

REPORTS WITH ENVIRONMENTAL ISSUES

***OFFICE OF THE
AUDITOR GENERAL***

PERFORMANCE AUDIT REPORT

ON

COLLECTION AND DISPOSAL OF SOLID WASTE

**MINISTRIES OF LOCAL GOVERNMENT AND MINISTRY OF
ENVIRONMENT WILDLIFE AND TOURISM**

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GLOSSARY AND ABBREVIATIONS

BCL	-	Bamangwato Concessions Limited
BHC	-	Botswana Housing Corporation
BPC	-	Botswana Power Corporation
CDC	-	Central District Council
DSWM	-	Department of Sanitation and Waste Management
LAs	-	Local Authorities
FCC	-	Francistown City Council
GCC	-	Gaborone City Council
JTC	-	Jwaneng Town Council
KDC	-	Kweneng District Council
KLDC	-	Kgatleng District Council
LTC	-	Lobatse Town Council
MWET		Ministry of Wildlife, Environment and Tourism
NDC	-	Ngami District Council
OAG	-	Office of Auditor General
SHHA	-	Self Help Housing Agency
SPTC	-	Selebi-Phikwe Town Council

EXECUTIVE SUMMARY

1. BACKGROUND

- 1.1 The Department of Sanitation and Waste Management (DSWM) falls under Ministry of Environment, Wildlife and Tourism and is charged with the responsibility to coordinate, monitor, and formulate policies on waste water/sanitation and solid waste management. Local Authorities (LAs) under Ministry of Local Government are responsible to carry out waste management operation in the field. DSWM formulates policies, whereas, Local Authorities implement these instruments to discharge their duties.
- 1.2 The audit of Solid Waste Management was motivated by the concerns in the media, members of Parliament, Environmentalists and the general public at large on poor management of waste and protection of the environment.
- 1.3 The objectives of the study were to examine overall policy and institutional framework, solid waste collection and disposal activity at the Local Authorities level and to come up with recommendations that could improve the system. Out of fifteen Local Authorities, eight were visited. LAs visited included Jwaneng Town Council (JTC), Northwest District Council (Ngami and Chobe), Lobatse, Town Council (LTC), Kweneng District Council (KDC), Kgatleng District Council (KLDC), Selebi- Phikwe Town Council (SPTC), Francistown City Council (FCC) and Gaborone City Council (GCC). Audit was limited to collection and disposal of solid waste for the period 1998/1999, 1999/2000 and 2000/2001.
- 1.4 The following findings could be highlighted as result of audit::
 - 1.4.1 Department of Sanitation and Waste Management (DSWM) was unable to formulate and compile a National Waste Management plan because LAs could not provide their respective individual plans. It affected the capability of the department to ensure that the implementing agencies are fully accountable for the management of solid waste and landfill in quantitative terms. In order to assist the LAs to prepare their individual plans, DSWM engaged consultants to conduct a pilot project at three selected LAs namely Gaborone City Council, Selebi Phikwe Town Council and Ngami District Council. The consultancy was still on going at the time of audit.

- 1.4.2 The non-availability of solid waste management plans at the respective LAs had made it difficult for the authorities to identify targets, quantities, and scope of work to be done either annually or strategically on a long term basis. The absence of such plans at local authorities hampered DSWM to effectively monitor and supervise the waste management operations at these LAs.
- 1.4.3 DSWM could not conduct inspections of the operational landfills as provided in the guidelines. However, there were insignificant number of audits of operating landfills which were audited that fell far much short of the standard requirement.
- 1.4.4 There was no uniformity of measurement units being adopted by different LAs to record the waste during the period under review, for example GCC used tons, Kasane loads, and Lobatse used both loads and cubic meter. It was observed that although most of the councils used different measurement units where weighbridges were available the same measurement units (tons) were used.
- 1.4.5 Substantial variations in per unit cost of solid waste management operations at Gaborone, Selebi Phikwe, and Kgatleng councils were noticed which indicated that the management both at the ministries as well as LAs levels did not review these operations to determine the cost effectiveness of the solid waste management activity.
- 1.4.6 Results of a survey conducted by audit revealed that on overall basis, 61% of the people were satisfied with services provided by the Local Authorities in the collection and disposal of waste, whereas, 39% showed their dissatisfaction.

2. CONCLUSIONS

- 2.1 Absence of Local Authorities Waste Management Plans, and the National Waste Plan, resulted in LAs finding it difficult to operate in a systematic manner. Availability of a national plan could have been instrumental in setting targets and information to measure performance of the LAs. Lack of effective monitoring and reviewing on the part of DSWM resulted in LAs facing problems in efficient and effective implementation of waste management

activities in field. Absence of basic infrastructure at some of LAs like landfills affected the performance of those units both quantitatively as well as qualitatively. Even performance of the respective LAs was not up to standard as there was no systematic and organized arrangement, which could ensure the smooth and efficient functioning of this activity. Quality of this operation was marred by lack of proper supervision and monitoring even by the respective LAs. A considerable number of people (39%) surveyed by the audit showed their dissatisfaction on the performance of LAs regarding waste collection and disposal.

- 2.2 The management in their response stated that funds were made available for the development of the infrastructure for waste management activities in the country. The government initiated several tasks in order to build institutional capacity such as development of landfills, provision of equipment and vehicles, arranging campaigns to create awareness among public, and training of staff. The capacity building at implementation level was not adequately done as LAs were unable to draw their respective Waste Management Plans for which DSWM had to assist them through engaging the consultants.

