circumstances should medical waste be accepted by the landfills.

8.3.4 Waste Disposal, including Regionalisation

The Kimberley Landfill needs to be effectively managed. A municipal employee should be designated the Responsible Person for this site and should be held accountable for the manner in which it is operated. The responsible person should be based at the landfill.

The landfill should be operated in terms of the minimum requirements of waste disposal through landfilling. A capital and operational budget should be sourced to ensure that this is the case.

A buffer zone should be secured for the Kimberley landfill. This will involve purchasing land around the landfill and establishing the buffer zone in the Town Planning Scheme.

An investigation into the feasibility of closing the Ritchie Landfill should be conducted. If necessary a transfer station should be established in Ritchie. In the light of the relatively short distances involved, the low volumes of waste generated and the state of the current landfill, this option is strongly recommended as it will removed significant environmental and safety risk from the municipality.

8.3.5 Waste Information

An urgent goal is to log each vehicle visiting the landfill and thus estimate the volumes of waste that have been disposed of on a daily basis.

The short-term goal will be to equip the landfill with a weighbridge that is manned at all times. As far as possible electronic systems should be used to ensure that the information gathered from weighbridges reflects reality.

In terms of the Draft Waste Information Regulations (due for promulgation shortly), the LMM will need to register the existing Kimberley Landfill commence reporting on quantities of waste disposed.

The SPLM is not registered with the national Waste Information System. A short-term goal is to register and for regular reports to be submitted to the Waste Information System.

GPS tracking devices are to be installed in every waste collection vehicle.

The medium-term goal is to conduct sample waste analysis in the local municipality twice a year, or whenever necessary.

A database and procedures for registration should be established in order to register waste recyclers in the municipality and to register waste transporters who either operate from Kimberley or regularly travel through the municipality.

8.3.6 <u>Institutional Arrangements</u>

While staffing levels appear adequate for the collection function of the municipality, it is apparent that insufficient provision has been made for staff at the landfill.

The waste management Officer should be formally designated and the vacancy at the head of the Cleansing Unit should be filled as soon as possible.

Capacity and waste-management training at operational levels could be improved. IWMSA Training should be undertaken for all waste-management employees, including the relevant sections for Councillors.

Succession planning should be carried out to cover for the loss through resignation or promotion of the existing waste management team members.

Waste managers should establish and use systems, such as timesheets, GPS data logging and patrols to the work areas to measure and track the

performance of all staff members. Control over staff actions should be significantly improved to advance quality levels.

The LM's by-laws were upgraded in 2006 to take into account new waste-management realities. These by-laws should be brought fully into line with NEMWA in due course.

Local law enforcement officials, or alternatively peace officers, should be trained in waste management enforcement. These officers should be empowered to trace offenders, issue fines or to call in higher levels of enforcement such as the network of Environmental Management Inspectors, the so-called Green Scorpions, or the South African Police Service.

Local magistrates should be made aware of the importance of the waste management laws. This will ensure that the courts do not treat environmental offences of this nature too leniently.

A toll free, public waste management hotline should be established in the local municipality. The complaints line should be advertised in the local media and brought the attention of all councillors in the local municipality. A log should be kept of the complaints registered through the line and the responses to the complaints.

8.3.7 Financial Arrangements

Full cost accounting of the waste management function should be implemented. Budgets should include provisions for amortization and depreciation of capital items. The satisfactory financial performance of the waste management function should be measured against these full costs.

Payment for services should be expanded to the approximately 5 000 households who receive a service, but who do not pay for it.

Currently 25% of the municipal accounts are not paid. Action should be taken to reduce this figure, either by covering the accounts from the Indigent Fund (if the non-payers are indigent) or by instituting credit control actions.

Charges for waste disposal at the landfill should be implemented. These would be implemented in conjunction with the construction of security and gate control at the landfill and the establishment of enforcement capacity at the waste management unit.

Financial measures regarding the waste management function should be developed. These measures are to be used to determine the efficiency of waste management in the municipality, allowing for adjustments to the service to be made by the waste management Officer.

8.3.8 Monitoring and Compliance

The waste management Officer should monitor the public complaints hotline to ensure that service delivery failures have been logged and rectified. A summary of the complaints and the rectification thereof should be made every three months.

The waste management Officer should monitor the financial measures of waste management efficiency, to ensure that service delivery constantly improves. A summary of the financial measures, and the steps taken to rectify the underlying negative causes should be made every three months.

Corrective actions arising from the annual waste services audit carried out by the FBDM should be implemented to ensure that the municipal audit score rises each year.

The waste management Officer should monitor the waste information data to ensure waste management efficiency and to ensure that service delivery constantly improves. A summary of the waste management information, and the steps taken to rectify any deviations or to adjust service delivery in the light of this information, should be made every three months.

Checks should be made on the large waste transporter and waste generators in the municipality every six months. This check should involve a site visit to determine the status of waste management at the premises. A record should be kept of every visit. Corrective actions should be taken, using the by-laws and NEMWA as a guide, to ensure that large waste transporters and generators are managing their waste effectively.

8.3.9 Action Plan

Table 63 - Sol Plaatje Local Municipality - Action Plan

Goal		Target	Action	Indicator	Priority	Responsibility	Est. Budget
Waste 0	Collection	Ensure 100%	Sub-let a community	Percentage of the	Medium Term	Waste	R360/serviced
and Trans	portation	collection in informa	entrepreneur to move refuse	informal		Management	household per year
		areas	bags to a location more	settlement		Officer	(total cost, including
			suitable for compactor access	population			personnel shown
				receiving a			below)
				service			
		Reduce vehicle	Sign an SLA with the	Days vehicle	Short Term	Waste	Not higher than
		service lead times	municipal workshop, or failing	spent out of		Management	current expenditure
			this tender the servicing of	service per event		Officer	
			vehicles out to a third party				
			provider				
		To control vehicle	Install GPS logging devices in	No. of vehicles	Short-Term	Waste	R10 000 per vehicle
		movements and to	all vehicles. Setup a	with GPS tracking		Management	One administrator
		derive managemen	management system to	installed		Officer	post per year.
		data from vehicle	monitor the devices and				
		movements	produce monthly management				
			reports				

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
	Random route	A waste supervisor should	No. of route	Short-Term	Waste	Nominal
	monitoring to	follow every collection truck	monitoring logs		Management	
	improve service	once a year, logs of the			Officer	
	quality	households visited and				
		service efficiency should be				
		made				
	Collection capacity	Waste managers should use	Fleet size report	Short-Term	Waste	Nominal
	analysis to	gathered data to determine if			Management	
	determine ideal fleet	the current fleet size is			Officer	
	size	adequate or not				
	Refuse bag use in	Provide two refuse bags per	Number of poor	Short-Term	Waste	R75c/week/household
	all areas	household in very poor areas.	households		Management	@ 10 000 households
		The use of a community	receiving two		Officer	= R390 000 per year
		entrepreneur to carry out this	refuse bags per			
		task should be considered	week			
	Serviceable and	Institute a fleet renewal	Age of fleet	Long-Term	Waste	16 vehicles over five
	cost effective	programme to be completed			Management	years, average price
	vehicle fleet	over five years.			Officer	of R1.1 million =
						R3.52 million per year
Recycling	Reduction in waste	Undertake investigation into	Establishment of	Short term	Waste	Study :-

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
	to disposal	separation at source buy-back centres and drop off point etc. Formulate a detailed Action Plan	facility/system		Management Officer	R 125 000
	Pilot separation at source scheme	Carry out a separation at source pilot programme in a high income area of Kimberley	recyclables from	Long-Term	Waste Management Officer	R150 000
	Eliminate landfill waste picking	Control and then remove all landfill waste pickers. Put in alternative reclamation measures at the landfill	pickers on the	Medium-Term	Waste Management Officer	R100 000 per year
	Functional composting yard	Ensure that the composting yard generates compost and diverts garden waste from the landfill	produced per year	Short-Term	Waste Management Officer	R1.3 million per year (assuming no sales)
	Awareness regarding compost yard and recycling	Advertise the composting yard. Councillor awareness sessions on recycling.	No. of users of the compost yard	Short-Term	Waste Management Officer	R50 000 per year

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
	Cleaner Production	Monitor national cleaner production developments and implement		Long-Term	Waste Management Officer	Nominal
Waste Treatment	Treat whole tyres at the landfill	All tyres should be shredded at the landfill. Charges should be levied for this service	_	Medium-Term	Waste Management Officer	R350 000 capital cost
	Monitor medical waste disposal	Information on medical waste disposal should be collected by the LM		Short-Term	Waste Management Officer	Nominal
Waste Disposal, including Regionalisation	Appoint responsible person at the landfill	•	Responsible person appointed	Short-Term	Waste Management Officer	R300 000 per annum.
	Kimberley Landfill in	Source a capital and operational budget in order to operate the landfill in accordance with the law.	Successful external audit	Medium-Term	Waste Management Officer	R3.6 million per annum operational cost
		Purchase the necessary land and implement buffer in Town	Established buffer	Short-Term	Waste Management	R500 000

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
	Kimberley Landfill	Planning Scheme			Officer	
	Investigate closure	Carry out detailed cost	Implemented	Short-Term	Waste	Costs to be
	of the Ritchie	investigation and implement	recommendation		Management	determined
	Landfill and	recommendations			Officer	
	transport waste to					
	Kimberley Landfill					
Waste Information	To log all vehicle	To create manual logs of the	Weekly logsheets	Urgent	Waste	Nominal
	visits to landfills	volumes that are disposed of			Management	
		in the local landfills			Officer	
	To install	To install weighbridges,	Detailed disposal	Short-Term	Waste	R800 000 capital cost
	weighbridges	measurement systems and	masses		Management	
	operational landfills	staffing			Officer	
	To register and	Register the landfill and	Registration	Short-Term	Waste	Nominal
	submit regular	submit regular monthly reports	certificate and		Management	
	monthly reports to		monthly reports		Officer	
	the national WIS					
	To conduct bi-	To sample waste volumes and	Sample reports	Short-Term	Waste	Nominal
	annual waste	categorisation twice a year at			Management	
	sampling, or	fixed, representative, sample			Officer	
	whenever	points				

