

PN-ABQ 591

85899

**PRIVATE PROVISION
OF
SOCIAL SERVICES
SOLID WASTE MANAGEMENT**

MBABANE AND MANZINI

PHASE II REPORT

Report prepared for:

**The Office of Housing and Urban Programs
U.S. Agency for International Development**

Prepared by:

**Jim Dohrman, consultant to
International City/County Management Association**

November 1993

**Contract No. PDC-1008-C-00-9091-00
Buy-In # 34**

SWAZILAND GOVERNMENT



KINGDOM OF SWAZILAND

MBABANE AND MANZINI

PRIVATE PROVISION OF SOCIAL SERVICES
SOLID WASTE MANAGEMENT

PHASE II REPORT

PREPARED BY:

UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT
AND
INTERNATIONAL CITY MANAGERS ASSOCIATION

NOVEMBER 1993

PRIVATE PROVISION OF SOCIAL SERVICES

SOLID WASTE MANAGEMENT

FOR

MBABANE AND MANZINI

KINGDOM OF SWAZILAND

PHASE II REPORT

Table of Contents

Report Section	Page Number
Table of Contents	(i)
Abbreviations	(iii)
1.0 Executive Summary	1-1
2.0 Introduction	2-1
2.1 Background	2-1
2.2 Other Projects	2-1
2.2.1 Urban Development Project	2-1
2.2.2 Matsapha Project	2-2
2.3 Purpose of the Project	2-2
3.0 Existing Systems	3-1
3.1 Mbabane	3-1
3.1.1 General	3-1
3.1.2 Collection	3-1
3.1.3 Disposal	3-2
3.1.4 Other Issues	3-4
3.1.5 Existing Cost of Service	3-3
3.2 Manzini	3-6
3.2.1 General	3-6
3.2.2 Collection	3-6
3.2.3 Disposal	3-7
3.2.4 Matsapha	3-7
3.2.5 Existing Cost of Service	3-8

3.3	Recycling	3-10
3.3.1	Paper	3-10
3.3.2	Beverage Cans	3-10
3.3.3	Glass	3-11
3.4.4	Plastic	3-11
4.0	Opportunities for Privatization	
4.1	General	4-1
4.2	Collection Systems	4-1
4.2.1	General	4-1
4.2.2	Service Area Definition	4-2
4.2.3	Cost Estimates	4-3
4.3	Disposal	4-4
4.4	Recycling	4-4
4.4.1	General	4-4
4.4.2	Paper	4-4
4.4.3	Beverage Cans	
4.4.4	Plastic	
4.5	Local Business Resources	4-6
5.0	Constraints to Privatization	
5.1	General	5-1
5.2	Regulations and Bye-Laws	5-1
5.3	Enforcement	5-2
5.4	Dust Bins	5-4
6.0	Recommendations	
6.1	Conclusions and Recommendations	6-1
6.2	Privatization	6-1
6.2.1	General	6-1
6.2.2	Collection Service Area	6-2
6.2.3	User Fees	6-2
6.2.4	Bye-Laws and Enforcement	6-2
6.3	Continued Public Operation	6-3

APPENDIX I - Sample Bye-Laws

LIST OF FIGURES

Description	Following Page No.
Figure 3.1 - Mbabane Location Map	3-1
Figure 3.2 - Manzini Location Map	3-6
Figure 4.1 - Daily Service Area Definition	4-1
Figure 4.2 - Weekly Collection Schedule	4-2

LIST OF TABLES

Description	Following Page No.
Table 4.1 - Cost Estimates Mbabane	4-3
Table 4.2 - Cost Estimates Manzini	4-4

ABBREVIATIONS

E	Emalangenzi (Swaziland National Currency) E 3.3 = US\$ 1.00
EA	Environmental Assessment
GOS	Government of Swaziland
IBRD	International Bank for Reconstruction and Development (World Bank)
JB/E	John Burrow & Partners Swaziland (PTY) Ltd., in joint venture with Euroconsult B.V. (UDP Phase II Consultants)
MbCC	Mbabane City Council
MHUD	Ministry of Housing and Urban Development
MNRE	Ministry of Natural Resources and Energy
MzCC	Manzini City Council
O&M	Operation and Maintenance
PPSS	Private Provision of Social Services
SEA	Swaziland Environmental Authority
SWSB	Swaziland Water and Sewer Board
UDP	Urban Development Project
USAID	United States Agency for International Development

1.0 Executive Summary

1.1 Background

Rapid population growth in the Mbabane-Manzini corridor plus significant budget deficits in both local and nation budgets have placed increasing demands on government officials to maintain essential municipal services. These factors, plus an inefficient user fee system for water, sewer and solid waste management has resulted in minimal funding and deferred capital expenditures of these services.

The World Bank is sponsoring a major Urban Development Project (UDP) to assist the Government of Swaziland (GOS) to manage its growing urban problems. This project which is targeting the unplanned settlements surrounding Mbabane and Manzini will also include proposals to upgrade solid waste collection and disposal services. In addition to the UDP project, the GOS has requested that USAID also evaluate privatization of solid waste services as a method of reducing dependence on limited public financing which is the focus of this report.

1.2 Existing Systems

A review of existing solid waste management services has found these services to be efficiently managed and operated, given significant constraints due to aging equipment and limited funding. Collection and disposal services are being provided at an estimated user cost of E 9.63 per month in Mbabane and E 4.49 in Manzini as compared to user fees of E 4.00 and E 3.00 respectively. An inefficient user fee system collects only 60% of the fees from those receiving service resulting in a severe shortfall in operating funds. The shortfall in revenues is made up through payments from the City Councils.

The Mbabane landfill is poorly located and is near its maximum capacity. An interim landfill will be required before the new UDP landfill will be constructed in 1995. The Manzini landfill is well operated and has sufficient remaining life until the UDP landfill is completed. Considering the lack of adequate equipment and cover soil, both landfills are well maintained.

Swaziland is fortunate to have local markets for paper and beverage cans and these two materials are recycled from the waste stream prior to landfilling. Due to economic and geographical differences, recycling in Manzini is more effective than in Mbabane. Opportunities to improve recycling from the Mbabane waste stream should be explored.

1.3 Opportunities for Privatization

Although several opportunities exist in the Mbabane-Manzini corridor for privatization of landfill operations and recycling, a greater and more timely opportunity exists for privatizing a portion of the waste collection system in each city. The primary benefit of this privatization is the decentralization of this service making it a self sustaining private enterprise, removing from the public rate structure. Initial privatization

An evaluation of the estimated private collection costs indicates that monthly user fees for collection alone could rise to the E 8 or E 9 in Mbabane and E 7 to E 8 in Manzini. The difference in cost between the two cities is a more difficult street pattern and steeper grades in Mbabane resulting in lower collection efficiencies. These estimated user fees assume that the landfill operating costs are transferred from the user fee to rates as proposed.