3 RECOMMENDATIONS

- 3.1 DSWM should formulate and compile a National Waste Management Plan as stipulated under Botswana Strategy for Waste Management issued in 1998.
- 3.2 It should also be ensured that all the LAs prepare their respective waste management plans timely and submit to DSWM.
- 3.3 MWET should develop a framework to coordinate the waste management operations of LAs and to ensure that a mechanism is put in place to retrieve information from LAs regarding quantities of waste collected and disposed of and efficient utilization of equipment and machinery during a month, quarter or annum. They should also create a database of the information obtained from LAs.

- 3.4 MWET should also provide adequate resources/infrastructure like landfills, machinery, equipment and vehicles to LAs for efficient collection and disposal of waste.
- 3.5 Monthly, quarterly, and annual inspections and auditing of the collection and disposal of waste should be carried out as stipulated in the Guidelines 7.5.1 and 7.5.2 in order to improve the quality of collection and disposal of waste.
- 3.6 LAs should be encouraged to keep proper and adequate records of maintenance and repairs of vehicles and equipment.
- 3.7 An efficient mechanism to generate necessary reports on regular basis should be put in place in order to strengthen the day-to-day supervision of waste management operations at LAs level.
- 3.8 MWET should consider possibility for out-sourcing collection of solid activity at LA level
- 3.9 LAs should conduct stakeholders' awareness on the Complaint System.

CHAPTER ONE

1. BACKGROUND

1.1 Introduction

As consequence of restructuring of the government sector a few new Ministries have been established and some of the departments relocated to such Ministries. DSWM as a result was relocated to the Ministry of Environment, Wildlife and Tourism. Local Authorities fall under the Ministry of Local Government. Although DSWM and LAs are both responsible for

waste management (environmental issues) they are placed in two different ministries.

Initially Department of Sanitation and Waste Management (DSWM) under the Ministry of Local Government, Lands and Housing has been responsible to coordinate, monitor, and formulate policies on waste water/sanitation and solid waste management in the country. It also serves as an advisory body to Local Authorities and the public on sanitation and waste management. It is involved in the design and construction of projects e.g. landfills, which are then handed over to Local Authorities for management.

1.2 **Organizational structure**

Department of Sanitation and Waste Management

DSWM is headed by the Director, and has four divisions: Sanitation Division; Waste Management Division; Training and Promotion Division; and the Administration Division. Each of the Division is further divided into units. The department sets the waste management policies, procedures, and guidelines within which the Local Authorities should operate. DSWM is concerned with planning and construction of major projects, such as landfills, supply of equipment, such as refuse compactors, front-end loaders, vehicles, plant and machinery used for collection and disposal of waste. Project memoranda are processed in consultation with DSWM before being sent to MFDP. They are also involved in supervision of the landfills, audits on the landfill and prepare reports.

Local Authorities (LAs)

Day to day operation of waste management is carried out at LAs level. To carry out this operation each Local Authority has established a department with various sections like Sanitation and Waste Management, Food Safety and Occupational Health and Safety. Local Authorities implement policies, guidelines, and procedures set by the Department of Sanitation and Waste Management. LAs collect solid waste generated by households and companies and dispose of it at the landfills. They also receive technical advice, guidance and attend workshops organized by DSWM.

1.3 **Mandate**

The Department of Sanitation and Waste Management (DSWM) was established by an act of Parliament “The Waste Management Act, 1998” on the 1st of April 1999.

1.4 **DSWM Overall Objectives**

The DSWM overall objective is:

“To reduce environment pollution caused by inappropriate and inadequate Sanitation and Waste Management practices, in order to improve public health, protect the environment against pollution and thereby assist in the conservation of water and other natural resources”

Following are the specific objectives:

1.4.4 **Specific Objectives**

According to Section 6 of The Waste Management Act DSWM aims at:

- Providing policy direction and leadership in all matters pertaining to Sanitation and Waste Management.
- Enhancing sectoral coordination by developing plans/programmes to guide the sectors in the performance/discharge of their duties. In this respect, closely monitoring the work of the sectors.
- Developing effective communication flow between the stakeholders in Sanitation and Waste Management and the public by instituting and maintaining a pro-active public awareness campaign.
- Ensuring that implementation of Sanitation and Waste Management projects is strategically designed to derive maximum benefit at minimum cost, accompanied by effective cost recovery policies.
- Providing reliable information for the support of both urban and rural sanitation and waste management development

- Instituting appropriate sanitary measures for the promotion of public health.
- Promoting and coordinating human resources development and institutional capacity within Local Government Systems to effectively implement sanitation and waste management programmes.
- Promoting and facilitating economic sustainability in the sanitation and waste management.

1.5 Financing of Activity

The Government provides funds to LAs for their capital projects. LAs prepare their budgets for capital projects in consultation with DSWM and send the same to the Ministry of Finance and Development for approval. The approved funds are then released through DSWM to Local Authorities on request. DSWM would then monitor the use of the funds. However, the respective LAs manage their own recurrent budgets to meet the day to day expenditure on account of solid waste management activities.

1.6 Policy Framework for Waste Management

In order to facilitate implementation of waste management strategy, DSWM had developed instruments like Guidelines on Landfill, Operations manual, and Strategy for Waste Management. It had also carried out a study on how Clinical Waste could be managed. The department had also developed Waste Management Regulations (registration and licensing of waste carriers). These were not yet in use as they were still with the Attorney Generals Chambers for approval.

Guidelines for the Disposal of Wastes by Landfill were developed. These were to ensure that all waste was disposed of in an environmentally acceptable manner at the Landfill. Operations Manual for each Landfill was available at the respective landfills.

Operating landfill sites must be inspected and monitored regularly to verify that the landfill was operated to the standards required by the Licence conditions, and that the licensed site design was properly implemented. Standards under consideration might include the proper compaction and covering of waste and monitoring the integrity of drainage systems.