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
	necessary					
		To establish the database, to		Short-Term	Waste	R25 000 per year
	waste recycler	survey all waste recyclers in	to date database		Management	
	database.	the municipality and to collect			Officer	
		information using a survey				
		form. This database should be				
		updated annually				
	To establish a	To establish the database, to	Complete and up	Short-Term	Waste	R25 000 per year
	waste transporter	survey all waste transporters	to date database		Management	
	database.	in the municipality and to			Officer	
		collect information using a				
		survey form. This database				
		should be updated annually				
Institutional	Establish posts and	Ensure that adequate staff is	Employment of	Short Term	Waste	R1.6 million per year
Arrangements	budget for staff at	in place at the landfill to	suitable staff		Management	
	the Kimberley	operate it in terms of the			Officer	
	Landfill	Minimum Requirements				
	Appoint a head of	This person should also be	Employment of	Urgent	Municipal Manager	R300 000 per year
	the Cleansing Unit	the Waste Management	suitable staff			
		Officer				

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
	Capacity Building	1) Waste Management	Informed and	Short to Medium	Municipal	R125 000 per year
		training courses with	capable staff	Term - ongoing	Manager/Waste	
		IWMSA			Management	
		2) Training on SAWIS			Officer	
	Control over daily	Positive management systems	Management	Short-Term	Waste	Nominal
	actions of waste	should be established to	Systems Outputs		Management	
	management staff	ensure that all staff actions	(Log-sheets,		Officer	
		and monitored and controlled	timesheets, GPS			
			readouts, task			
			orders)			
	Establish posts and	List as per Section 7.6	Employment of	Short Term	Waste	R150 000 per year
	budget for staff at		suitable staff in		Management	
	the enforcement		the enforcement		Officer	
	section		section			
	Waste Management	Promulgate updated by-laws	Promulgated	Long-Term	Waste	Nominal
	By-Laws	to fully take into account	Waste		Management	
		NEMWA	Management By-		Officer	
			Laws			
	Members of Council	To conduct awareness	Aware councillors	Short Term	Waste	Nominal
	to be fully aware of	sessions with members of			Management	

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
	waste management,	council regarding waste			Officer	
	its function, legal	management. Specific				
	aspects and	emphasis should be placed on				
	resource	councillors who are members				
	requirements.	of the mayoral committee				
		dealing with waste.				
		Awareness to be conducted				
		by a suitably senior politician				
		or external official				
	Operational Public	A toll free waste hotline should	Advertised	Medium-Term	Waste	R10 000 per year
	Hotline	be established and advertised	telephone number		Management	
		throughout the municipality.	and monthly		Officer	
		The line should be answered	complaints			
		100% of the time during	register			
		business hours.				
	100% attendance at	All senior waste managers to	Attendance	Short-Term	Waste	Nominal
	IGR meetings	attend the IGR meetings	register		Management	
					officer	
Financial	Institute full cost	Establish procedures and	Use of the	Short-Term	Waste	Nominal
Arrangements	accounting for	values in conjunction with the	monthly reports		Management	
	waste management	finance department. Create			Officer	

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
		appropriate monthly reports				
		Identify these households in conjunction with the finance	additional rate	Short-Term	Waste Management	Nominal
	who receive a service, pay for it	department and register them for municipal accounts	payers		Officer/Financial Officer	
		Setting tariffs and establish procedures for these waste charges		Short-Term	Waste Management Officer	Nominal, capital costs included elsewhere
		A set of appropriate financial measures should be developed which describe waste management efficiency.	monthly financial	Short-Term	Waste Management Officer	Nominal
Monitoring and Compliance	Monitor waste hotline	Three monthly summary of complaints made and actions taken		Medium Term	Waste Management Officer	Nominal
	Monitor financial measures	Three monthly summary of financial measures and the actions taken to improve them	financial	Medium Term	Waste Management Officer	Nominal
	Corrective	All corrective measures	Successful	Short-Term	Waste	Nominal or as

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
	measures from the	recommended by the annual	Implementation as		Management	required
	annual waste audit	district waste audit should be	per district WMO		Officer	
		implemented	reports			
	Monitor waste	Three monthly summary of	3 monthly waste	Medium Term	Waste	Nominal
	information	waste management data	information		Management	
		collected from various sources	summaries		Officer	
		(GPS, weighbridges, SAWIS				
		etc) and actions taken to				
		improve/address issues raised				
		in the data				
	Check on large	Site visits to the organisation's	6 monthly site visit	Medium Term	Waste	Nominal
	waste transporters	premises to determine	reports		Management	
	and generators	compliance with legislation			Officer	

8.4 Magareng Local Municipality



8.4.1 Collection and Transportation

The LM has a waste collection service using its own vehicles. Coverage is not universal and standard waste receptacles are not used. Vehicle and crew efficiencies are low, given numerous areas of illegal dumping and poor condition of the vehicles.

Universal collection from urban and peri-urban areas should be planned and implemented.

The waste collection service to rural areas should be extended where the demand is clear. This should involve the sub-letting of collection out to a community entrepreneur who would use a suitable vehicle, probably a 1 to 3 ton high-sided truck, to collect and dispose of waste at the municipal landfill.

Vehicle serviceability should be improved by signing a Service Level Agreement with the municipal workshops to ensure that vehicles uptime is acceptable.

Waste management vehicles should be fitted with GPS trackers and a fleet management suite used to monitor their movements. This package should be sophisticated enough to show the routes taken by vehicles and the stopping locations. Monitoring reports for each truck should be used in monthly progress meetings with truck crews to improve collection efficiency.

Collection efficiency, per household, should be monitored on a random basis by having a supervisor follow waste compactors along their routes. A log should be kept of the households serviced during the route. This should be done for each vehicle at least twice yearly.

A transport investigation should be carried out to determine the need for additional waste collection vehicles.

Two refuse bags per week should be provided to households in very poor areas. This should be done during the waste collection round or by a community entrepreneur contracted to the municipality to provide this service.

A capital programme of fleet renewal should be implemented. The capital programme should be spread over five years to ensure that the overall costs of the vehicle fleet are minimised.

8.4.2 Waste Prevention, Minimisation and Recycling

It is recommended that the results of other studies into the practicality and economics of issues such as buy-back centres, drop-off centres and separation at source be used to plan for municipal waste recycling. Other studies include those to be conducted at the Frances Baard District Municipality and the Sol Plaatje Local Municipality. Once the planning has been completed, a recycling centre should be established in the municipality. This could take the form of a drop-off or a buy-back centre.

Landfill waste picking should be eliminated. The feasibility of recovering waste using a sorting centre at the municipal landfill should be investigated. This would involve manually processing all waste through the centre, prior to disposal. Employment at this facility would be used to move waste pickers off the landfill.

A garden centre/composting yard should be established to divert garden waste from the landfill or final disposal. This yard should be part of the new transfer station or of the landfill depending upon the results of the landfill study. The compost product should be bagged and sold into the market at ten percent less than the market price, or at the cost price.

Advertising the recycling and garden centre/composting initiatives should be carried out by the municipality. This will ensure that source material is brought in and that the market for the compost is developed. Councillor awareness sessions should also be held to ensure that the community is aware of the recycling opportunities that exist in the municipality.

8.4.3 Waste Treatment

Waste treatment at the municipality should start with the processing of tyres. Whole tyres should not be accepted at the landfill/transfer station. Shredded tyres would be acceptable and the municipality should install a tyres shredder for this purpose. Charges should be levied to shred tyres at the landfill/transfer station.

Disposal of shredded tyres is not an acceptable long-term solution and other alternatives, such as the use of tyres as fuel in cement kilns, should be investigated.

Tyres should not be burnt at the landfill/transfer station.

8.4.4 Waste Disposal, including Regionalisation

The Warrenton Landfill/Transfer Station needs to be effectively managed. The landfill should be operated in terms of the minimum requirements of waste disposal through landfilling or any other application legislation. A capital and operational budget should be sourced to ensure that this is the case.

An investigation into the feasibility of closing the Warrenton Landfill should be conducted. If necessary a transfer station should be established in Warrenton. In the light of the relatively short distances involved, the low volumes of waste generated and the state of the current landfill, this option is strongly recommended as it will removed significant environmental and safety risk from the municipality.

8.4.5 Waste Information

An urgent goal is to log each vehicle visiting the landfill/transfer station and thus estimate the volumes of waste that have been disposed of on a daily basis.

The short-term goal will be to equip the landfill/transfer station with a weighbridge that is manned at all times. As far as possible electronic systems should be used to ensure that the information gathered from weighbridges reflects reality.

In terms of the Draft Waste Information Regulations (due for promulgation shortly), the LMM will need to register the existing Warrenton Landfill commence reporting on quantities of waste disposed.

The MLM is not registered with the national Waste Information System. A short-term goal is to register and for regular reports to be submitted to the Waste Information System.

GPS tracking devices are to be installed in every waste collection vehicle.

The medium-term goal is to conduct sample waste analysis in the local municipality twice a year, or whenever necessary.

A database and procedures for registration should be established in order to register waste recyclers in the municipality and to register waste transporters who either operate from Warrenton or regularly travel through the municipality.

8.4.6 <u>Institutional Arrangements</u>

While staffing levels appear adequate for the collection function of the municipality, it is apparent that insufficient provision has been made for staff at

the landfill/transfer station. Staffing in all divisions would have to be increased to service a greater percentage of the local municipality.

The waste management Officer should be formally appointed.

Capacity and waste management training at operational levels could be improved. IWMSA Training should be undertaken for all waste management employees, including the relevant sections for Councillors.

Succession planning should be carried out to cover for the loss through resignation or promotion of the existing waste management team members.

Waste managers should establish and use systems, such as timesheets, GPS data logging and patrols to the work areas to measure and track the performance of all staff members. Control over staff actions should be significantly improved to advance quality levels.

Waste management by-laws which are fully compliant with the requirements of the NEMWA should be promulgated in the local municipality.