1.4 Constraints to Privatization

Although privatization is basic in theory, its implementation can be quite complex. Several constraints to privatization will have to be addressed before proceeding.

Existing national regulations regarding solid waste management are very general and more specific bye-laws in each city will be required in order to sufficiently define the privatization service and measure performance. Without such bye-laws and local enforcement, the private contractor will be reluctant to commit his resources to an undefined task.

Perhaps the largest constraint to privatization of the collection system is the present system of administering user fees. The mere privatization of the service will not solve the existing user fee problems which are based on Cabinet approval which can be very time consuming. The last fee increase took two years to approve. A current proposal to transfer the Water and Sewer Board to a self sustaining parastatal agency in April 1994, should provide the impetus to revise the user fee system and make it more responsive to actual costs of service. If the councils wish to proceed with privatization prior to the revision of the service fee process they should be prepared to guarantee payment of the obvious shortfall in operating costs which will result from current fees.

1.5 Continued Public Operation

As stated above, the existing collection system is efficiently managed and operated given the limited funding. If the funding problems were solved by revisions to the user fee system, and new updated equipment were provided, the public system would probably function on an equal level with a private contractor.

1.6 Recommendations

The decision to move toward privatization of the solid waste collection system rests with the city councils of each municipality. Although the benefits of decentralizing municipal services will theoretically reduce public spending, its success will depend on the user's ability and willingness to pay higher user fees.

During the tender process, the private contractors will seek assurances that they will be paid for services rendered and will identify risks associated with escalating costs and non-payment of fees. If these risks are too high, then the contractor will not tender for the services.

Based on the evaluations performed, it is our opinion that the risks to the private sector are too high at the present time and to pursue privatization in the next 3 to 6 months would not be successful.

Within that time frame the UDP project should move into the implementation phase and the Water and Sewer Board will establish new guidelines for setting user fees. These are two major events that will consume council resources and demonstrate their ability to implement self sustaining services. Both city councils should use this time to establish Solid Waste Management Bye-Laws, improve enforcement of existing regulations, and increase the collection of unpaid fees.

This period should also be used to determine the user fee method to be used when the collection system is privatized. Will the fees continue to be collected by the Water and Sewer Board or will they be collected by the private contractor? Once the user fee system is established, and approved by the appropriate national agencies, the councils can move forward with the privatization process, beginning with the definition of the service area as outlined in Section 4.2 and preparation of a request for tender.

2.0 INTRODUCTION

2.1 Background

Swaziland is experiencing rapid urbanization of its growing population. The 1989 population of the Mbabane-Manzini urban corridor, which is the subject of this report, is estimated at 108,000, which is a 61% increase since 1976.

This rapid growth has largely been unplanned and unregulated, thereby placing increasing demands on the local governments to provide basic municipal services. In both the Mbabane and Manzini urban areas, a large percentage of the generated solid waste, estimated between 30 and 50 percent, remains uncollected. This situation is a result of a combination of policies and practices that limit each municipality's capacity to provide full coverage. For example, narrow roadways and steep topography in many unplanned settlements prevents collection vehicles from entering the areas. Regulations and fines to discourage illegal dumping are inappropriate and poorly enforced and funds to maintain the municipality's collection fleets are insufficient, resulting in frequent equipment breakdowns.

In May 1991, USAID provided support for a feasibility study of privatization of solid waste management services in the Mbabane-Manzini corridor, performed by the International City Managers Association. This study concluded that the greatest opportunities for privatization were in the collection of commercial and industrial wastes.

Until recently, insufficient funding and shifting priorities for the Councils precluded further consideration of the recommendations made in the feasibility study. On-going work being performed by the World Bank to improve the urban infrastructure in both cities, has renewed the Councils' interest in assessing in more detail the role which could be played by the private sector in providing required municipal services.

The rapid urbanization is also occurring in unplanned settlements outside of the city boundaries along major highways. These areas practice on-site solid waste disposal or utilize communal dumping areas.

2.2 Other Projects

2.2.1 Urban Development Project

The World Bank began evaluating the expanding urbanization problems in the Mbabane-Manzini corridor in 1985 and implementation of an Urban Development Project (UDP) is anticipated within the next few years. In addition to upgrading water, sewage and highway infrastructures, the UDP will also address the provision of solid waste collection and disposal services. The consultancy for this major project assembled much of the data that will be used in the following assessment. This data includes waste generation rates, landfill siting, information on existing systems, the number of current plots serviced and general cost estimates of both current and proposed services.

The budgets for implementing the UDP include funds for the acquisition of new collection equipment and the development of new landfill sites. The following assessment of privatization opportunities will include options for utilizing these resources where appropriate.

2.2.2 Matsapha Project

The Kingdom of Swaziland, through the Ministry of Commerce and Industry, and the Kreditanstalt fuer Wiederaufbau, a German donor agency, are sponsoring infrastructure improvements in Matsapha which is an industrial area located approximately 5 km west of the Manzini City Council incorporation limits. This project is addressing expansion and improvements to the existing solid waste dump site as well as water, wastewater and roadway rehabilitation. The domestic solid waste generated in the industrial park by workers, restaurants, etc., is collected by a private contractor and each industry is responsible for hauling its own process waste to the dump site. The minimal operation of the dump is also contracted to a private company.

2.3 Purpose of the Project

The primary purpose of this project is to determine optimum waste management improvements in Swaziland and in particular, opportunities for privatization of solid waste collection and disposal services. This will be accomplished through a detailed review of current practices, identification of problem areas and recommendations for improvements. Where appropriate, privatization of services will be presented as an alternative to continued public provision of those services.

3.0 EXISTING SYSTEMS

3.1 Mbabane

3.1.1 General

The city of Mbabane is located at the northern end of the Mbabane-Manzini corridor and has an estimated 1993 population of 56,300. Several bordering areas increase the regional population to 58,100. As shown on the topographic location map, included as Figure 3.1, the City is characterized by concentrated downtown urban development surrounded by steep hillsides. The unplanned, informal development, mentioned in the introduction, is occurring on the steep hillsides without a formal transportation system and thus cannot be serviced by traditional waste collection trucks. These unplanned areas, also referred to as "squatters" are not divided into building lots and the residents do not pay rates or other fees.

The UDP will upgrade transportation access to the unplanned areas through new roadways and improved foot paths. The project also includes a program of surveying and designating individual plots and assessing fees for services to be provided.

Solid waste collection and disposal services in Mbabane were administered by the Department of Health but have been transferred to the Cleansing Department of the City Engineer's Office.

3.1.2 Collection

The current formal collection system includes six collection vehicles consisting of 2-10.7 M³ compaction trucks, 3 non-compacting 13 M³ square body trucks and 1 tractor/trailer for servicing 6 M³ containers. Presently there are 3 covered containers in the City Center and 5 open containers in Msunduza. Although Msunduza is a planned residential area, some of the housing units are located on steep slopes and accessible only by footpaths and are therefore serviced with containers.