Inspection would be undertaken by the DSWM, which was the regulatory authority.

CHAPTER TWO

2. AUDIT DESIGN

2.1 Motivation

The audit was undertaken because there had been a lot of concern by the media, members of Parliament, Environmentalist and the general public at large on poor management of waste and protection of the environment.

2.2 Objective of the Study

The objective of the study was to examine overall policy issued by Ministry of Wildlife, Environment and Tourism and guidance frameworks established by DSWM to regulate, supervise, and monitor solid waste management activity in the country and to measure efficiency and effectiveness of the implementation of these instruments at LAs level and also to make recommendations to improve the system.

2.3 Methods of Data Collection and Scope of Audit

In order to complete our audit, the following methodologies were adopted:

2.3.1 Interviews and Survey

Officers working in the Department of Sanitation and Waste Management, Local Authorities, NGOs, and Environmental Health units were interviewed. The general public was given questionnaires.

2.3.2 Sites Visits

Landfills and dumping sites were inspected. 5 Landfills (Lobatse, Pilane, Selebi-Phikwe, Francistown and Jwaneng) and 3 dumping sites (Gaborone, Ngami and Chobe) were visited in order to establish if waste collected was disposed of in an efficient manner.

2.3.3 Document Reviews

Policies, Acts, files and other documents on waste management were examined.

The data of the following Local Authorities was reviewed:

- i) Gaborone City Council,
- ii) Lobatse Town Council
- iii) Kgatleng District Council
- iv) Kweneng District Council (Mogoditshane and Molepolole)
- v) Jwaneng Town Council
- vi) Northwest District Council (Ngami and Chobe)
- vii) Francistown City Council
- viii) Selebi Phikwe Town Council

2.3.4 Audit Period

Audit findings are based on review of data pertaining to three financial years, that is 1998-1999 to 2000-2001. Audit was started in March 2002 and concluded in January 2003.

CHAPTER THREE

3. PROCESS OF COLLECTION AND DISPOSAL OF SOLID WASTE

DSWM provides LAs with policies, guidelines and procedures to regulate the waste management activity in the country. LAs are responsible for the actual collection and disposal of general/domestic and garden waste from residential, business and industrial premises. The LAs have a schedule of collection in place at all Councils. Refuse compactors and trucks are used for the collection and disposal of waste.

3.1 Waste Management

The Waste Management Act 1998 provides for a National Waste Management Plan, which should be based on consolidation of the individual waste plans of all LAs. The Act also stipulates for each of LA to have their operational plans indicating the specific activities to be covered by them in quantitative terms. Guidelines for the Disposal of Waste at Landfills provide for the management of these sites in the country. These frameworks attempt to ensure that all waste is disposed of in an environmentally acceptable manner. Operations Manual for Landfill sites stipulates that these places must be inspected and audited regularly. Manuals also ensures for arrangements to have regular monitoring by DSWM to verify that landfills are operated according to the standards required by the License conditions, and that the licensed site design is properly implemented. Standards under consideration might include the proper compaction and covering of waste and monitoring the integrity of drainage systems. Inspection will be undertaken by the DSWM, which is the regulatory authority.

3.2 Collection of Solid Waste

Waste collection service is provided free of charge or at minimal fees. LAs also provide refuse bags; refuse bins and skips, especially in public areas. The provision of refuse bins differs from authority to authority. Some LAs provide refuse bins free of charge for SHHA plots only; other plots belonging to BHC, BCL, BPC are provided for by the respective companies, for example Selebi-Phikwe. Other

LAs provide refuse bags to plot owners and provide refuse bins in malls and public areas at Ngami and Chobe.

LAs have divided their towns and districts into different areas, from which refuse is collected according to a drawn schedule to make their work easier. Some LAs have privatized some areas where private companies collect and dispose of at the landfill for free (Jwaneng and Francistown).

3.3 Disposal of Solid Waste

All waste collected is disposed of at the landfills/dumpsites. Vehicles carrying waste are first registered at the entrance of the landfills. The vehicles are registered again and weighed at the weighbridge before they proceed into the landfills. Information at the weighbridge is computerized and vehicles that frequent the landfill are given codes. The codes are used whenever these vehicles climb the weighbridge.

The vehicles proceed to the landfill to dispose waste. At the landfill there is a person who assesses the type of waste that is brought in, then guides the truck driver where to unload the waste. Waste is pushed towards the wall into cells and compacted by a front-end loader. Waste is covered with soil daily.

The vehicle is weighed again on its way out and registered. Weight of refuse/waste is calculated by finding the difference between weight of a vehicle before and after disposal of waste.

Clinical waste is collected from hospitals and clinics (private and public). Private hospitals and clinics bring in their waste for disposal. Maun clinical waste is sent to Francistown. It is not scheduled it is brought whenever it is available and ready for disposal.

Used tyres, metal scraps and cans are segregated from general and garden waste. Some individuals buy some of the tyres from the landfill (Francistown). The remaining tyres are cut into small pieces and pushed into the cell for compaction. Some individuals collect scrap metals for personal use and heaps were observed at the landfills.

CHAPTER FOUR

4. FINDINGS

The findings in this report are discussed in two parts. Part one highlights the issues pertaining to the entity (DSWM) dealing with policy and guidance framework. The second part discusses the matters relating to solid waste management activities at operational level at the LAs.