Local law enforcement officials, or alternatively, peace officers, should be trained in waste management enforcement. These officers should be empowered to trace offenders, issue fines or to call in higher levels of enforcement such as the network of Environmental Management Inspectors, the so-called Green Scorpions, or the South African Police Service.

Local magistrates should be made aware of the importance of the waste management laws. This will ensure that the courts do not treat environmental offences of this nature too leniently.

A toll free, public, waste-management hotline should be established in the local municipality. The complaints line should be advertised in the local media and brought the attention of all councillors in the local municipality. A log

should be kept of the complaints registered through the line and the responses to the complaints.

8.4.7 Financial Arrangements

Full cost accounting of the waste management function should be implemented. Budgets should include provisions for amortization and depreciation of capital items. The satisfactory financial performance of the waste management function should be measured against these full costs.

The cost per serviced household in MLM is R916, which is about 40% higher than the district average. Given the concentrated nature of the population, the poor state of the collection fleet, the low service coverage and the dire condition of the Warrenton Landfill, it is suggested that the municipality is not getting value for money. A budget reconciliation should take place to identify efficiency saving in the waste management unit of the MLM. Funds so identified should be used to provide a better service or should be used elsewhere in the municipal budget.

A reconciliation should be conducted to resolve the billing problems, currently 1 100 household received bills but do not receive a service. These households should be identified and the billing halted until they receive a service

Currently 55% of the municipal accounts are not paid. Action should be taken to reduce this figure, either by covering the accounts from the Indigent Fund (if the non-payers are indigent) or by instituting credit control actions.

Charges for waste disposal at the landfill/transfer station should be implemented. This would be implemented in conjunction with the construction of security and gate control at the landfill/transfer station and the establishment of enforcement capacity at the waste management unit.

Financial measures regarding the waste management function should be developed. These measures are to be used to determine the efficiency of waste management in the municipality, allowing for adjustments to the service to be made by the waste management Officer.

8.4.8 Monitoring and Compliance

The waste management Officer should monitor the public complaints hotline to ensure that service delivery failures have been logged and rectified. A summary of the complaints and the rectification thereof should be made every three months.

The waste management Officer should monitor the financial measures of waste management efficiency, to ensure that service delivery constantly improves. A summary of the financial measures, and the steps taken to rectify the underlying negative causes should be made every three months.

Corrective actions arising from the annual waste services audit carried out by the FBDM should be implemented to ensure that the municipal audit score rises each year.

The waste management Officer should monitor the waste information data to ensure waste management efficiency and to ensure that service delivery constantly improves. A summary of the waste management information, and the steps taken to rectify any deviations or to adjust service delivery in the light of this information, should be made every three months.

Checks should be made on the large waste transporter and waste generators in the municipality every six months. This check should involve a site visit to determine the status of waste management at the premises. A record should be kept of every visit. Corrective actions should be taken, using the by-laws and NEMWA as a guide, to ensure that large waste transporters and generators are managing their waste effectively.

8.4.9 Action Plan

Table 64 - Magareng Local Municipality - Action Plan

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
Waste Collection and Transportation			population receiving a	Medium Term	Waste Management Officer	To be obtained from existing budgets
	Reduce vehicle service lead times	-	spent out of	Short Term	Waste Management Officer	Not higher than current expenditure
	To control vehicle movements and to derive management data from vehicle movements	management system to	No. of vehicles with GPS tracking installed	Short-Term	Waste Management Officer	R10 000 per vehicle One administrator post per year.
	Random route	A waste supervisor should	No. of route	Short-Term	Waste	Nominal

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
	monitoring to	follow every collection truck	monitoring logs		Management	
	improve service	once a year, logs of the			Officer	
	quality	households visited and				
		service efficiency should be				
		made				
	Collection capacity	Waste managers should use	Fleet size report	Short-Term	Waste	Nominal
	analysis to	gathered data to determine if			Management	
	determine ideal fleet	the current fleet size is			Officer	
	size	adequate or not				
	Refuse bag use in	Provide two refuse bags per	Number of poor	Short-Term	Waste	R75c/week/household
	all areas	household in very poor areas.	households		Management	@ 2 000 households
		The use of a community	receiving two		Officer	= R78 000 per year
		entrepreneur to carry out this	refuse bags per			
		task should be considered	week			
	Serviceable and	Institute a fleet renewal	Age of fleet	Long-Term	Waste	2 RELs over five
	cost effective	programme to be completed			Management	years, average price
	vehicle fleet	over five years.			Officer	of R1.1 million =
						R440 000 per year
Recycling	Reduction in waste	Implement .findings of other	Establishment of	Short term	Waste	R250 000
	to disposal	studies to establish drop off or	recycling facility		Management	

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
		buy-back centres.			Officer	
		Control and then remove all		Medium-Term	Waste	R100 000 per year
	waste picking	landfill waste pickers. Put in alternative reclamation measures at the landfill	•		Management Officer	
	Functional garden	Ensure that a functioning	Tons of compost	Short-Term	Waste	R250 000
	centre/composting	garden centre/composting	produced per year		Management	
	yard	yard generates compost and			Officer	
		diverts garden waste from the				
		landfill				
	Awareness	Advertise the composting	No. of users of the	Short-Term	Waste	R25 000 per year
	regarding compost	yard. Councillor awareness	compost yard		Management	
	yard and recycling	sessions on recycling.			Officer	
Waste Treatment	Treat whole tyres at	All tyres should be shredded	Tons of tyres	Medium-Term	Waste	R350 000 capital cost
	the landfill	at the landfill. Charges should	shredded		Management	
		be levied for this service			Officer	
Waste Disposal,	Investigate closure	Carry out detailed cost	Implemented	Short-Term	Waste	Costs to be
including	of the Warrenton	investigation and implement	recommendation		Management	determined
Regionalisation	Landfill and	recommendations			Officer	
	transport waste to					

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
	Jan Kempdorp Landfill					
	Warrenton Landfill/Transfer	operational budget in order to operate the landfill/transfer station in accordance with the	Successful external audit	Medium-Term	Waste Management Officer	At least R400 000 operational cost, per landfill, R100 000 per annum for transfer stations
Waste Information		To create manual logs of the volumes that are disposed of in the local landfills/transfer stations	Weekly logsheets	Urgent	Waste Management Officer	Nominal
	To install weighbridges operational landfills/transfer stations		Detailed disposal masses	Short-Term	Waste Management Officer	R500 000 capital cost
		Register the landfill and submit regular monthly reports	Registration certificate and	Short-Term	Waste Management	Nominal

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
	monthly reports to the national WIS		monthly reports		Officer	
	annual waste	To sample waste volumes and categorisation twice a year at fixed, representative, sample points	Sample reports	Short-Term	Waste Management Officer	Nominal
		To establish the database, to survey all waste recyclers in the municipality and to collect information using a survey form. This database should be updated annually		Short-Term	Waste Management Officer	R25 000 per year
		To establish the database, to survey all waste transporters in the municipality and to collect information using a survey form. This database should be updated annually		Short-Term	Waste Management Officer	R25 000 per year
Institutional	Expand	Ensure that adequate staff is	Employment of	Short Term	Waste	To be obtained from

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
Arrangements	employment as service coverage increases	in place at the collection and landfill/transfer station to ensure compliance with NEMWA and this IWMP	suitable staff		Management Officer	existing budgets
	Appoint a Waste Management Officer	A suitably skilled and knowledgeable person should be appointed into this position.		Urgent	Municipal Manager	To be obtained from existing budgets
	Capacity Building	Waste Management training courses with IWMSA Training on SAWIS	Informed and capable staff	Short to Medium Term - ongoing	Municipal Manager/Waste Management Officer	To be obtained from existing budgets
		Positive management systems should be established to ensure that all staff actions and monitored and controlled	Management Systems Outputs (Log-sheets, timesheets, GPS readouts, task orders)	Short-Term	Waste Management Officer	Nominal
	Establish posts and budget for staff at the enforcement		Employment of suitable staff in the enforcement	Short Term	Waste Management Officer	To be obtained from existing budgets

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
	section		section			
	Waste Management	Promulgate by-laws to fully	Promulgated	Long-Term	Waste	Nominal
	By-Laws	take into account NEMWA	Waste		Management	
			Management By-		Officer	
			Laws			
	Members of Council	To conduct awareness	Aware councillors	Short Term	Waste	Nominal
	to be fully aware of	sessions with members of			Management	
	waste management,	council regarding waste			Officer	
	its function, legal	management. Specific				
	aspects and	emphasis should be placed on				
	resource	councillors who are members				
	requirements.	of the mayoral committee				
		dealing with waste.				
		Awareness to be conducted				
		by a suitably senior politician				
		or external official				
	Operational Public	A toll free waste hotline should	Advertised	Medium-Term	Waste	To be obtained from
	Hotline	be established and advertised	telephone number		Management	existing budgets
		throughout the municipality.	and monthly		Officer	
		The line should be answered	complaints			
		100% of the time during	register			

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
		business hours.				
	100% attendance at IGR meetings	All senior waste managers to attend the IGR meetings	Attendance register	Short-Term	Waste	Nominal
	igk ineetings	attend the 19K meetings	register		Management officer	
Financial Arrangements	accounting for	Establish procedures and values in conjunction with the finance department. Create appropriate monthly reports		Short-Term	Waste Management Officer	Nominal
		The current cost per serviced household is 40% higher than the district average. Savings should be identified and redeployed or re-allocated	serviced household cost to	Urgent	Municipal Manager	Nominal
		Carry out a reconciliation to determine which households have been overbilled and credit their accounts	in municipal bills	Short-Term	Waste Management Officer/Financial Officer	Nominal
	100% billing	Ensure that, as service coverage expands, that billing		Medium-Term	Waste Management	Nominal

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
		for the service keep pace.	management bills		Officer/Financial Officer	
		Setting tariffs and establish procedures for these waste charges		Short-Term	Waste Management Officer	Nominal, capital costs included elsewhere
		A set of appropriate financial measures should be developed which describe waste management efficiency.	monthly financial	Short-Term	Waste Management Officer	Nominal
Monitoring and Compliance	Monitor waste hotline	Three monthly summary of complaints made and actions taken	_	Medium Term	Waste Management Officer	Nominal
	Monitor financial measures	Three monthly summary of financial measures and the actions taken to improve them	financial	Medium Term	Waste Management Officer	Nominal
	Corrective measures from the annual waste audit	All corrective measures recommended by the annual district waste audit should be	·	Short-Term	Waste Management Officer	Nominal or as required

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
		implemented	reports			
	Monitor waste	Three monthly summary of	3 monthly waste	Medium Term	Waste	Nominal
	information	waste management data	information		Management	
		collected from various sources	summaries		Officer	
		(GPS, weighbridges, SAWIS				
		etc) and actions taken to				
		improve/address issues raised				
		in the data				
	Check on large	Site visits to the organisation's	6 monthly site visit	Medium Term	Waste	Nominal
	waste transporters	premises to determine	reports		Management	
	and generators	compliance with legislation			Officer	

8.5 Frances Baard District Municipality

8.5.1 Collection and Transportation

An extension of the waste collection service to fully cover the DMA, where the demand is clear, should be implemented. Rural servicing options that could be considered include community contractors servicing using open topped one ton LDVs and community-level waste aggregators who prepare waste for collection by the above and waste exchange programmes.