Based on information provided by the UDP consultants, curbside collection or container service is provided to the central commercial/industrial areas and all planned residential developments consisting of approximately 5,820 plots having a population base of only 26,800 representing 48% of the City's total population. The remaining 29,500, primarily the unplanned areas, receive no waste collection services.

Although detailed collection routing has not been fully evaluated by the UDP consultants, it is assumed that all plots are serviced at least twice per week. Based on 5,820 plots, 11,640 collections are made per week, which equates to an average 465 collections per day, per truck, assuming all five trucks are operational. Considering that three of the five trucks are manual loading, the rate for the two compactor trucks would be well above the 465 average. Considering the crew size, irregular street patterns and topography of the City, this is a very good collection rate of one collection every 45 seconds.

Assuming that all of the unserved population is in the areas of unplanned housing, and an estimated generation rate of 0.4 kg/cap/day, (UDP estimate) 11.8 tons of solid waste is

generated in the unplanned areas each day but is not collected. This waste is disposed of in a variety of ways, including on-site burial, "over the bank dumping", burning, and consumption by animals. It is also probable that some of this waste is placed in public dust bins or containers in the central business district where most of these people work, shop or go to school.

Even in areas that are serviced with collection vehicles, a large amount of illicit dumping was observed during this study. This was most noticeable at multi-unit housing flats on hillsides with adjoining wooded areas. Although each flat is supposed to have its own dust bin, to be placed at the curbside on the scheduled collection day, very few actually have dust bins and the residents prefer to dump their waste in the adjacent wooded areas rather than purchase a dust bin and use the City collection service. These dumping areas are very visible and known to the health department but no enforcement action is being taken.

3.1.3 Disposal

The existing landfill is located just below the abattoir, on the main road to Mhlambanyati, 2.5 km from the City Center, as shown on Figure 3.1. The site is fully visible from the east and is adjacent to residential areas. Two new homes are being constructed just below and immediately adjacent to the landfill. Although a steel wheeled compactor and D5B crawler dozer are assigned to the site, they are frequently inoperable due to their age.

The most obvious problems at the site are a lack of adequate cover material and a very short remaining life. Some earth material is dumped at the site from nearby civil works projects but the amount is not sufficient to provide adequate daily cover. Flies and odors are frequent problems at the site. Due to its small size, there is very little room to maneuver vehicles and waste must be dumped, spread and compacted almost immediately to make room for the next truck. This has nearly totally eliminated any scavenging or recycling at the site.

Although a new site has been identified in the UDP project, design and development are being delayed until access to the site can be obtained. It is not likely that the existing site will provide sufficient volume until the new proposed UDP site can be constructed and an interim site will be necessary. The most obvious location of this interim site would be the former site in Mahwala, which was closed due to protests from adjacent residents in unplanned developments. Based on a brief walkover inspection, it would appear that the site has an additional 2 to 3 years of life, which would be adequate as an interim solution until the new UDP site is completed.

3.1.4 Other Issues

As stated above, there is a significant amount of illegal disposal in Mbabane and public health regulations are not being enforced, even when the violations are obvious and reported.

Part of this problem is related to the division of authority between the Engineering Department and the Health Department. The Engineering department is now responsible for waste collection and disposal but they do not have the authority to enforce health regulations. Although they report violations, the guilty parties are not served notice and the illegal dumping continues. Since the Health Department is no longer responsible for solid waste,

they appear to be reluctant to enforce regulations. This division of authority is obviously creating a significant enforcement problem.

A second issue is the use of dust bins. Regulations require the use of dust bins but few people actually use them and they are often stolen and used for other purposes. Failure to use dust bins requires placement of loose or bagged waste at the curbside, which contributes to litter, especially in the central business district where street litter is a constant problem. Most of the flats that were observed did not have specific areas for residents to store their dust bins so that they are not an eyesore or source of odors. All flats should be supplied with such areas or converted to the use of 6M³ containers and eliminate the use of individual dust bins.

The above issues are significant deterrents to the potential privatization of collection services in Mbabane. When a specific area is designated for private collection in a tender document, the contractor will prepare his tender based on the defined level of service and the number of plots within that area. If a percentage of plot owners or residents are illegally dumping rather than using the collection system, the system becomes inefficient and the City may be paying for services that are not rendered.

This could be overcome by a direct user fee system where the user pays the contractor directly and the contractor may suspend service for non-payment of the fee. Unfortunately this still relies on public sector enforcement of illegal dumping which would most likely be the result of a suspension of service by the contractor. Any consideration of private collection must be accompanied by new by-laws which permit the City Council to designate a disposal site, collection contractor, the procedures of the actual collection and payment of fees. Enforcement of the by-laws should remain with the City Council.

The failure to require the use of dust bins will also create problems for privatization. Tender documents must define a level of service. If that level of service does not require the use of dust bins or other suitable containers, then the contractor will assume worst case conditions without dust bins and his prices will be higher. As stated above, a direct user fee system, allowing the contractor to suspend service if a dust bin is not used, will only be effective if firmly enforced by the City Council.

3.1.5 Existing Cost of Service

Prior to considering privatization of solid waste services it is important to determine the current cost of providing those services through the public sector so that a comparison can be made with the estimated cost of providing the same level of service using a private contractor. This is often a difficult task since privatization is usually accompanied by an improvement in the level of services, or the costs of existing services are not well defined.

The following cost estimate is based on information presented in the UDP report regarding the current level of service. Assumptions will be made regarding labor overhead rates, equipment O&M and capitalization of equipment. Although most of the older equipment is already paid for, the cost estimates assumes that all equipment is capitalized over a ten year period at 10% interest. This may overestimate the actual existing costs but will result in a more appropriate comparison to other alternatives, including privatization.

Existing Collection Cost Estimate (5 day work week)

	E/Year
Labor:	
6 Drivers @ E 29.00/day x 260 days	E 45,240.00
13 Operators @ E 22.00/day x 260 days	E 74,360.00
Housing allowance @ 12%	E 14,352.00
Overhead @ 15% (Pension, Medical etc.)	E 17,940.00
Subtotal Labor	E 151,892.00
Administration @ 15%	E 22,784.00
TOTAL LABOR	E 174,676.00
Equipment:	
2 Compactors @ E 200,000	E 400,000
3 Hino Trucks @ E 100,000	E 300,000
1 Tractor/Trailer @ E 120,000	E 120,000
8 Containers @ E 8,000	E 64,000
Miscellaneous	E 30,000
Subtotal Equipment	E 914,000
Annual cost 10 years @ 10%	E 148,753.00
Operation and Maintenance:	
Uniforms 19 @ E 200/yr	E 3,800.00
Equipment O&M, Fuel, Repairs etc.	E 90,000.00
Miscellaneous Supplies	E 5,000.00
TOTAL O&M	E 98,800.00
TOTAL ANNUAL COST OF COLLECTION	E 422,229.00
ANNUAL COST PER SUBSCRIBER (5,820)	E 72.54
MONTHLY COLLECTION COST	E 6.05