Part 1

4.1 Non- Availability of Waste Management Plan

The Government developed and published Waste Management Strategy in 1998. DSWM was established in 1999 following the enactment of Waste Management Act. Waste Management Strategy stipulated that DSWM should prepare a national waste management plan on the basis of the individual waste management plans obtained from the respective LAs. It was apparent that DSWM could not prepare a Master Plan because LAs could not come up with their individual plans. The LAs lacked the technical know how to develop the plans. In view of the capacity constraints at LA level and to expedite the matter, the Department decided to engage consultants to assist three selected LAs namely Gaborone, Selebi-Phikwe and Maun as a pilot project in the preparation of the plans. The consultancy was still on going at the time of audit.

Non-availability of national waste management planning instrument had a bearing on the capacity of DSWM to effectively monitor and oversee the waste management operations at LAs. The delay in finalising the pilot study affected the completion of the master plan. This affected the monitoring capability of the Department on waste management operations.

Accountability of the implementing agencies could not be ensured in the absence of quantifiable targets and operational plans, as was provided to be done in the waste management strategy.

The management agreed that a consultant was appointed to assist LAs to prepare waste management plans because it

was realized that they did not have capacity to prepare the plans. The department further stated that formulation of Waste Management Plan was not just simply a mundane activity but represented an extremely complex set of activities and expertise, which the Local Authorities did not have. That being the reason DSWM had to go for a pilot project on three Local Authorities to ensure the promotion and demonstration effects and therefore substantial compliance.

4.2 Inefficient Monitoring of Landfill Operations

According to the Guidelines for the Disposal of Waste by Landfill (para 7.5), DSWM was responsible for the inspection of the landfill sites on regular basis to ensure that the landfills are being operated according to the standards required by the licence conditions. Guideline 7.5.1 stipulated that frequency of inspection of landfills would depend on availability of resources and would tend to be similar to that required for the site audits. There was no documentary evidence, which could show that DSWM inspected the landfills in accordance with provisions of the guidelines. DSWM could not carry out even a single inspection of the operating landfills located at Lobatse, Jwaneng, Francistown, Selebi-Phikwe, and Pilane during the period under review.

The departmental guidelines 7.5.2 further stipulated that large landfills should be audited four times a year, whereas, medium and small landfills should be audited twice and once per annum respectively. These audits were to be conducted by the Audit committees representing Licence Holders, the Site Manager and DSWM and where applicable relevant professional consultants.

Although DSWM conducted some audits, these audits were not as frequent as stated in the guidelines. The frequency of this exercise remained deficient as some of the places were not audited as many times as they should have been as shown by the table below:

Name of Landfill	Date of operation	Required No of audits (F.Ys1998-1999 to 2000-2001)	No. of audit conducted
Jwaneng (Medium)	12/2000	1	1
S/Phikwe (Medium)	06/2002	0	0
Lobatse (Medium)	11/1994	6	0
Francistown (Large)	06/2000	2	0

The details given in the above table showed that Lobatse Town Council should have been audited six times during the period under review, yet no audit was conducted at the site. Francistown City Council should have been audited twice for the period under audit, but it was noted that no audit was undertaken there. However, at Jwaneng one audit due for the period under review was conducted.

Review of the audit reports indicated that landfill operations were carried out satisfactorily. However, the documents highlighted certain areas such as house keeping, record keeping, safety and first aid, disposal operations that needed improvements by the respective authorities.

Management in their response indicated that on account of shortage/ limitations in staff at the DSWM (only two officers), both landfill inspections and landfill site auditing were done concurrently during the presence of the appointed stakeholders and audit committees.

OAG, however, is of the view that inspections and audits are stipulated in the Landfill Guidelines as two distinct activities to be carried out by two different entities to fulfill different responsibilities. There was no evidence, which could

substantiate that inspections were carried out by DSWM, hence lack of compliance to landfill guidelines.

4.3 Delays in Developing Infrastructure

Waste Management Component of Rural Sanitation Project provided for the development of infrastructure for waste management activities in the country. The purpose of the project was to develop landfills and provide equipment at various stations in the country.

Construction of four landfills by respective LAs in collaboration with DSWM was started at CDC Serowe, NEDC Masunga, SEDC Ramotswa, and Tsabong, along with carrying out two landfills studies for Southern DC Kanye and Kweneng DC.

The physical status of these projects at the time of review was as follows:

Name of Work	Start date	Original completion date	Latest completion date	Current Status %
LFC at CDC Serowe	5/2002	5/2003	5/2003	30
LFC NEDC Masunga	6/2002	6/2003	8/2003	85
LFC at SEDC Ramotswa	5/2002	5/2003	9/2003	85
LFC Tsabong	3/2002	2/2003	10/2003	65
LF Study Southern DC Kanye	1/2000	6/2000	3/2003	100
LF Study Kweneng	8/2001	1/2003	6/2003	60

Details of landfills construction and studies given in the above table indicated that the projects were not completed on the targeted dates, resulting in revision of timeframe of all these projects. However, landfill study at Southern District Kanye was delayed by 33 months against the original completion date of 6/2000. It is evident from the above details that the landfill studies, which started in January 2000 and 2001 could not be completed even in 2003. Although

there was delay, the indications are that there was substantial progress towards completion of projects.

The delay in completion of the projects did not marginally affect the budget. The departmental record showed that the budget to the extent of P102.194 million was provided for the activities to be executed under waste management component of the project. However, when this report was written an amount of P74.057 million was spent, leaving an unspent balance of P28.137 million which constituted 27.53% of the allocated budget.

The management in their response stated that the delay in the completing the projects had a marginal effect on the budget. However due to the reasons like change in design, liquidation, contract termination, and delayed mobilization on site the progress of these projects was delayed.

Conclusion of Part 1

OAG noticed that the Ministry of Wildlife, Environment and Tourism through DSWM provided policy and guidance framework for solid waste management activity. DSWM being a technical department has the responsibility to provide and monitor the waste management activity in the entire country. Ministry of Local Government provided support to LAs to the extent of providing them with grants for their recurrent expenditure along with provision of the staff only.