Collection efficiency, per household, should be monitored on a random basis by having a supervisor follow waste compactors along their routes. A log should be kept of the households serviced during the route. This should be done at least twice yearly.

The district should monitor the efficiency of various community collection initiatives. Best practice in this regard should then be spread to the local municipalities to assist with their efforts in expanding the service coverage.

8.5.2 Waste Prevention, Minimisation and Recycling

It is recommended to investigate the practicality and economics of issues such as buy-back centres, drop-off centres and separation at source. This information should be shared with the local municipalities to assist in the establishment of municipal recycling.

The district should conduct an annual waste characterisation and share the results with the local municipalities. The results of these studies should be shared with local municipalities to assist in their implementation of national and provincial policy.

The district municipality should monitor cleaner production developments mandated by the National Waste Management Strategy and higher spheres of

government. The results of these studies should be shared with local municipalities to assist in their implementation of national and provincial policy.

8.5.3 Waste Treatment

The FBDM should monitor the processing and treatment of healthcare waste in the district. Regular co-ordination meetings should be held with the provincial Department of Health to ensure that this function is being effectively carried out. Information on the efficiency of this service should be gathered.

A budget should be allocated to ensure that practical assistance to this function can be rendered.

8.5.4 Waste Disposal, including Regionalisation

The FBDM should monitor the progress of landfill closure. This would include assisting with setting up alternative disposal options and assisting affected municipalities with disposal charges and correctly configuring their vehicle fleets. The establishment of transfer stations should be encouraged.

Financial support to the necessary studies should be provided.

8.5.5 Waste Information

In terms of the Draft Waste Information Regulations, the DM will need to register the Koopmansfontein Landfill and commence reporting on quantities of waste disposed.

GPS tracking devices are to be installed in every waste collection vehicle.

A database and procedures for registration should be established in order to register waste recyclers in the district municipality and to register waste transporters who either operate from each municipality or regularly travel through each municipality. Implementation of the databases should then occur at each local municipality. These databases will improve knowledge on waste types and volumes in the district and assist in district-level emergency response.

8.5.6 Institutional Arrangements

A small waste management unit should be established in the district. This unit will manage all the district's waste management responsibilities. It will also provide support and co-ordination services to each of the local municipalities.

The unit will be led by a waste management Officer, whose responsibility it is to ensure that this IWMP is implemented. This includes the monitoring of the disposal of health care waste in the district.

A public complaints line (the waste management hotline) should be established in the district municipality, which covers the DMA. The hotline line should be advertised in the local media and brought the attention of the relevant councillors. A log should be kept of the complaints registered through the line and the responses to the complaints.

The FBDM should develop model waste management by-laws and share this knowledge with local municipalities. This will assist in by-laws that are in-line with NEMWA.

Awareness should be conducted with regards to waste management with members of the district council. This will ensure that waste management is given a sufficiently high priority in the planning of the district's budgets. This should be done in a series of sessions, by an external waste management official of appropriate seniority.

The district level waste management Officer should arrange and facilitate the action items as presented at the IGR meetings. This includes following-up on the waste management commitments made by the local municipalities. The meetings should be attended by senior representatives of the local municipalities in the district.

The forum should meet in January, April, July and October every year and will discuss areas of mutual interest in district waste management.

Topics should, at least, include:

- Financing of the waste management function;
- Sharing equipment, human resources and facilities;
- Ensuring that best waste management practice is spread throughout the district;
- A co-ordinating function to ensure that waste management actions are aligned with the goals of this IWMP;
- Feedback on public complaints received through various channels including the waste management hotlines;
- Settling of waste management disputes between municipalities;
- Monitoring waste management performance in each local municipality;
 and
- Response and co-ordination of district-level waste management emergencies.

8.5.7 Financial Arrangements

Full cost accounting of the waste management function should be implemented. Budgets should include provisions for amortization and depreciation of capital items. The satisfactory financial performance of the waste management function should be measured against these full costs.

Financial measures regarding the waste management function should be developed. These measures are to be used to determine the efficiency of waste management in the municipality, allowing for adjustments to the service to be made by the waste management Officer.

8.5.8 Monitoring and Compliance

An annual waste services audit of the achievement of the goals of this IWMP, and for compliance to the NEMWA, should be carried out by the FBDM Waste Management Officer. The audit should take place in February of every year to allow time for discussion and setting of budgets prior to the new financial year. This audit should be discussed in the April IGR Meeting and steps taken to address non-compliance. The audit should be carried out District-wide.

The waste management Officer should also involve himself in healthcare waste disposal arrangements. This officer should attend provincial meetings where healthcare waste is discussed and should monitor healthcare waste disposal in the district. Financial provisions should be made to assist in healthcare waste disposal where required.

8.5.9 Action Plan

Table 65 - Frances Baard District Municipality - Action Plan

Goal		Target	Action	Indicator	Priority	Responsibility	Est. Budget
Waste	Collection	Ensure 100%	Sub-let a community	Percentage	Medium Term	Waste	R50/serviced
and Tran	sportation	collection	entrepreneur to conduct waste	population		Management	household per year
			collection in all areas of the	receiving a		Officer	
			DMA	service			
		Random route	A waste supervisor should	No. of route	Short-Term	Waste	Nominal
		monitoring to	follow every collection truck	monitoring logs		Management	
		improve service	once a year, logs of the			Officer	
		quality	households visited and				
			service efficiency should be				
			made				
		Collect efficiency	Create a district-wide data	Complete and	Medium-Term	Waste	Nominal
		measures for	repository of all the different	updated data		Management	
		various community	community collection	repository		Officer	
		collection	methodologies and				
		methodologies	effectiveness measures for				
			each.				
Recyclin	g	Reduction in waste	Undertake investigation into	Establishment of	Short term	Waste	Study :-
		to disposal	separation at source buy-back	recycling		Management	R 125 000

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
		centres and drop off point etc. Formulate a detailed Action Plan	facility/system		Officer	
	Annual waste characterisation study	Undertake and document an annual waste characterisation study. This should be done on representative waste in the district	characterisation	Short-Term	Waste Management Officer	R50 000 per year
	Cleaner Production	Monitor national cleaner production developments and implement	No of national initiatives implemented	Long-Term	Waste Management Officer	Nominal
Waste Treatment	Monitor medical waste disposal	Attend Provincial medical waste disposal meetings and collect information on medical waste disposal in the district	medical waste	Short-Term	Waste Management Officer	Nominal
Waste Disposal, including Regionalisation	Monitor landfill closure process	Assist where necessary in the closure process, including advice on appropriate waste disposal charges and fleet composition		Medium-Term	Waste Management Officer	Nominal
Waste Information	To log all vehicle	To create manual logs of the	Weekly logsheets	Urgent	Waste	Nominal

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
	visits to landfills	volumes that are disposed of in the local landfills			Management Officer	
		Register the landfill and submit regular monthly reports	Registration certificate and monthly reports	Short-Term	Waste Management Officer	Nominal
	To setup a waste recycler database.	To establish the database, for use by all local municipalities	Set up the database	Short-Term	Waste Management Officer	Nominal
	To setup a waste transporter database.	To establish the database, for use by all local municipalities	Set up the database	Short-Term	Waste Management Officer	Nominal
Institutional Arrangements	Establish a waste management unit in the district	Establish a waste management unit and appoint a Waste Management Officer	Established unit	Short Term	Waste Management Officer	R350 000 per year
	Appoint a Waste Management Officer	A suitably skilled and knowledgeable person should be appointed into this position.		Urgent	Municipal Manager	To be obtained from existing budgets
	Operational Public Hotline	A toll free waste hotline should be established and advertised throughout the municipality.	telephone number	Medium-Term	Waste Management Officer	R10 000 per year

Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
		The line should be answered	•			
		100% of the time during business hours.	register			
	Model Waste	Develop model waste	Model waste	Medium-Term	Waste	Nominal
	Management By-	management by-laws for use	management by-		Management	
	Laws	in municipalities which require	laws		Officer	
		assistance.				
	Members of Council	To conduct awareness	Aware councillors	Short Term	Waste	Nominal
	to be fully aware of	sessions with members of			Management	
	waste management,	council regarding waste			Officer	
	its function, legal	management. Specific				
	aspects and	emphasis should be placed on				
	resource	councillors who are members				
	requirements.	of the mayoral committee				
		dealing with waste.				
		Awareness to be conducted				
		by a suitably senior politician				
		or external official				
	Arrange and	Arrange DWMF meetings four	Minutes of DWMF	Short-Term	Waste	Nominal
	facilitate inclusion of	times per year, including	meetings		Management	
	waste management	secretarial duties and			officer	
	issues at the IGR	following-up on				

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Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
	meetings	implementation of commitments made at the forum				
Financial	Institute full cost	Establish procedures and	Use of the	Short-Term	Waste	Nominal
Arrangements	accounting for	values in conjunction with the	monthly reports		Management	
	waste management	finance department. Create appropriate monthly reports			Officer	
	Establishment of	A set of appropriate financial	Use of the	Short-Term	Waste	Nominal
	monthly financial	measures should be	monthly financial		Management	
	performance	developed which describe	measures		Officer	
	measures	waste management efficiency.				
Monitoring and	Conduct an annual	A waste management audit,	Waste	Short-Term	Waste	Nominal or as
Compliance	waste management	against the requirements of	Management		Management	required
	audit (District Wide)	this IWMP and the	Audit Reports		Officer	
		requirements of NEMWA				
		should be, conducted and				
		documented. Results should				
		guide the future year's				
		planning				
	Heath Care Waste	Health care waste	Annual health	Urgent	Waste	R50 000 per annum
	Monitoring	management is a provincial	care management		Management	
		responsibility; however the	report on district		Officer	

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Goal	Target	Action	Indicator	Priority	Responsibility	Est. Budget
		FBDM should involve itself in	level activities			
		this activity to ensure that it is				
		carried out. The attendance of				
		relevant meetings and				
		monitoring of health care				
		volumes is a minimum				
		requirement.				