Existing Disposal Cost: (5 day work week)

Labor:

Equipment Operators 2 @ E 29.00 x 260	E 15,080.00
Laborer 1 @ E 22.00 x 260	E 5,720.00
Housing allowance @ 12%	E 2,496.00
Overhead @ 15% (Pension, Medical etc.)	E 3,120.00

Subtotal Labor E 26,414.00

Administration @ 15% E 3,962.00

TOTAL LABOR E 30,376.00

Equipment:

1 Wheeled Compactor @ E 700,000	E 700,000
1 Bulldozer @ E 400,000	E 400,000

Subtotal Equipment E 1,100,000

Annual cost 10 years @ 10% E 179,025.00

Operation and Maintenance:

Uniforms 3 @ E 200	E 600.00
Equipment O&M, Fuel, Repairs etc.	E 40,000.00
Miscellaneous Supplies	E 500.00

TOTAL O&M E 41,100.00

TOTAL ANNUAL COST OF DISPOSAL E 250,501.00
ANNUAL COST PER SUBSCRIBER (5,820) E 43.04

MONTHLY DISPOSAL COST E 3.59

COST SUMMARY:

TOTAL ANNUAL COLLECTION COST E 422,229.00
TOTAL ANNUAL DISPOSAL COST E 250,501.00

TOTAL ANNUAL COST E 672,730.00

TOTAL ANNUAL COST E 115.59

TOTAL MONTHLY COST E 9.63

The above cost estimate indicates that the Mbabane City Council should be assessing a monthly fee of E 9.63 to each of the estimated 5,820 system subscribers if the system were

to be self sustaining. According to historical cost data included in the UDP report, the City received E 370,417 from fees and charges in 1991/1992 which is insufficient to fund the existing system. The current fee charged for waste collection and disposal is E 4.00 per month. The UDP report estimated that approximately 80% of the plots receiving service are charged a fee and the collection rate is estimated at 75%. Cost estimates for the proposed improved public system and private operation are included in Section 4.3.

3.2 Manzini

3.2.1 General

Based on its geographic area and population, the City of Manzini is much smaller than Mbabane with an estimated 1993 population of 28,664. However, when the adjoining areas are added, including Matsapha, the regional population is significantly greater than Mbabane at 64,326. Unlike Mbabane, the majority of the unplanned, informal development has occurred outside of the City boundaries.

The topography of Manzini and its surrounding area is also significantly different than Mbabane, being much flatter, without the steep hillsides that surround Mbabane on three sides. This flatter topography has had a positive impact on providing transportation infrastructure and other required public services, including waste management.

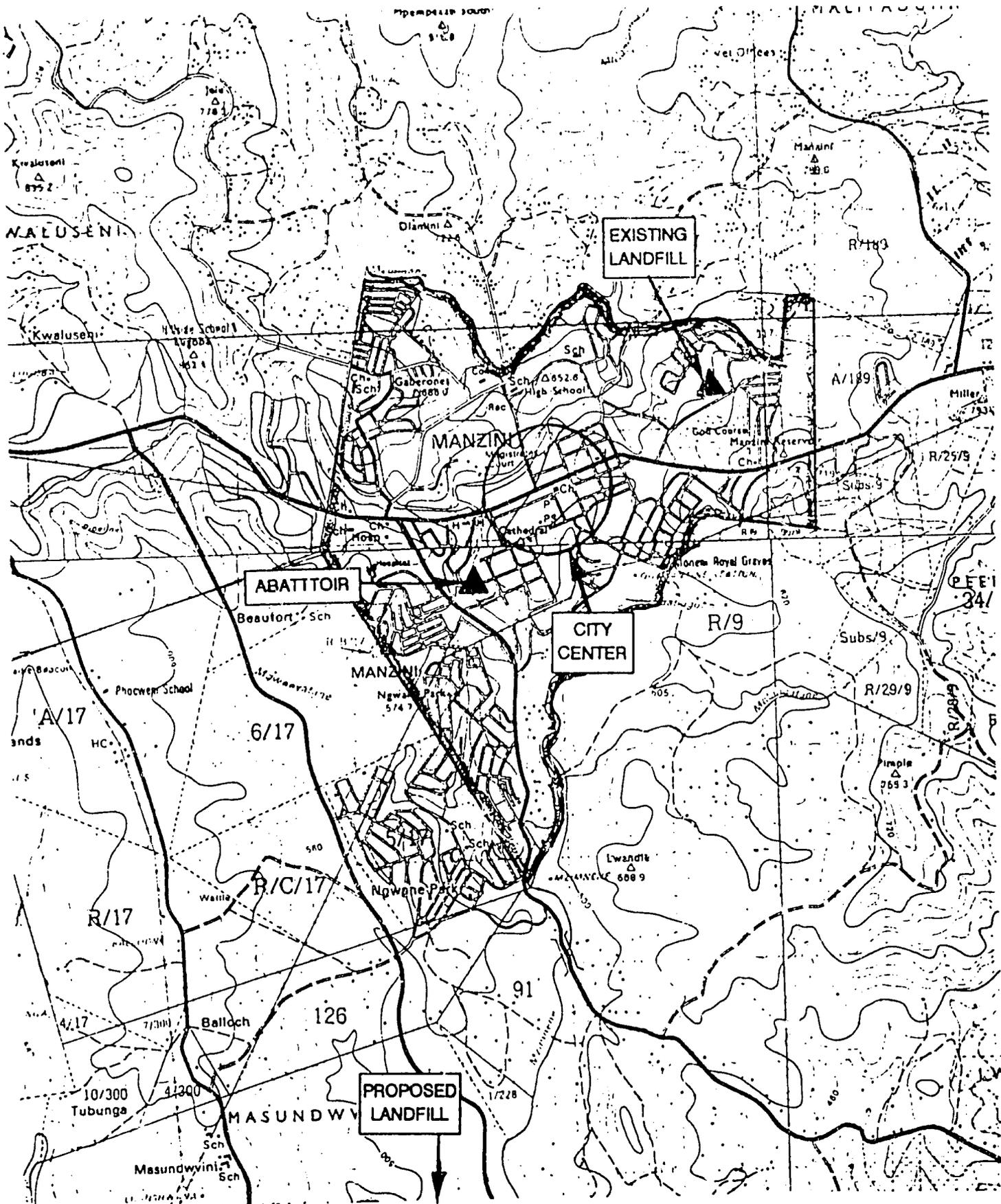
Unlike Mbabane, Manzini provides solid waste collection and disposal services through the Public Health Department.