DSWM has a direct responsibility to supervise and monitor the waste management operations at LAs. This is provided for under Section 6 (g) and (l) of the Waste Management Act of 1998 and paragraph 7.5. of the Guidelines for the Disposal of Waste by Landfill. Weak monitoring arrangements at policy-making level resulted in lack of feedback to the Ministry of Wildlife, Environment, and Tourism regarding the performance of the Local Authorities on solid waste management activity.

Part 11

4.4 Management of Waste by LAs

This part of the report discusses the specific issues relating to the solid waste management activities being carried out at

LAs level. It highlights the matters pertaining to the economy, efficiency, and effectiveness aspects of waste management operation. It brings out the deficiency noticed at operational level, which qualitatively marred the overall performance of the implementing agencies.

DSWM has an overall responsibility to provide policy framework and guidance to the LAs for efficient and effective waste management activities. The department monitored the solid waste management operations but did not have jurisdiction to supervise this operation at LAs level on day-to-day basis. Functionally the LAs are independent being semi-autonomous entities and that Ministries of Local Government (to a lesser extent) and Wildlife, Environment and Tourism only provide broader policy and guidance framework. This situation incapacitated these ministries to take responsibility on day-to-day supervision of LAs performance in respect of waste management activities.

DSWM could not provide either adequate monitoring or guidance to LAs in respect of waste management operations in the country. Inability of the department to fulfill its duty to take cognizance of the situation at implementation level resulted in inefficiency and ineffectiveness of solid waste management at different LAs as discussed below:

4.4.1 LAs failed to carry out waste management activity in a systematic and organized way. None of the LAs visited during review prepared its annual operational plans; hence, all were unable to identify the physical targets to be achieved during the period under examination.

4.4.2 Volumes of collected and disposed solid waste were not being measured in uniform units during the period under review. However, we appreciate the fact that the government was not able to cover all sites with adequate equipment like weighbridges. However, the weighbridge was available only at Gaborone City Council during the period under review and it was using ton as unit of measurement. The other places like Kgatleng, Selebi-Phikwe, Lobatse, and Ngami councils used either cubic meters or loads. Adoption of different measurement units indicated that this activity was not seriously reviewed and evaluated at appropriate monitoring forum.

In year 2002-2003 weight of solid waste was recorded in tonnage at Selibe-Phikwe, Lobatse, and Jwaneng, which showed an improvement in this regard.

4.4.3 LAs were unable to maintain a complete record of disposed solid waste; the situation indicated poor execution of the activity by those agencies. LAs also could not evolve a system to measure their performance on regular basis against certain quantifiable indicators resulting in an environment where accountability of the staff entrusted with this responsibility could not be ensured.

4.4.4 Details of solid waste collected (see annexure 2) depicted that out of nine LAs visited, three entities, that is, Francistown City Council, Kweneng District Council, and Jwaneng Town Council did not provide information for the period under review. One of the LAs namely Chobe provided information for one year. Kgatleng District Council provided data for two years, Lobatse Town Council also provided data for two years, in loads for 1999-2000 and cubic meters for 2000-2001. Three LAs namely Gaborone City, Ngamiland and Selebi-Phikwe councils provided information for three years.

Absence of information in some of the authorities along with different measuring units during the period under review made it difficult to measure the performance of the LAs in quantitative terms on consolidated basis.

During 2000-2001 Lobatse Town Council planned to collect 53942.4 cubic meters of solid waste, whereas, against the target they could collect only 32973.64 cubic meters of waste. There was variance of 20968.36 cubic meters between the quantities planned to be collected and the actually collected.

However, the above details indicated that on average annual basis GCC, SPTC, and NDC were able to collect and dispose of 260511.79 tons, 3746.66 loads, and 18771.66 cubic meters of solid waste respectively during period under audit.

The management stated that tons, cubic meters and loads are all units of measurement in solid waste management. Tons are derivatives of cubic meters, loads can be extrapolated /interpolated into useful numerical values if vehicular capacity is known. References to cubic meters/ loads have been used in

the past particularly where weighbridges were not initially provided.

OAG is of the view that absence of a uniform unit of measurement of solid waste during the period under review indicated lack of adequate arrangement at monitoring and supervisory levels. For instance where weighbridges were not available loads were used and the loads varied according to the sizes of vehicles used. On the other hand where weighbridges were available the measurement unit also varied. In Lobatse cubic meters were used, whilst in Jwaneng, Selebi Phikwe and Francistown tonnage was used. This situation also affected the capacity of the management both at DSWM and LAs levels to assess the performance of the operational staff in an organized and uniform way.

4.4.5 Pula to per Ton/Load Ratio

In order to assess the cost effectiveness of solid waste management activities at LAs level, we collected the data regarding the volumes of waste collected and expenditure incurred during the period under review. The purpose of carrying out this exercise was to see how economically the different LAs in the country carried out the same activity.

At GCC cost of collection and disposal of one tonne waste was Pula 24 per ton, which increased to Pula 34 in 1999-2000, but considerably decreased to Pula 14 in 2000-2001. The cost for same activity at Selebi-Phikwe during the three financial years remained as Pula 243, 250, and 446 per load respectively showing substantial increase during 2000-2001.

Cost of per ton at Kgatleng remained Pula 899 and 1190 during 1998-99 and 1999-2000 respectively which was far more than per ton cost for the same period at Gaborone City Council. At Lobatse Town Council cost of collection and disposal of one load waste was Pula 554 in 1999-2000, whereas, in 2000-2001 the cost of one cubic meter remained 65 Pula.