9. IMPLEMENTATION PLAN

The implementation plan is the timeline for the Action Plans listed in Section 8: Action Planning.

The long-term goal is to ensure that waste management in the municipality complies with all legislative requirements. This is with respect to disposal, collection, treatment, recycling and the financial arrangements.

A further aspect of the long-term goal is to ensure that the waste management services in the local municipality are benchmarked against their peers within the district and against similar municipalities countrywide.

It is important when implementing the IWMP that compliance with waste management legislation is maintained. This applies to new projects where Environmental Impact Assessments, Water Use Licences and Landfill Licences will be required. These permissions take varying periods of time to obtain, and this should be factored into project planning and monitoring.

If the plan is to be successfully implemented, responsible stakeholders will need to plan carefully for success. This includes aspects such as ongoing monitoring, public participation processes, meeting target dates, financial planning, legislation and policy compliance, the undertaking of feasibility studies and education and awareness both in the public domain and within local authorities.

9.1 Monitoring plan

Monitoring of an implementation programme allows the responsible authority to ensure that the proposed plan is implemented within the designated timeframes. Monitoring should also be flexible enough to allow for changing conditions and to adapt to these changing conditions.

An effective monitoring plan is necessary to provide information against which the IWMP implementation is measured. If performance falls behind the implementation plan, corrective measures should be taken to ensure that the implementation plan is brought back in line with expectations.

When monitoring, key performance measures are measured against a benchmark to provide an objective understanding of the progress made in implementing the IWMP.

Establishment of the benchmark is an important first task when commencing the monitoring process. The benchmark should be taken as the results of the first enumeration of the key performance indicators. Subsequent enumerations can then be presented as a percentage of the initial enumeration, thus giving an accurate indication of progress.

Prior to meetings of the municipal waste management, each of the key performance measures should be enumerated. The results should be presented in a tabular form to management for review against pre-established goals. Regular review, as provided for in the annual district level waste audits of these performance measures will ensure that the IWMP is successfully implemented.

9.2 Timeframes for Implementation

The timelines for implementation are laid out below. Timelines are provided for each local municipality in the district and provide guidance on the dates for completion of the action plans.

Frances Baard District Municipality

IMPLEMENTATION PLAN

↓ Key Performance Measure Complete ↓ Date for the Completion of Setup, Implementation to follow

GOAL	TARGET	Year					
		2011	2012	2013	2014	2015	
Dikgatlong Local Mun	icipality						
Waste Collection	100% residential collection service		- U	-			
	Reduce Vehicle Service Lead Times	1					
	Control Vehicle Movements and Derive Data		\mathbb{U}	-			
	Random Route Monitoring	- U					
	Collection Capacity Analysis	Ū					
	Refuse Bag Use in all Areas	Ū					
	Servicable and Cost Effective Vehicle Fleet			Ū			
Recycling	Reduction in Waste to Disposal						
	Eliminate Landfill Waste Picking				1		
	Functional Garden/Compost Centres						
	Awareness Raising Regarding Compost		J				
Waste Treatement	Treat Whole Tyres at Landfill					-	
Waste Disposal	Investigate closing Delpoortshoop and Windsorton	1					
and Regionalisation	Operate all Landfills Legally						
Waste Information	Log all Vehicles visiting Landfills	1					
	Install Weighbridges at all Waste Facilities		1				
	Register and Report to SAWIS	■					
	Bi-Annual Waste Sampling	1	1		1		
	Recycler Database	1	1				
	Transporter Database	Ū	ĺ				
Institutional Arrangements	Expand Employment in line with Service Coverage		J				
	Appoint a Waste Management Officer	1					
	Capacity Building				J	. 1	
	Control over Waste Management Staff	1			Ĭ	Ť	
 	Solition Stor Waste Wallagement Stair	-	_				

Establish Enforcement Section			Ļ		
Waste Management By-Laws		1	<u> </u>		
Councillor Awareness	T.				
Public Waste Hotline	T.				
100% Attendance at IGR Meetings	T.				
Full Cost Accounting		T	<u> </u>		
Credits to Incorrectly Billed Households		1	<u> </u>		
100% Billing Coverage	T.				
Waste Charges for Disposal			1		
Monthly Financial Performance Measures		1	Ļ		
Monitor Waste Hotline		1	J	1	, J
Monitor Financial Measures			J		l 1
Corrective Measures Highlighted by Annual Audit		1	↓		Į.
Monitor Waste Information		1	J	1	, J
Check on Large Transporters and Generators			1	1	Ţ
	Waste Management By-Laws Councillor Awareness Public Waste Hotline 100% Attendance at IGR Meetings Full Cost Accounting Credits to Incorrectly Billed Households 100% Billing Coverage Waste Charges for Disposal Monthly Financial Performance Measures Monitor Waste Hotline Monitor Financial Measures Corrective Measures Highlighted by Annual Audit Monitor Waste Information	Waste Management By-Laws Councillor Awareness Public Waste Hotline 100% Attendance at IGR Meetings Full Cost Accounting Credits to Incorrectly Billed Households 100% Billing Coverage Waste Charges for Disposal Monthly Financial Performance Measures Monitor Waste Hotline Monitor Financial Measures Corrective Measures Highlighted by Annual Audit Monitor Waste Information	Waste Management By-Laws Councillor Awareness Public Waste Hotline 100% Attendance at IGR Meetings Full Cost Accounting Credits to Incorrectly Billed Households 100% Billing Coverage Waste Charges for Disposal Monthly Financial Performance Measures Monitor Waste Hotline Monitor Financial Measures Corrective Measures Highlighted by Annual Audit Monitor Waste Information	Waste Management By-Laws Councillor Awareness Public Waste Hotline 100% Attendance at IGR Meetings Full Cost Accounting Credits to Incorrectly Billed Households 100% Billing Coverage Waste Charges for Disposal Monthly Financial Performance Measures Monitor Waste Hotline Monitor Financial Measures Corrective Measures Highlighted by Annual Audit Monitor Waste Information	Waste Management By-Laws Councillor Awareness Public Waste Hotline 100% Attendance at IGR Meetings Full Cost Accounting Credits to Incorrectly Billed Households 100% Billing Coverage Waste Charges for Disposal Monthly Financial Performance Measures Monitor Waste Hotline Monitor Financial Measures Corrective Measures Highlighted by Annual Audit Monitor Waste Information

Frances Baard District Municipality

IMPLEMENTATION PLAN

↓ Key Performance Measure Complete
 ↓ Date for the Completion of Setup, Implementation to follow

GOAL	TARGET	Year					
		2011	2012	2013	2014	2015	
Phokwane Local Muni	icipality						
Waste Collection	100% residential collection service		- U				
	Reduce Vehicle Service Lead Times	Ū,					
	Control Vehicle Movements and Derive Data		Ω				
	Random Route Monitoring	\Box					
	Collection Capacity Analysis	1					
	Refuse Bag Use in all Areas	- I					
	Servicable and Cost Effective Vehicle Fleet			1			
Recycling	Reduction in Waste to Disposal		- J				
	Eliminate Landfill Waste Picking				1		
	Functional Garden/Compost Centres		1				
	Awareness Raising Regarding Compost		J				
Waste Treatement	Treat Whole Tyres at Jan Kempdorp Landfill						
Waste Disposal	Investigate closing Hartswater and Pampierstad	1					
and Regionalisation	Operate all Landfills Legally		Ū				
Waste Information	Log all Vehicles visiting Landfills	Ū					
	Install Weighbridges at all Waste Facilities		Ū				
	Register and Report to SAWIS	1					
	Bi-Annual Waste Sampling	I.	↓	↓	1	1	
	Recycler Database	Ū.	Ū.				
	Transporter Database	Į.	1				
Institutional Arrangements	Expand Employment in line with Service Coverage		Į.				
	Appoint a Waste Management Officer	1					
	Capacity Building				1	1	
	Control over Waste Management Staff	Ţ					
	Ĭ		_				

	Establish Enforcement Section			ļ		
	Waste Management By-Laws		1	ļ		
	Councillor Awareness	T.				
	Public Waste Hotline	T.				
	100% Attendance at IGR Meetings	T.				
Financial Arrangements	Full Cost Accounting		1	Ļ		
	Credits to Incorrectly Billed Households		1	<u> </u>		
	100% Billing Coverage	T.				
	Waste Charges for Disposal			T T		
	Monthly Financial Performance Measures		1	Ļ		
Monitoring and Compliance	Monitor Waste Hotline			Į.	Į.	J
	Monitor Financial Measures			1		ļ
	Corrective Measures Highlighted by Annual Audit		1		Į	J
	Monitor Waste Information					
	Check on Large Transporters and Generators		1	Į	l l	1

Frances Baard District Municipality

IMPLEMENTATION PLAN

↓ Key Performance Measure Complete ↓ Date for the Completion of Setup, Implementation to follow