3.2.2 Collection

The current formal collection system in Manzini consists of two 10.7 M³ compactor trucks and one tractor with a 9 M³ tipping trailer. The tractor and trailer are used to provide curbside service to low income areas of the City with narrow streets. Containers are not utilized in Manzini but there are numerous concrete block bunkers around the City Center that serve the same purpose.

Based on UDP information, waste collection services are provided to the majority of Manzini Residents representing approximately 74 % of the City population. Evaluating the larger region, the percentage of population served is similar to Mbabane at only 46%. The unserved 54%, a population of 34,740, generate an estimated 13.9 tons of waste per day which is disposed of in communal dumping areas, burned or eaten by animals. As in Mbabane, residents of unplanned housing areas probably deposit some of their waste in bunkers in and around the City Center.

Collection frequency varies in the city with some areas receiving twice per week collection while others are collected three times per week. Restaurants and markets are serviced every day. For the purpose of determining collection efficiency, we have assumed that all plots are serviced at least twice per week. Based on this assumption, the three collection vehicles make, on average, 824 collections per day, or one collection every 26 seconds. As with



**MANZINI
LOCATION MAP
FIGURE 2.2**

Mbabane (465 collections per day) this is a very high efficiency. The higher efficiency in Manzini is the result of two additional workers per collection crew, 4 in Mbabane versus 6 in Manzini, and the more uniform street pattern and grades in Manzini.

3.2.3 Disposal

The current landfill is located east of the City Center near the golf course as indicated on the Location Map in Figure 3.2. The site is totally fenced and security is well maintained. Although a minimum amount of cover material is available from a nearby borrow pit, the site does not have any permanent equipment and relies on periodic compaction and covering by public works equipment only when it is not used on other projects.

The Swazi Paper Mill maintains two full time employees at the landfill who remove all cardboard, news paper and other non-coated paper. The paper is temporarily stored on-site and picked up by one of the Mill's recycling compactors. (see Section 3.4.1). In addition to removing paper from the landfilled waste, nearly all of the beverage cans are separated and removed for recycling. (see Section 3.4.2) The remaining waste in the landfill has a very high plastic content, composed mostly of high density and low density plastic polyethylene bags and packaging film. Other than the infrequent compaction and covering of the landfill, the site is very well maintained.

The site was originally a shallow gully which has been filled with waste. The stream that drains the gully is intermittent at the down gradient base of the landfill and potential impacts from leachate are possible. According to an City official, limited tests performed on stream samples show that the stream is clean.

Based on the current landform, it appears that the site has several more years of life but a final contour design should be completed to establish finished grades and calculate actual remaining capacity. Finished grades should be a minimum of 5% to allow rainwater to run off the landfill and not percolate through the waste, forming additional leachate.

A new landfill site is included in the UDP project, located approximately 13 km south of the City Center on the new Nhlanguano road.

3.2.4 Matsapha

Matsapha is an industrial area located approximately 5 km west of the Manzini Center, which is under the control of a separate Town Board and the Ministry of Commerce and Industry. This high density industrial area has precipitated significant residential development to the north and east towards Manzini. Although most of this development is of an unplanned, informal nature, several groups of three story flats have been constructed along the main road. These flats are equipped with brick walled areas for storing individual dust bins.

The Town Board contracts with a private company for the collection of domestic refuse within the industrial park but individual industries are responsible for removing any industrial or trade waste generated by them. It is assumed that the flats along the main road are also serviced by the same private contractor, who utilizes a non-compaction flat body truck. It has

been reported that a container hoist truck operates at the industrial park, transferring bulk industrial waste to the landfill. The ownership of the vehicle is unknown at this time.

Since Matsapha is not part of the City of Manzini, it has its own landfill located near the southern corner of the park. The site is fenced and a private contractor periodically grades and covers the waste. Due to the nature of the waste, the landfill has a major scavenger problem. The scavengers remove plastic and cloth materials from textile plant waste, and food waste from several food processing facilities in the park. Since many of the scavengers live at the landfill or arrive early in the morning, they frequently build fires to keep warm, which often ignite the landfilled waste. It was reported that the landfill burns or smolders most of the time.

As mentioned in the introduction, a separate development project sponsored by the Ministry of Commerce and Industry is planning numerous infrastructure improvements to the Matsapha park, including the landfill. According to a representative from GWK, the German engineering firm who designed the improvements, the landfill will be expanded and will contain separate areas for special industrial wastes that were identified during an audit of all wastes generated in the park. It was also reported that the expanded landfill would have sufficient capacity to also accept Manzini's waste through the year 2006 before an additional expansion would be required.

3.2.5 Existing Cost Of Service

The costs of operating the existing Manzini waste collection and disposal systems are estimated as follows:

Existing Collection Cost Estimate (5 day work week)

	E/Year
Labor:	
3 Drivers @ E 29.00/day x 260 days	E 22,620.00
18 Operators @ E 22.00/day x 260 days	E 102,960.00
Housing allowance @ 12%	E 15,070.00
Overhead @ 15% (Pension, Medical etc.)	E 18,840.00
Subtotal Labor	E 159,490.00
Administration @ 15%	E 23,920.00
TOTAL LABOR	E 183,410.00
Equipment:	
2 Compactors @ E 200,000	E 400,000
1 Tractor/Trailer @ E 120,000	E 120,000
Miscellaneous	E 30,000
Subtotal Equipment	E 550,000
Annual cost 10 years @ 10%	E 89,512.00

Operation and Maintenance:

Uniforms 21 @ E 200	E 4,200.00
Equipment O&M, Fuel, Repairs etc.	E 40,000.00
Miscellaneous Supplies	E 5,000.00
TOTAL O&M	E 49,200.00
TOTAL ANNUAL COST OF COLLECTION	E 322,122.00
ANNUAL COST PER SUBSCRIBER (6,183)	E 52.10
MONTHLY COLLECTION COST	E 4.34

Existing Disposal Cost: (5 day work week)

Labor:

Laborer 1 @ E 22.00 x 260	E 5,720.00
Housing allowance @ 12%	E 687.00
Overhead @ 15% (Pension, Medical etc.)	E 858.00
Subtotal Labor	E 7,265.00
Administration @ 15%	E 1,090.00
TOTAL DISPOSAL LABOR	E 8,455.00

Equipment: (capital costs)

E 0.00

Operation and Maintenance:

Uniforms 1 @ E 200	E 200.00
Periodic Grading & Covering	E 2,000.00
Miscellaneous Supplies	E 100.00
TOTAL O&M	E 2,300.00
TOTAL ANNUAL COST OF DISPOSAL	E 10,755.00
ANNUAL COST PER SUBSCRIBER (6,183)	E 1.74
MONTHLY DISPOSAL COST	E 0.15

21

COST SUMMARY:

TOTAL ANNUAL COLLECTION COST	E 322,122.00
TOTAL ANNUAL DISPOSAL COST	E 10,755.00
TOTAL ANNUAL COST	E 332,877.00
TOTAL ANNUAL COST PER SUBSCRIBER	E 53.84
TOTAL MONTHLY COST PER SUBSCRIBER	E 4.49

The above cost estimate indicates that the Manzini City Council should be assessing a monthly fee of E 4.49 to each of the estimated 6,183 system subscribers if the system were to be self sustaining. According to historical cost data included in the UDP report, the City collected E 433,974 from fees and charges in 1991/1992 which is sufficient to fund the existing system. The current fee charged for waste collection and disposal is E 3.00 per month. The UDP report estimated that approximately 80% of the plots receiving service are charged a fee and the collection rate is estimated at 75%. Cost estimates for the proposed improved public system and private operation are included in Section 4.2.3.