Review of data pertaining to expenditure incurred on solid waste collection and disposal and actual

quantum of work done at some of the visited LAs showed varied results. It disclosed that cost per ton collection and disposal not only differed greatly in various areas, but also at the same stations during the period under review. This situation revealed weak monitoring and reviewing arrangements at LAs level, which had responsibility to carry out this operation economically.

4.4.6 Per Person to Per ton/ Load Ratio Analysis

An exercise was carried out by comparing the number of deployed staff to the quantities of solid waste collected each year during the period under audit. The purpose of this comparison was to indicate the working efficiency of the manpower against the workload disposed of in each year.

Ratio of per person to per load of disposed waste at Selebi-Phikwe on average for the period under review remained 1:50. Ratio of per person to per cubic meter of waste disposed at Ngamiland on annual average basis remained 1:180. Ratio of per person to per ton waste disposed of at Kgatleng on average for years 1998-99 and 1999-2000 was 1:26.

Ratio of per person to per ton waste disposed at Gaborone City Council on average for the period under review remained 1:1409 (details at Annex 1).

The above analysis disclosed that there was substantial difference in per person to per ton collected and disposed waste ratio between councils of Kgatleng and Gaborone. The efficiency of the staff of GCC was greater than that of Kgatleng Council.

Responding to the above situation the Department stated that since financial year 2000- 2001 much progress had been made and that now a uniform unit of measurement, tonnage is used by some LAs where weighbridges are available to record the collected and disposed waste. One of the LAs namely Selebi-Phikwe expressed their view that there was increase in work, but manpower strength remained static.

Efficiency of staff with regard to per person to per ton/ load also varied considerably at different stations. Comparison of data related to staff

deployed on solid waste management activity against the quantum of waste managed at four of the visited LAs showed lack of consistency.

4.4.7 Inefficient Utilization of Vehicles

Capacity of various LAs to carry out waste management activity was affected by inadequate transport arrangements. Most of vehicles were very old and always not available for use, hence, failed to collect waste on regular basis. Another factor, which contributed towards inefficient running of the waste management transport systems at different LAs, was frequent breakdown of the vehicles.

Data revealed that Selebi Phikwe had nine refuse trucks, and half of them were hardly in a working condition. Chobe was worst hit by lack of vehicles and equipment as they had three very old trucks. These were open and were not suitable for refuse collection.

Lobatse Town Council had three trucks, information about one of them was not available. According to information provided by the LA two vehicles remained operational for 435 working days during 2000-2001, hence, 23% of the operational time during this year could not be utilized, as these vehicles remained out of order. This town council had one skip loader that remained operational for 230 working days, but 18% of its working time could not be availed on account of break down. There was one Skip tractor at this station, which remained operational for 132 working days only. The information indicated that this vehicle remained out order for 149 working days during 2000-2001, which was 53% of the available operational time. This council did not provide information about other two years i.e 1998-1999 and 1999-2000 covered under this study.

OAG was unable to determine the time vehicles remained off roads at other LAs because they failed to maintain the essential repairs and service record completely. Information like dates of release of vehicles from the workshops after repairs was missing and even service schedules were also not kept. In absence of these details the working efficiency of these vehicles could not be measured.

The department in their response indicated that vehicles and other necessary equipment for proper landfill operation were provided to LAs for their utilization and that authorities could enter into preventive maintenance contracts with suppliers.

However, OAG is of the view that the problem in respect of maintenance of vehicles at LAs level is of great concern to us as it took a long time to repair them. This situation needed to be resolved as soon as possible because it had direct bearing on waste management activity in the field.

4.4.8 Lack of Plant and Equipment at LAs

Absence of adequate equipment had direct bearing on the efficiency of those waste disposal sites. All the landfills visited had incinerators, whereas, dumping sites did not have them, except for GCC. Resultantly the sites were lacking this facility and staff had to travel long distances to dispose of hazardous waste. For instance, in case of large quantities of clinical waste Ngamiland and Chobe had to travel as far as Francistown to dispose of medical and other hazardous waste. For smaller quantities they were using incinerators at hospitals. Kweneng District Council used Gaborone dumping site to dispose of their clinical waste.

All landfills, except Pilane, had weighbridges. No dumping sites had this facility. Kgatleng District Council (Pilane) used the Department of Roads weighbridge. At the dumping sites only number of loads per day were recorded. During site visits it was noticed that weigh bridge of GCC was not functioning. In absence of this equipment the management was handicapped to ascertain the exact quantities of waste disposed of at those places, hence, failing to measure the efficiency of those entrusted to perform this function. OAG could not calculate operational costs of vehicles and equipment used in the collection and disposal activity for the period under review, because of unavailability of information.

4.4.9 Poor Record Keeping

At all LAs visited the quality of record keeping was found to be poor that resulted in haphazard maintenance of data at these places. Complete data relating to waste management activity at all these places was not properly maintained. The information like quantum of waste collected/ disposed of was not available at some LAs, minutes of some of the meetings were missing, some of reports (monthly, quarterly and annual) were not available and the complaint registers were kept incomplete. In the workshops maintenance/service registers, log books and job cards were available in incomplete conditions.

In absence of complete record it was difficult to deduce the number of days the vehicles remained un-operational. It was also difficult to deduce the number of days the refuse collectors were present/absent from work, and not easy to determine response time to public complaints.

4.4.10 Lack of Efficient Monitoring & Supervision Tools at LAs

There was no documentary evidence available to substantiate that LAs were able to monitor and supervise the waste management operation on regular basis. No meeting schedules were prepared, minutes of meetings held were not made available, and where this information was available, it showed that meetings were not held regularly. When it came to day-to-day supervision of refuse collectors, though we were informed that Environmental Health Officers followed them up and made checks on their progress, no documentary evidence was provided to show that such activity took place. When refuse collectors complained about their job, there was also no evidence that their problems were addressed and they were given feedback. The consequence of lack of giving feedback on the part of environmental health officers was that workers were disgruntled and demotivated which could affect their performance.