GOAL	TARGET	Year					
		2011	2012	2013	2014	2015	
Sol Plaatje Local M	uncipality						
Waste Collection	100% Informal Settlement Collection Service		- U				
	Reduce Vehicle Service Lead Times	1					
	Control Vehicle Movements and Derive Data		$\hat{\mathbf{T}}$				
	Random Route Monitoring	\Box					
	Collection Capacity Analysis	1					
	Refuse Bag Use in all Areas	Ū					
	Servicable and Cost Effective Vehicle Fleet			- U			
Recycling	Reduction in Waste to Disposal		- U				
	Pilot Separation at Source Scheme				↓		
	Eliminate Landfill Waste Picking				↓		
	Functional Composting Yards		1				
	Awareness Raising Regarding Compost		1				
Waste Treatement	Treat Whole Tyres at Jan Kempdorp Landfill				Ū.		
	Monitor Medical Waste Disposal		$ar{\mathbf{U}}$				
Waste Disposal	Appoint Responsible Person at Kimberley Landfill	1					
and Regionalisation	Operate all Landfills Legally		↓				
	Secure Landfill Buffer Zone			↓			
	Investigate closing the Ritchie Landfill	1					
Waste Information	Log all Vehicles visiting Landfills	$ \Box$					
	Install Weighbridges at all Waste Facilities		↓				
	Register and Report to SAWIS	1					
	Bi-Annual Waste Sampling		↓	J			
	Recycler Database		1				
	Transporter Database	Ţ.	1				

Institutional Arrangements	Establish Posts for Kimberley Landfill			!		
	Appoint a Waste Management Officer					
	Capacity Building				1	Į. Į
	Control over Waste Management Staff	1	_			
	Establish Enforcement Section		1	1		
	Waste Management By-Laws		1			
	Councillor Awareness	$\sqrt{1}$	_			
	Public Waste Hotline	Ţ	-			
	100% Attendance at IGR Meetings	1				
Financial Arrangements	Full Cost Accounting		1	l		
	Ensure 100% Payment/Accounting for the Service		1	1		
	100% Billing Coverage	T.				
	Waste Charges for Disposal			1		
	Monthly Financial Performance Measures		1	1		
Monitoring and Compliance	Monitor Waste Hotline			Į	Į	l 1
	Monitor Financial Measures			1	Į.	J
	Corrective Measures Highlighted by Annual Audit		1			ļ
	Monitor Waste Information					
	Check on Large Transporters and Generators		1	Į	Į Į	ļ

Frances Baard District Municipality

IMPLEMENTATION PLAN

↓ Key Performance Measure Complete
 ↓ Date for the Completion of Setup, Implementation to follow

GOAL	TARGET	Year					
		2011	2012	2013	2014	2015	
Magareng Local Munic	cipality						
Waste Collection	100% residential collection service		1				
	Reduce Vehicle Service Lead Times	↓					
	Control Vehicle Movements and Derive Data		Ω				
	Random Route Monitoring	T.					
	Collection Capacity Analysis	1					
	Refuse Bag Use in all Areas	- U					
	Servicable and Cost Effective Vehicle Fleet			1			
Recycling	Reduction in Waste to Disposal		- U				
	Eliminate Landfill Waste Picking				1		
	Functional Garden/Compost Centres		1				
	Awareness Raising Regarding Compost		J				
Waste Treatement	Treat Whole Tyres at Jan Kempdorp Landfill				↓		
Waste Disposal	Investigate closing the Warrenton Landfill	1					
and Regionalisation	Operate all Landfills Legally		Ū				
Waste Information	Log all Vehicles visiting Landfills	Ū					
	Install Weighbridges at all Waste Facilities		Ū				
	Register and Report to SAWIS	- I					
	Bi-Annual Waste Sampling	↓	↓	↓	Ū.		
	Recycler Database	,	Ū.				
	Transporter Database	1	1				
Institutional Arrangements	Expand Employment in line with Service Coverage		Į.				
	Appoint a Waste Management Officer	1					
	Capacity Building				1	1	
	Control over Waste Management Staff	J					
	Ĭ		_				

	Establish Enforcement Section			ļ		
	Waste Management By-Laws		1	ļ		
	Councillor Awareness	1				
	Public Waste Hotline	T)				
	100% Attendance at IGR Meetings	T)				
Financial Arrangements	Full Cost Accounting		Ţ			
	Budget Reconciliation and Efficiency Savings		1	<u> </u>		
	Credits to Incorrectly Billed Households		1			
	100% Billing Coverage	T T	-			
	Waste Charges for Disposal			1		
	Monthly Financial Performance Measures		1			
Monitoring and Compliance	Monitor Waste Hotline		1	. J		
	Monitor Financial Measures			,		
	Corrective Measures Highlighted by Annual Audit		1	. U	. J	
	Monitor Waste Information		1	, J	. J	. J
	Check on Large Transporters and Generators		1	- U	. 1	T T

Frances Baard District Municipality

IMPLEMENTATION PLAN

↓ Key Performance Measure Complete ↓ Date for the Completion of Setup, Implementation to follow
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GOAL	TARGET	Year					
		2011	2012	2013	2014	2015	
Frances Baard District	Municipality						
Waste Collection	100% residential collection service		- U	-			
	Random Route Monitoring	T.					
	Efficiency Measures for Various Collection Methods	<u></u>	1		-		
Recycling	Reduction in Waste to Disposal			-			
	Annual Waste Characterisation Study	1	1		. [1	
	Monitor Cleaner Production Initiatives	1	1			Į	
Waste Treatement	Monitor Medical Waste Disposal	Û					
Waste Disposal	Monitor Landfill Closure Process	<u>1</u>	1		[Į	
Waste Information	Log all Vehicles visiting Landfills	Û					
	Register and Report to SAWIS	Ū					
	Recycler Database		1	-			
	Transporter Database		1	-			
Institutional Arrangements	Establish Waste Management Unit		1	-			
	Appoint a Waste Management Officer	Ū					
	Public Waste Hotline	Û					
	Develop Model Waste Management By-Laws		1				
	Councillor Awareness	\Box					
	Arrange Inclusion of Waste Issues at IGR Meetings	Û					
Financial Arrangements	Full Cost Accounting		1	_			
	Monthly Financial Performance Measures		Û	-			
Monitoring and Compliance	Conduct Annual Waste Management Audit	Û	1	. Į	. [Į	
	Medical Waste Monitoring	↓	\Box			[

9.3 Revision of the plan

The IWMP has a time horizon of five years. This time period has been chosen to allow for the full implementation of the action plans in the document.

The following review should occur in 2015. The review will update the status quo with regards to waste management in the municipality and compare this to the goals and targets that were set in the 2015 IWMP.

The results of this exercise should be analysed to determine the lessons learnt and to guide the way forward in establishing new focus areas.

The revised plan will then take these new areas of focus into account and plan for the following five years.

10. PUBLIC PARTICIPATION

This IWMP has been compiled following extensive consultation with all relevant waste stakeholders on both a local and district level to ensure that the information provide is accurate and relevant. Stakeholders were defined as people with an active professional interest in waste management at District and Local Level. There has been stakeholder participation since the very beginning of the project in the form of stakeholders information meetings and questionnaires.

The information gathered through these meetings and questionnaires was used to inform the IWMP; to check its factual accuracy and to discuss the resultant recommendations flowing from the IWMP.

The table below provides a record of the stakeholder consultations that were carried out during the IWMP process.

Table 66 - Record of Public Participation

Date	Type of Engagement	Attendance				
	<i>,</i> , , , , , , , , , , , , , , , , , , ,	Name	Organization / Position			
	26 Feb 2010 Inception Meeting	Ciaran Chidley	Nemai Consulting			
26 Feb 2010		Kenny Lucas	FBDM: Environmental Health Manager			
		Aluwani Ralukake	FBDM			
		Deon Coetzee	FBDM			
		Kenny Lucas	FBDM: Environmental Health Manager			
17 Mar 2010	Questionnaires emailed	Ryan Petersen	Magareng Local Municipality: Technical Manager			
		Keith Williams	Sol Plaatje Local Municipality: Environmental Health Manager			

Date	Type of Engagement		Attendance
	,,	Name	Organization / Position
		Mr. Pitsu	Phokwane Local Municipality: Environmental Health Practitioner
		Mr. Maposa	Dikgatlong Local Municipality: Waste Manager
		Elani Holton	Nemai Consulting
12 May 2010	Site Visit / Interview	Keith Williams	Sol Plaatje Local Municipality: Environmental Health Manager
		Mr. Robinson	Dikgatlong Local Municipality: Acting Municipal Manager
		Elani Holton	Nemai Consulting
13 May 2010	Site Visit / Interviews	Mr. Tinsanyani	Phokwane Local Municipality: Waste Management Official
		Ciaran Chidley	Nemai Consulting
03 May 2010	Site Visit / Interviews	Ryan Petersen	Magareng Local Municipality: Technical Manager
		Mr. Pitsu	Phokwane Local Municipality: Environmental Health Practitioner
		Elani Holton	Nemai Consulting
		Lerato Mokhoantle	Department of Environment and Nature Conservation
		Elise Lameyer	Department of Environment and Nature Conservation
23 Jun 2010	IWMP PSC Meeting 1	Lebogang Swaratlhe	DWA: Northern Cape
25 5411 25 10	TWWII 1 GO Weeking 1	Keith Williams	Sol Plaatje Local Municipality: Environmental Health Manager
		Kenny Lucas	FBDM: Environmental Health Manager
		Deon Coetzee	FBDM
		Kelebogile Mosaga	FBDM

Date	Type of Engagement		Attendance							
		Name	Organization / Position							
		Solomon Selogilwe	FBDM							
		Masego Thebe	FBDM							
		Elani Holton	Nemai Consulting							
		Elise Lameyer	Department of Environment and Nature Conservation							
05.4 0040		Kenny Lucas	FBDM: Environmental Health Manager							
25 Aug 2010	IWMP PSC Meeting 2	Masego Thebe	FBDM							
		Mr. Pitsu	Phokwane Local Municipality: Environmental Health Practitioner							
		Mpho Nche	Phokwane Local Municipality							
		Mr. Mothusieng	Magareng Municipality							

This document was made available for a commenting period of one month between 10 September 2010 and 11 October 2010 and advertised as such in the Diamond Field Advertiser on 8 September 2010. This document was available for review at the following locations:

No	Location	Address	Telephone
1	Hartswater Library	Eric Louw Street	053 474 9700
2	Barkly West Library	22 Campbell Street	053 531 0671
3	Kimberley Library	67 Chapel Street	053 830 6911
4	Warrenton Library	Magrieta Prinsloo Street	053 497 3111

No comments were received during the indicated commenting period. It is therefore accepted that this document is accepted by local authorities and the general public.