3.3 Recycling

3.3.1 Paper

Paper and corrugated cartons are recycled by Swazi Paper Mills, Ltd. located in Matsapha. They operate a fleet of compactor trucks that service the commercial and industrial areas of Mbabane every day. Shopkeepers and markets merely place their paper waste and empty cardboard cartons at the curbside or other designated storage locations and the Swazi Paper compactors remove it free of charge. This service is also available for offices where they will pick up full "sugar sacks" of office paper and pay the generator E 4.00 per sack. The efficiency of the paper recycling in the central business district could be improved by consolidating several paper generators into common collection areas, where the paper could be kept separate from the other waste until it is collected. The paper recycling service is not aggressively advertised and could be expanded to other office buildings in Mbabane.

3.3.2 Beverage Cans

Although some soft drinks and beer, is sold in deposit, refillable glass bottles, which are less expensive, the bi-metal, steel/aluminum can is the most popular beverage container used in Mbabane and Manzini and is both a disposal and litter problem. Despite the fact that a system and market exists for recycling these cans in the region, which is very successful in Manzini, there appears to be little interest in can recycling in Mbabane.

The Swaziland Brewers Ltd., in Matsapha will pay E 7.60 for a sack of approximately 190 cans which is 4 cents a can. The SABIL Foundation, a local non-profit civic organization, sponsored by the brewery, accepts cans at their Manzini depot from local collectors and pays E 5.00 per sack and transports them to the brewery where they are baled and returned to South Africa. A SABIL representative in Manzini stated that they also have depots in

Mbabane, Big Bend and Piggs Peak, but they are not as active as the Manzini depot. Although transportation costs of the cans to Matsapha may be a deterrent to recycling the cans, the transportation economics could be improved by pre-crushing the cans or using empty back-haul trucks to transport the cans to the Brewery.

3.3.3 Glass

Although there is very little glass in the waste stream, due to the use of returnable glass bottles, others food and liquor containers offer the potential for glass recycling.

A local market exists at Ngwenya Glass for a small quantity of high quality clear glass cullet. Since they produce high quality hand made glass products, the specifications for the glass cullet are very stringent but they pay a relatively high price of 20 cents per kilogram for glass meeting their specifications. The glass must only be container glass and must not contain window glass, mirrors, pyrex, lightbulbs or other higher temperature glass. The majority of the Ngwenya glass cullet is obtained from the Coca-Cola bottling plant in Matsapha where they purchase clean broken bottles of a known quality. During the peak season in the months prior to Christmas they often purchase glass from other local suppliers.

Consol Glass in Johannesburg will also purchase clear, green and brown glass bottles.

3.3.4 Plastic

The waste stream in both Mbabane and Manzini contains a significant amount of plastics, including bags and rigid containers made of low and high density polyethylene which can be recycled. If separated, kept relatively clean and baled, the material could be marketed in South Africa. In Gaborone, Botswana, Waste Paper Recovery separates and recycles both waste paper and plastic film.

The potential for recycling plastics in the Mbabane-Manzini corridor will depend on the volume of material present in the waste stream and transportation costs to South Africa for processing. If sufficient quantities of materials could be obtained locally, one of the several plastics manufacturing facilities in Matsapha may be interested in installing a processing facility to convert the waste plastic film into pellets which are then used as the raw material for other plastic products. The paper company in Matsapha may also be interested in collecting and baling plastic film along with their paper recycling.

4.0 Opportunities for Privatization

4.1 General

Privatization of municipal services is an increasing trend in many developing as well as developed countries. Although the theory of privatization is basic and straight forward the implementation can be quite complex. This is especially true in developing countries where specific experience may not exist in the private sector and where national and local political concerns become significant issues. Full privatization can lead to undesirable monopolies or uncontrollable costs where adequate and experienced competition may not exist. In these instances a partial or phased privatization of services is recommended, with the public sector retaining the ability to perform the service if a private sector default should occur. This would be the preferred implementation strategy for privatization in Mbabane and Manzini. After a trial period which demonstrates the advantages and quality of service of the partial privatization then the councils could proceed with privatizing the remaining portion of the collection system.

In general, municipalities consider privatization for one or more of the following reasons:

- Improve the services being rendered
- Avoidance of labor or Union issues
- Reduce overall costs
- Transfer costs from the tax base to user fees

In Mbabane and Manzini the primary emphasis appears to be on transfer of costs from the tax base to private user fees. Although the current system is already based on user fees, they are collected by the Swaziland Water and Sewer Board. As reported in the latest UDP report, the user fee system is less than fully efficient with an estimated 80% of all users actually being billed for services rendered and a 75% collection rate for those who are billed. These two factors result in an overall income efficiency of 60%. This results in an under funded system, the use of old outdated equipment, deferred capital expenditures and substandard service during periods equipment breakdowns.

Economies of scale will effect the privatization of collection services. Although smaller routes and businesses using non-compaction trucks may foster small business enterprise in Swaziland, they will not be as efficient as larger companies using modern compactor trucks, and will be more difficult to manage. In order to capitalize the investment in a compactor collection truck, it should be fully utilized, allowing adequate time for maintenance and routine repairs. Therefore in evaluating areas for private collection, increments of one truck should be considered in defining a service area.

4.2 Collection Systems

4.2.1 General

By far, the greatest potential for privatization in the Mbabane-Manzini corridor is in refuse collection services. Although the Phase I study of this project concluded that this potential was greatest in the commercial/industrial areas, further evaluation in Phase II indicates that

this component alone would not be large enough to efficiently privatize. Although the commercial sectors are well developed in both cities, most of the region's industrial development is in the Matsapha Industrial Complex which already has private collection.

Commercial waste from the shopping areas and city centers of Mbabane and Manzini is very high in paper, cardboard and other packaging. The paper component of the commercial waste is already being picked up by Swazi Paper Mills and recycled at their facility in Matsapha. The remaining volume of commercial waste would not be large enough to justify a full time compactor truck and additional collection areas must be added to fully utilize one truck.