The charge hands (supervisors) registered refuse collectors daily in the mornings and afternoons. Health Environmental Officers and paying officers relied on the Charge Hands reports. There was no

arrangement to check and verify the authenticity of the registers prepared by the Charge Hands. Lack of proper check on the registers posed a risk on genuineness of such record as the information was used for calculating wages of the staff at the end of the month.

The day-to-day supervision of waste management activity at LAs level was not documented. Absence of such reporting process could materially affect the capacity of supervisory staff to gauge and measure the performance of field operational staff on daily basis. Lack of field supervision in LAs was evident by the fact that refuse bags were left unattended and destroyed by animals, especially at Ngamiland, Chobe, and Selibe-Phikwe.

OAG is of the view that day-to-day operations of this activity were not supervised properly at operational level, which qualitatively marred the performance of staff at different LAs as some of the basic information needed to be available for day-to-day decision-making was not maintained.

4.5 Site Visits

Five landfills and three dumping sites were visited to ascertain how these places were being operated. At some of the sites visited we observed that these places were not being managed as prescribed in the Guidelines for the Disposal of Waste by Landfill. For instance Pilane landfill was not clean as the papers were scattered around and on the fence. FCC landfill was full of flies everywhere, even as far as the workshop offices, where the refuse compactors were parked. The reason for this was that the landfill was not being properly compacted because the landfill compactor had not been working for at least six months.

During site visits at Jwaneng and Francistown it was noticed that waste was not being properly compacted and covered. It was explained that quality of compaction was affected due to either non-availability of requisite equipment like compactor at Jwaneng and breakdown of the same item at Francistown.

GCC, Ngamiland and Kasane (main) dumping sites were in a bad state, for example, they were not fenced and it was difficult to control the scattering of litter and to keep out

scavengers. This led to the areas looking very dirty. Gaborone City Council dumping site was the only one of the three visited sites, which was fenced. Ngamiland and Kasane were not fenced and was an eyesore. The dumping site in Kasane was made worse by the fact that animals came and went as they pleased to scavenge for food, which posed a threat to them.

It was learnt that collection of waste in some areas at Jwaneng and Francistown were privatized. We noticed that these areas were cleaner than the localities being directly managed by LAs.

4.6 General Public Views

A survey (see Annexure 2) was conducted to obtain response of the public on waste management activity in their respective areas. A total of 95 questionnaires were responded to. The results of the survey indicated that, 61% of the people were satisfied with services provided by the Local Authorities in the collection and disposal of solid waste, whereas, 39% showed their dissatisfaction. This showed that although a larger percentage of the public was satisfied, there was still a considerable percentage, which was still not satisfied. When it comes to overall satisfaction, 7% were very satisfied, 54% were satisfied, 34% were dissatisfied and 5% gave no answer. The situation demanded efficient efforts on the part of LAs for improving their performance in this regard.

4.7 Public Complaint System

All LAs have a public complaint system in place, but only a few of the public members were aware of it. These bodies did not make serious efforts to create awareness among the public about presence of a complaint system. Absence of such awareness on the part of public put a constraint on them to approach LAs in connection with waste management issues in their respective areas.

LAs were also unable to have feedback under these conditions about the public opinion on the performance of their field staff.

CHAPTER FIVE

5.0 RECOMMENDATIONS

The following recommendations are proposed to improve the operational efficiency and effectiveness of solid waste management activity in the country:

- 5.1 The Ministry of Wildlife, Environment and Tourism should formulate and compile a National Waste Management Plan as stipulated under Botswana Strategy for Waste Management issued in 1998.
- 5.2 The Ministry of Wildlife, Environment and Tourism should ensure that all the LAs prepare their respective waste management plans on time in order to facilitate the preparation of the National Waste Management Plan.
- 5.3 The Ministry of Wildlife, Environment and Tourism should develop a framework to coordinate the waste management operations of LAs and to ensure that a mechanism is put in place to retrieve information from LAs regarding quantities of waste collected and disposed of and efficient utilization of equipment and machinery during a month, quarter or annum. They should also create a database of the information obtained from LAs.
- 5.4 Ministries of Local Government and Wildlife, Environment, and Tourism should devise a mechanism that could enable them to monitor the actual waste management operations at LAs level. Such an arrangement will go a long way in providing feedback on performance of the LAs to policy makers in this area.
- 5.5 The Ministry of Wildlife, Environment and Tourism should provide adequate resources/infrastructure like landfills, machinery, equipment and vehicles to LAs for efficient collection and disposal of waste.
- 5.6 The Ministry of Wildlife, Environment and Tourism should carryout monthly, quarterly, and annual inspections and auditing of the collection and disposal of solid waste as stipulated in the Guidelines 7.5.1 and 7.5.2 in order to improve the quality of collection and disposal of solid waste.

- 5.7 The Ministry of Wildlife, Environment and Tourism should monitor LAs so that they keep complete, systematic and uniform records on operational information, as absence of this information makes it difficult to measure their performance.
- 5.8 The Ministry of Wildlife, Environment and Tourism should consider possibility for outsourcing collection of solid waste activity at LAs level.
- 5.9 LAs are encouraged to keep proper and adequate records of maintenance of vehicles and equipment.
- 5.10 An efficient mechanism to generate necessary reports on regular basis should be put in place in order to strengthen the day-to-day supervision of waste management operations by LAs in field.
- 5.11 Awareness among the people about the Complaint System should be increased through activity of Public Awareness Campaign.