10.1 Inception meeting

Aims of the Engagement

Introduction of the Nemai project manager (Ciaran Chidley) to Frances Baard District Municipality role players and to map out a strategy for the successful implementation of the project.

Information/outcomes achieved

Specific issues that FBDM feels were not addressed in previous IWMPs were raised, namely that Nemai should ensure that the relevant legislation is being addressed and to indicate what the status of the current landfill sites are. It was requested that problems on these sites should be identified and solutions provided. Other issues brought to light were the lack of By-Laws in the district, lack of control on dumpsites and animal carcasses. Detailed explanations on the information gathering process to be conducted by Nemai were given. This included the detailing of Public Participation and Stakeholders Information meetings.

10.2 Questionnaires

Aims of the Engagement

To collect information on the current waste status of each local municipality including available information on waste management, including waste generation, financial matters and current constraints. Questionnaires were sent out on 17 March 2010.

Information/outcomes achieved

Questionnaires were completed by half of the municipalities that received them. information collected from the questionaniares was checked on subsequent foillowup visits. Outstanding information was collected during the followup visits.

10.3 Site visits / Interviews

Aims of the Engagement

To obtain and confirm status quo information for each local municipality and to visit landfill sites and other facilities to get a sense of onsite management, compliance with minimum standards and assessment of improvements that can be made.

Site visits and interviews were held in May and June 2010.

Information/outcomes achieved

The necessary status quo information was collected, the site visits and the interviews were informative and provided insight into the waste management challenges faced by each municipality

10.4 First PSC Meeting

Aims of the Engagement

This PSC Meeting was a status quo workshop to present the District waste management status quo to all relevant stakeholders.

Information/outcomes achieved

The meeting served to check the factual accuracy of the information collected to date and to identify gaps and limitations in current waste management practise. It also confirmed of allowed the discussion of more comprehensive strategic and action planning, adding confidence and accuracy to the findings.

10.5 Second PSC Meeting

Aims of the Engagement

The aim of the session was to discuss the proposed action plans per Municipality and to adjust action plans where necessary, following comments received from the municipalities. The meeting also presented an opportunity to stakeholders to provide suggestions and comments.

Information/outcomes achieved

A discussion was carried out with regards the location of the preferred regional site to serve the Phokwane and Magareng Local Municipalities. It was felt by stakeholders that the existing Jan Kempdorp site would be better suited for this purpose in light of development trends and land availability. The alternative site was a new locality in Hartswater. It was decided that the Jan Kempdorp site would be more suited to the need than the Hartswater site.

Stakeholders proposed that existing IGR meetings be used to raise issues, as opposed to the suggested establishment of a district level Waste Management Forum. This proposal was adopted.

Concerns regarding the scope of public participation were raised; that broader public participation on a local level is required. It was pointed out that wider public participation would be appropriate at local level IWMPs. Plans were made to have the draft district IWMP put out for public comment for the period of one month.

Other issues raised and addressed at the meeting are:

- Cost of the proposed changes these would have to be managed within existing budgets or additional budgets sought to ensure that waste management in the district was carried out legally and effectively;
- The District Municipality's involvement in executing the proposed actions a support, mentoring and monitoring role would be played by the district;
- Social impacts of lesser landfills and changing the general public's attitude towards waste management – this aspect is ongoing and will improve as waste management practise in the district improves;

- The proposed hotline, in light of an existing toll free national complaints line –
 the waste hotlines are dedicated for the waste at a local level, the national
 complaints line is not sufficiently responsive to achieve the aims of the local
 waste hotlines;
- Increasing income generation this is an ongoing challenge that can be addressed through the indigent register or improved financial management;
 and
- Rehabilitation of mismanaged landfills budgets would have to be allowed to ensure that waste disposal in the district was carried out legally.

10.6 Public Review of the IWMP

The draft IWMP is to be placed for public review for a period of one month.

The review will be achieved by following the methodology below:

- Place adverts in each local edition of the Diamond Fields Advertiser to ensure public notification of the review period;
- Place copies of the IWMP document at libraries in each of the local municipalities;
- Place copies of the IWMP with the Speaker at each of the local municipalities so that councillors would be able to use the document to brief their communities; and
- Prepare an information document for distribution by councillors in event that additional information is sought by members of the public.

The document will be available for public review from 10 September 2010 to 11 October 2010.

Public copies of the document will be placed at the following locations:

Table 67 - Public Lodgement of the draft IWMP document

Municipality	Public Review Location	Councilor/Public Review Location
Dikgatlong Local Municipality	Barkly West Library	Office of the Speaker

Phokwane Local Municipality	Hartswater Library	Office of the Speaker
Sol Plaatje Local Municipality	Kimberley Library	Office of the Speaker
Magareng Local Municipality	Warrenton Library	Office of the Speaker
Frances Baard District Municipality	Kimberley Library	Office of the Speaker

Comments received from the public during the review period will be incorporated into the IWMP and a final document prepared for the approval of the Frances Baard District Municipality Council.

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Dikgatlong Local Municipality Integrated Development Plan

Magareng Local Municipality Integrated Development Plan

Phokwane Local Municipality Integrated Development Plan 2009/2010

Phokwane Local Municipality By-Laws

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
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FBDM INTEGRATED WASTE MANAGEMENT PLAN

APPENDIX A

LANDFILL SITES IN FRANCES BAARD DISTRICT MUNICIPALITY



25 km

FBDM INTEGRATED WASTE MANAGEMENT PLAN

APPENDIX B

WASTE GENERATION MODELLING TABLES

Frances Baard District Municipality - Per houshold Financial Summary

Local Municipalty		Dikgatlong LM	Phokwane LM	Sol Plaatje LM	Magareng LM2	DMA
Service Coverage		60.3	58.8	91.8	71.8	5.9
No. Households		10,015	13,770	52,120	5,669	1,314
Budget - Capital	2008/2009 2009/2010 2010/2011	R0	R300,000	R6,400,000	R0	R0
Budget - Operational	2008/2009 2009/2010 2010/2011	R3,615,302	R3,713,670	R24,400,000	R3,730,136	R24,000
Budget - Total	2008/2009 2009/2010 2010/2011	R3,615,302	R4,013,670	R30,800,000	R3,730,136	R24,000
Per Household Operational Annual Cost	2008/2009 2009/2010 2010/2011	R0.00 R360.99 R0.00	R0.00 R269.69 R0.00	R0.00 R468.15 R0.00	R0.00 R657.99 R0.00	R0.00 R18.26 R0.00
Per Household Operational Annual Cost (Service Coverage)	2008/2009 2009/2010 2010/2011	R0.00 R598.65 R0.00	R0.00 R458.66 R0.00	R0.00 R509.97 R0.00	R0.00 R916.42 R0.00	R0.00 R309.57 R0.00
Highest Monthly Residential Charge Annual Residential Charge Annual Surplus/Deficit/household		R62.00 R744.00 R145.35	R41.40 R496.80 R38.14	R56.30 R675.60 R165.63	R49.52 R594.24 -R322.18	R0.00 -R309.57
No. Municipal Accs sent out Recovery Rate Households Who Should be billed Billing Coverage Shortfall in Billing Coverage (H/H)		8,452 10% 6,039 140.0% -2,413 r	20% 8,097 0.0% n/a	42,000 75% 47,846 87.8% 5,846	5,200 45 4,070 127.8% -1,130	0 0 78 0.0% 78
Projected Annual Income Annual Projected Surplus/Deficit		R700,000 -R2,915,302	R4,539,084 R525,414	R31,270,000 R470,000	R1,390,521 -R2,339,615	-R24,000

Frances Baard District Municipality

Waste Generation - Total Model

Local Municipalty	Comment		Year												
Local Municipalty	Comment	2001	2007	2010	2015										
Dikgatlong LM		8,962	10,182	10,805	11,930										
Phokwane LM		15,365	11,694	11,694	11,694										
Sol Plaatje LM		70,020	84,202	92,010	106,665										
Magareng LM		5,266	4,952	4,805	4,444										
DMA		1,305	647	647	647										
Frances Baard DM		100,918	111,678	119,962	135,381										

Frances Baard District Municipality - Waste Generation Rates

Industry	WGR Used in the Model
,	trie iviouei
Agriculture, hunting,	0
Mining and Quarrying	1.7
Manufacturing	1.7
Electricity, gas and water	1.8
Construction	1.7
Wholesale and retail	1.6
transport, storage and	1.3
Financial, insurance, real	1.4
Community, social and	1.3
Other and not adequately	0
Private Households	0
Undetermined	0

No. of Days in the Year: 365

Population Growth Rates	2007	2010	2015
Dikgatlong	2%	2%	2%
Phokwane	-4%	0%	0%
Sol Plaatje	3%	3%	3%
Magareng	-1%	-1%	-1%
ĎMA -	-11%	0%	0%