4.2.2 Service Area Definition

The service area or number of collections is the most critical factor in defining a collection privatization project. The differences in the two cities as outlined in Section 3 will necessitate different factors in defining each service area. In general terms the street patterns and topography in Mbabane are more difficult to service than those in Manzini and therefore the service area definition in Mbabane will include less collection stops per truck than Manzini. In Mbabane, the speed and maneuverability of the compactor truck is assumed to be the limiting factor and increasing the crew size to 7 like Manzini, will not guarantee higher collection efficiencies measured in number of collections per day.

The total number of stops or daily truck capacity is normally determined by time and motion studies performed in the actual collection areas under consideration. Since such studies have not been performed, we have estimated the daily truck capacity in both Mbabane and Manzini using the existing rates attained by the City collection crews and several assumptions. In Mbabane the daily truck capacity is estimated at 550 stops per day and 750 stops per day in Manzini, assuming a 5 man crew in Mbabane and a 7 man crew in Manzini.

The daily service area definition process is shown graphically on Figure 4.1. Assuming that the initial privatization area will include the central business district, the process starts by preparing a list of all the daily collection points. These would include generators of highly organic wastes which could develop odors if not collected daily, including food markets and restaurants.

Containers placed in the central business district in high traffic areas such as the bus stations should also be serviced daily. This assumes that these containers would be converted from the present tractor hauled containers to ones that are serviced by compactor trucks using a cable and winch. Since the containers must be serviced from the rear of the vehicle, some site work may be necessary at some locations. This certainly would be the case in Manzini where the existing concrete bunkers should be converted to containers. Since containers are larger and will take longer to service, they should be counted as 10 normal stops in calculating daily truck capacity.

The total contract service area is determined by considering the weekly schedule. Figure 4.2 shows a generic routing schedule assuming 50 daily stops in both Mbabane and Manzini and twice per week basic service to all other stops. This example indicates that the service area in Mbabane should consist of the daily collections plus 3, twice per week service areas of 500 stops each for a total service area of 1,550 collection stops.

DAILY SERVICE AREA DEFINITION

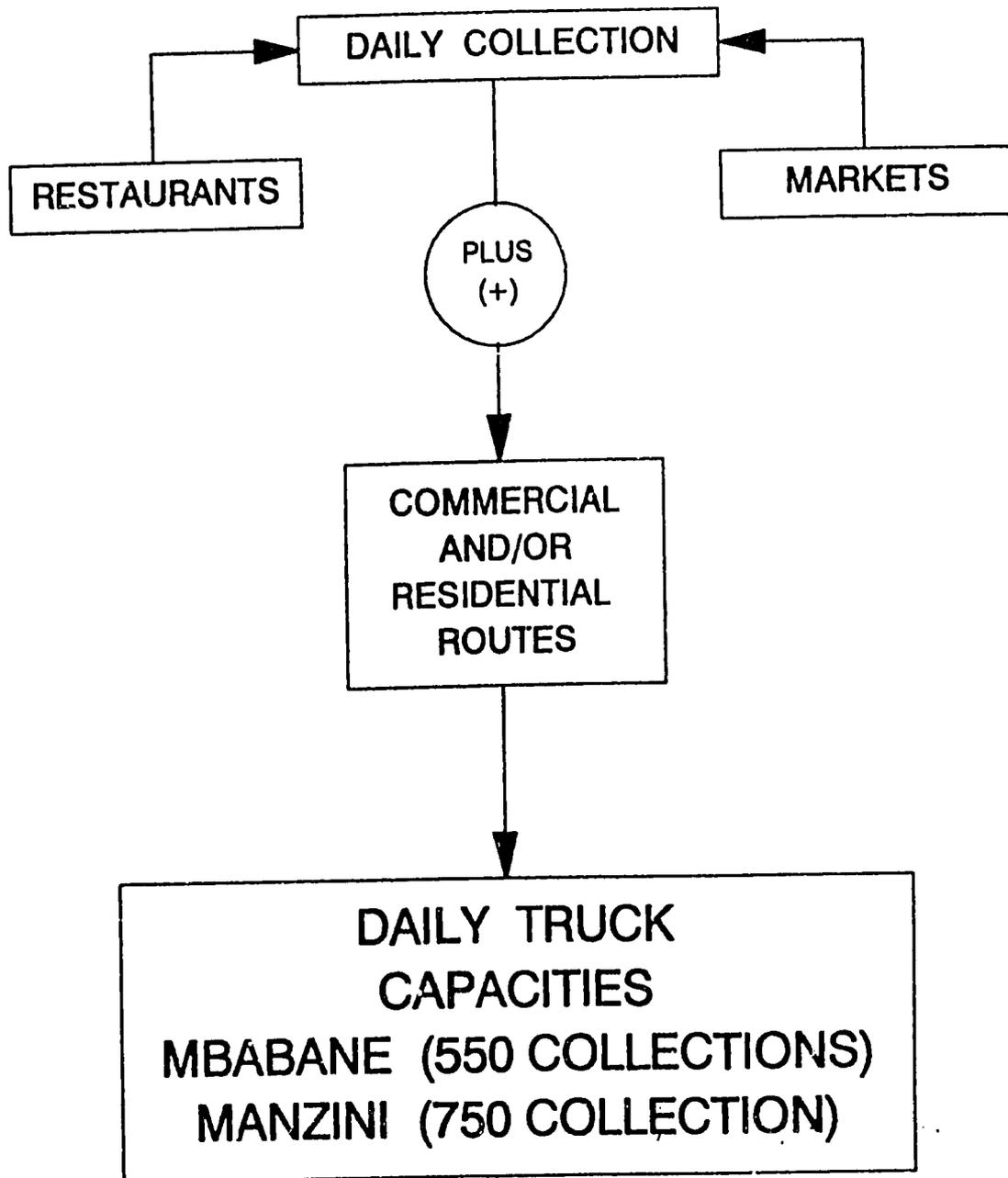
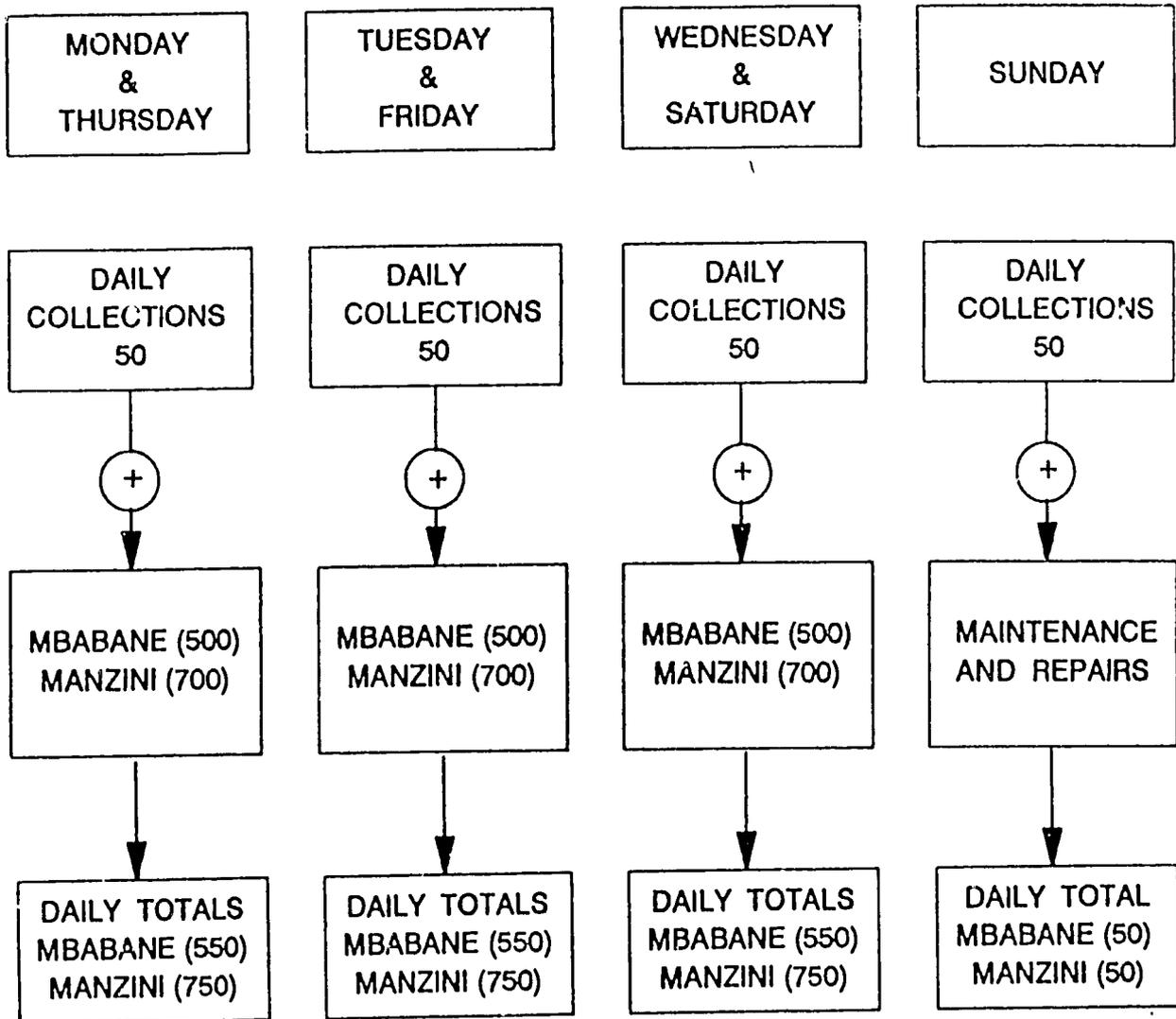