PULA TO PER TON/LOAD RATIO

1. **Ratio of Pula to per ton at Gaborone City Council was 24: 1, 34:1, and 14:1 in 1998-9 9, 1999-2000, and 2000-2001 respectively. The ratio of Pula to per load at Selibe-Phikwe remained 243:1, 250:1, and 446:1 in the years 1998-1999, 1999-2000,and 2000-2001 respectively. At Kgatleng ratio of Pula to per ton was 899:1 and 1190:1 for the years 1998-99 and 1999-2000 respectively. We were unable to work out per ton Pula ratio on countrywide basis because financial as well as operational information at most of the selected LAs was not furnished to us. Though quantities of waste in term of loads Ngamiland were available, but Pula to load ratio could not be calculated because accounts of the council for the three years are yet to be prepared.**
2. Ratio of per person to per load of disposed waste at Selebi-Phikwe on average for the period under review remained 1:50. On average monthly basis this ratio was 1: 4, whereas, on average daily basis it was 1: 0.13. It means that on daily average basis one person at this town could collect and dispose 0.13 load of waste. During 1998-99 this ratio was 1:59, which in 1999-2000 went down to 1:42, and then in 2000-2001 it went to 1:50 that was still below the achievement of year 1998-99.
- 3, Ratio of per person to per cubic meter of waste disposed at Ngamiland on average for the period under review remained 1:180. On average monthly basis this ratio was 1:15, whereas, on average daily basis it was 1: 0.5. It means that on daily average basis one person at this town could collect and dispose 0.5 cubic meter waste. During 1998-99 this ratio was 1:67, which in 1999-2000 went up to 1:414, and then in 2000-2001 it went down considerably to 1:58 that was below the achievement of preceding year 1999-2000.
4. Ratio of per person to per ton waste disposed of at Kgatleng on average for years 1998-99 and 1999-2000 was 1:26. On average monthly basis this ratio remained 1:2, whereas, on daily average basis it was 1: 0.07 during two year. It means

that on daily basis one person at this town could collect and dispose 0.07 ton waste. During 1998-99 this ration was 1:24, which went up to 1:27 in 1999-2000 showing an upward trend.

5. Ratio of per person to per ton waste disposed at Gaborone City Council on average for the period under review remained 1:1409. On average monthly basis this ratio was 1:117, whereas, on average daily basis it was 1:4. It means that on daily average basis one person at this town could collect and dispose 4 tons waste. During 1998-99 this ratio was 1:1220, which in 1999-2000 went down to 1:929, and then in 2000-2001 it went up to 1:2078 which was much more than the achievements of the preceding years.

ANNEXURE 2

The following table shows details of solid waste collected by LA'S covered by our sample.

Year	GCC Tons	FCC Loads	SPTC Loads	LTC cubic metres	KLDC Loads	KDC Loads	NDC cubic metres	Chobe Loads	JT C
98-99	218394.80	N/A	4375	N/A	803.38	N/A	14672	2537	N/A
99-00	168211.68	N/A	3137	3125 Loads	908.18	N/A	364345	N/A	N.A
00-01	394928.89	N/A	3728	32973.64	N/A	N/A	5208	N/A	N.A

ANNEXURE 3

DETAILS OF THE GENERAL PUBLIC SURVEY

Out of 95 people who responded;

1. 49% answered that refuse was collected weekly in their area, 32% replied that it was done monthly and 19% said that either it was collected on yearly basis or never done.
2. 66% people were satisfied with collection, 27% were not satisfied and 7% gave no answer.
3. 68% persons said that waste collection was efficient, 26% said it was inefficient and 6% gave no answer.
4. 53% know about a system of complaint at local authority, 44% did not know about the system and 3% gave no response.
5. 12 % said it took a week for the LA to respond to complaints, 8% said a month or less, 22% said more than a month and 58% gave no answer.
6. 9% were very happy, 42% were happy, 33% were not happy with dumping/landfill site and 16% had no comment.
7. 19% said that people were involved in the selection of the sites, 41% said that they were not consulted and 40% were unaware.
8. 66% felt they should be involved in the selection of the site, 22% said that they may not be involved in this activity and 12% gave no answer.

ABBREVIATIONS AND GLOSSARY

CORRECTIVE MAINTENANCE-	Is a reactive maintenance where equipment is run to failure and maintenance is performed to correct the failure.
DOWNTIME	- Is the total length of time the treatment plants, network and equipment components including reservoirs were not in operation and remained idle
MRP	- MATERIALS REQUIREMENTS PLANNING A system that automatically advises the Corporate Buyers to replenish stock
NSCWP	- NORTH SOUTH CARRIER WATER PROJECT
OAG	- OFFICE OF THE AUDITOR GENERAL
ODI	- OPERATION DIVISIONAL INSTRUCTION
PREVENTIVE MAINTENANCE	Is maintenance that is carried out at predetermined intervals or corresponding to predefined criteria and is intended to reduce the probability of failure or the performance of degradation of treatment plants, equipments, reservoirs, networks and dams' components.
RCM	- RELIABILITY CENTRED MAINTENANCE A process used to determine what should be done to ensure that any physical asset continues to do whatever its users want it to do in its present operating context
SADCOSAI	- SOUTHERN AFRICAN DEVELOPMENT COMMUNITY OF SUPREME AUDIT INSTITUTIONS

SAP R/3**- SYSTEMS APPLICATION PRODUCT**

Is an integrated enterprise resource planning(ERP) business solution that comprises several integrated business modules such as, Human Resources, finance, materials management, quality, controlling, plant maintenance and project systems.

WUC**- WATER UTILITIES CORPORATION**