	Dikaatlona LM Phokwane LM Sol Plaatie LM				Magareng LM				District Management Are		gement Area	a a		FRANCES BAARD DM										
	2001	2007	2010	2015	2001	2007	2010	2015	2001	2007	2010	2015	2001	2007	2010	2015	2001	2007	2010	2015	2001	2007	2010	2015
											Agriculture	e; hunting; fore	stry and fishin	g										
Population	1,286	1,448	1,537	1,697	4,935	3,863	3,863	3,863	1,388	1,657	1,811	2,099	926	872	846	804	1,108	551	551	551	9,643	8,391	8,607	9,014
WGR (kg/p/d)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Waste Generated (t/a)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
												Aining and Qua	rrying											
Population	1,079	1,215	1,290	1,424	30	23	23	23	2,748		3,586	4,157	232	218	212		264	131	131	131	4,353	4,869	5,242	5,735
WGR (kg/p/d) Waste Generated (t/a)	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Waste Generated (va)	669.5195	753.9876999	800.137779	883.416762	19	15	14.5710363	15	1705.134	2036.01917	2224.81312	2579.16817	144	136	131.506289	0	164	81	81.4114992	81	2,701	3,022	3,252	3,559
Population	419	472	501	553	803	629	629	629	3100	3.702	4.045	Manufacturi 4,689		189	184	175	23		11		4.546	5.003	5.369	
WGR (kg/p/d)	1.7	17	1 7	1.7	1.7	1.7	1.7	1.7	3100	3,702	4,045	4,689	201	189	184	1/5	1.7	17	1.7	11	4,546	5,003	5,369	6,056 1.7
Waste Generated (t/a)	259.9895	292.7904043	1.7	343.050624	498	390	390.01807	390	1923.55	1.7	1.7	2909.54197	124.7205			108.350412	1.7	7.7	7	7.7	2,821	3,104	3,332	3,758
(,	233.3033	232.7304043	310.7113134	343.030024	430	330	390.01007	390	1020.00	2230.01323	2303.73040	2000.54101	124.7200	117.421073	113.334320	100.550412		,		- '	2,021	3,104	3,332	3,730
											Election	city; gas and w	ater supply											
Population	58	65	69	77	103	81	81	81	398	475	519	602	15	14	14	13	0	0	0	0	574	635	683	772
WGR (kg/p/d)	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Waste Generated (t/a)	38.106	42.91354515	46	50.2800577	68	53	53	53	261.486	312.227959	341	395.521037	9.855	9.27828687	9	8.56148998	0	0	0	0	377	417	449	507
												Construction												
Population	246	277	294	325	376	294	294	294	2649	3,163	3,456	4,007	96	90	88	83	23	11	11	11	3,390	3,836	4,144	4,721
WGR (kg/p/d) Waste Generated (t/a)	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Waste Generated (va)	152.643	171.9008102	182.422515	201.409197	233	183	182.623654	183	1643.7045	1962.66913	2144.66155	2486.25054	59.568	56.0820895	54.4163954	51.7494506	14	/	7.09266849	/	2,103	2,380	2,571	2,929
											VA/II	nolesale and re	oil trade											
Population	507	571	606	669	1,282	1,003	1,003	1,003	7162	8,552		10,833	429	404	392	373	40	20	20	20	9,420	10,550	11,366	12,898
WGR (kg/p/d)	1.6	1.6	1.6	1.6	1,202	1,003	1,003	1,003	1.6	1.6	9,343	10,033	1.6	1.6	1.6	16	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
Waste Generated (t/a)	296.088	333.4431784		390.681828	749		586.041364	586	4182.608	4994.25269	1.0	6326.56988	250.536			217.652101	23	12	11.609483	12	5,501	6,161	6,638	7,533
																					-,	-,	0,000	.,
											Transport	; Storage and	communication	1										
Population	182	205	218	240	126	99	99	99	2639	3,151		3,992	150	141	137	130	9	4	4	4	3,106	3,600	3,901	4,465
WGR (kg/p/d)	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Waste Generated (t/a)	86.359	97.25426037	103.2069991	113.948866	60	47	46.79874	47	1252.2055	1495.19885	1633.84416	1894.07317	71.175	67.0098496	65.0195901	61.8329832	4	2	2	2	1,474	1,708	1,851	2,119
			1		1			1			nancial; insuran												1	
Population WGR (kg/p/d)	230 1.4	259 1.4	275 1.4	303 1.4	474	371 1.4	371 1.4	371 1.4	4360	5,206	5,689 1.4	6,595 1.4	153	144	140	133	23 1.4	11	11	11	5,240	5,992	6,486 1.4	7,414
Waste Generated (t/a)	1.4	1.4		1.4	1.4 242		1.4	1.4	1.4 2227.96	1.4 2660.30075	2906.98246	3369,9894	78.183	73.6077425		1.4 67.9211539	1.4	1.4	1.4	1.4	1.4 2,678	1.4 3.062	3,314	1.4 3,788
Waste Odrierated (va)	117.55	132.3376091	140.4592296	133.076339	242	190	109.394093	190	2221.90	2000.30073	2900.90240	3309.9094	70.103	73.0077423	71.421319	07.9211339	12	6	0	6	2,070	3,062	3,314	3,700
											Community	y; social and pe	ersonal service	es										
Population	834	939	997	1,100	1,218	953	953	953	14759	17,623	19,257	22,324	602	567	550	523	59	29	29	29	17,472	20,112	21,787	24,930
WGR (kg/p/d)	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Waste Generated (t/a)	395.733	445.6596327	472.9375675	522.161289	578	452	452.38782	452	7003.1455	8362.12197	9137.51645	10592.8859	285.649	268.932863	260.945288	248.156373	28	14	14	14	8,290	9,543	10,338	11,830
-																								
											Other a	and not adequa	tely defined											
Population	0	0	0	0	0	0	0	0	3	4	4	5	0	0	0	0	0	0	0	0	3	4	4	5
WGR (kg/p/d)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Waste Generated (t/a)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
												Private Housel	oldo											
Population	574	646	686	757	1,464	1.146	1,146	1,146	4117	4,916	5,372	Private Housel 6,227	nolds 462	435	422	401	332	165	165	165	6,949	7,308	7,791	8,697
WGR (kg/p/d)	5/4	046	086	/5/	1,404	1,146	1,146	1,146	411/	4,916	5,3/2	0,227	462	435	422	401	332	165	105	165	0,949	7,308	7,791	0,097
Waste Generated (t/a)	0	0	0	0	0	0	0	0	0	0	0	0	n	0	n	n	0	0	0	0	0	n	0	0
1	o .	٥	0	Ü	-	0	· ·	3	U			Ü			· ·	v	Ů,	0	٥	Ü	٥	· ·	-	J
											_	Undetermin	ed											
Population	4097	4,614	4,896	5,406	1,002	784	784	784	3052	3,644	3,982	4,616	163	153	149	142	217	108	108	108	8,531	9,304	9,920	11,056
WGR (kg/p/d)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Waste Generated (t/a)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Population	9,512	10,712	11,368	12,551	11,813	9,247	9,247	9,247	46,375	55,374	60,509	70,146	3,429	3,228	3,132	2,777	2,098	1,043	1,043	1,043	73,227	79,604	85,298	95,764
Total Waste Gen (T/a)	2,016	2,270	2,409	2,660	2,446	1,915	1,915	1,915	20,200	24,120	26,356	30,554	1,024	964	935	764	260	129	129	129	25,946	29,398	31,745	36,022

Frances Baard District Municipality - Waste Generation Rates

	Jarrod Ball	Suggested	WGR
	WGR	WGR	Used in
Income Band	(kg/c/d)	(kg/c/d)	the Mode
Low Income	0,45	0,2	0.4
Middle Income	1,10	0,7	1.
High Income	1,85	0,9	1.8

No. of Days in the Year: 365

Population Growth Rates	2007	2010	2015
Dikgatlong	2.1929%	2%	2%
Phokwane	-4.5339%	0%	0%
Sol Plaatje	3.1711%	3%	3%
Magareng	-1.0260%	-1%	-1%
ĎΜΑ	-11.0293%	0%	0%

		Dikgatlong	LM			Phokwan	e LM			Sol Pla	atje LM			Magare	ing LM			District Manag	gement Area			FRANCES E	BAARD DM	
	2001	2007	2010	2015	2001	2007	2010	2015	2001	2007	2010	2015	2001	2007	2010	2015	2001	2007	2010	2015	2001	2007	2010	2015
									Low Inc	ome (R 0 to F	: 38 400/y)										Low Income			
Population	31,924	36,361	38,587	42,603	51,448	38,946	38,946	38,946	146,062	176,151	192,485	223,143	19,320	18,161	17,621	16,758	4,607	2,285	2,285	2,285	253,361	271,905	289,925	323,735
WGR (kg/p/d)	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
Waste Generated (t/a)	5,244	5,972	6,338	6,998	8,450	6,397	6,397	6,397	23,991	28,933	31,616	36,651	3,173	2,983	2,894	2,752	757	375	375	375	41,615	44,660	47,620	53,174
	Middle Income (R38 400ly to R153 600ly)													Middle Income										
Population	3,254	3,706	3,933	4,343	8,033	6,081	6,081	6,081	42,308	51,024	55,755	64,635	2,043	1,920	1,863	1,772	454	225	225	225	56,092	62,956	67,858	77,056
WGR (kg/p/d)	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Waste Generated (t/a)	1,306	1,488	1,579	1,744	3,225	2,442	2,442	2,442	16,987	20,486	22,386	25,951	820	771	748	711	182	90	90	90	22,521	25,277	27,245	30,938
									High Inc	ome (R153 00	0 upwards)										High Income			
Population	587	669	710	783	1,840	1,393	1,393	1,393	13095	15,793	17,257	20,006	369	347	337	320	157	78	78	78	16,048	18,279	19,774	22,580
WGR (kg/p/d)	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85	1.85
Waste Generated (t/a)	396	451	479	529	1,242	941	941	941	8,842	10,664	11,653	13,509	249	234	227	216	106	53	53	53	10,836	12,343	13,352	15,247
															· ·				· ·				· ·	
Total Population	35,765	40,736	43,230	47,729	61,321	46,420	46,420	46,420	201,465	242,967	265,497	307,784	21,732	20,428	19,821	18,850	5,218	2,588	2,588	2,588	325,501	353,140	377,556	423,371
Total Waste Gen (t/a)	6,946	7,912	8,396	9,270	12,918	9,779	9,779	9,779	49,820	60,083	65,654	76,111	4,243	3,988	3,870	3,680	1,045	518	518	518	74,972	82,280	88,217	99,358