FIGURE 4.1

WEEKLY COLLECTION SCHEDULE (PER TRUCK)



NOTE: DOES NOT INCLUDE 3X PER WEEK COLLECTIONS

FIGURE 4.2

Manzini, with a higher daily truck capacity of 750, can accommodate the assumed 50 daily stops plus three twice per week service areas of 700 collections each for a total service area of 2,150.

The example shown in Figure 4.2 is generic and based on very limited data. Although it assumes a basic service of two collections per week, in reality, some commercial generators or housing flats may require three collections per week. This would have to be worked into the Monday, Wednesday and Saturday routes. Each Council should make its own assessment of collection efficiencies and service areas prior to issuing tenders for the privatization of services.

4.2.3 Cost Estimates

The comparison of cost estimates between public and private collection services, per collection truck, is presented on Tables 4.1 and 4.2. Table 4.1 compares the costs in Mbabane with its more difficult street pattern and smaller crew, and Table 4.2 compares costs in Manzini. The comparisons assume that both the public and private operations are equal in efficiency as measured by the number of collection stops serviced each day per truck. Each table presents four alternatives defined as follows:

Alternate No. 1 assumes public operation with equipment purchased through the UDP at an assumed subsidized interest rate of 10%

Alternate No. 2 is also a public operation but with new equipment purchased at government's finance rates assumed at 15% for this evaluation.

Alternate No. 3 is private operation assuming that equipment is purchased by the City Councils using UDP funding and leased to the private contractor. The evaluation assumes that the lease includes an additional 5% service charge over and above the actual cost of the vehicle. Alternates 3 and 4 reflect lower labor and overhead rate paid by the private sectors, but higher administration rates for setting up a user fee system.

Alternate No. 4 assumes a totally private operation and equipment capitalization at an assumed commercial rate of 21%. Otherwise, Alternate 4 is identical to Alternate 3.

The results of the cost comparison show that there is little cost difference between the private and public operation of the collection systems. Assuming the availability of UDP funding for purchase of collection equipment, the private alternative is approximately 5% less than the public alternative, and only 1% less if the UDP funding is not available.

Although there is a significant savings due to the lower labor rates, they are offset by significantly higher private administration costs required to establish a separate user fee system, and higher finance costs. These numbers would look a little more favorable for privatization if a two-truck service area were considered which would spread the administration costs over a larger revenue base.

PPSS SWAZILAND
 COST ESTIMATES (PER TRUCK)
 MBABANE

	UNITS	ALTERNATE NO.1 PUBLIC W/UDP		ALTERNATE NO.2 PUBLIC WO/UDP		ALTERNATE NO.3 PRIVATE W/UDP		ALTERNATE NO.4 PRIVATE	
		UNIT COST (E)	TOTAL COST (E)	UNIT COST (E)	TOTAL COST (E)	UNIT COST (E)	TOTAL COST (E)	UNIT COST (E)	TOTAL COST (E)
LABOR:									
1 DRIVER	PER DAY	29.00	9,425.00	29.00	9,425.00	22.00	7,150.00	22.00	7,150.00
4 COLLECTORS	PER DAY	88.00	28,600.00	88.00	28,600.00	68.00	22,100.00	68.00	22,100.00
HOUSING ALLOWANCE	(%)	12.00	4,563.00	12.00	4,563.00	0.00	0.00	0.00	0.00
OVERHEAD (PENSION,MEDICAL)	(%)	15.00	4,974.45	15.00	4,974.45	12.00	2,652.00	12.00	2,852.00
SUBTOTAL LABOR			47,562.45		47,562.45		31,902.00		31,902.00
ADMINISTRATION & PROFIT	(%)	15.00	7,134.37	15.00	7,134.37	25.00	7,975.50	25.00	7,975.50
TOTAL ANNUAL LABOR	PER YEAR		54,696.82		54,696.82		39,877.50		39,877.50
EQUIPMENT:									
1 COMPACTOR TRUCK	EACH	260,000	260,000.00	260,000	260,000.00	260,000	260,000.00	260,000	260,000.00
5 6 CU. METER CONTAINERS	EACH	8,000	40,000.00	8,000	40,000.00	8,000	40,000.00	8,000	40,000.00
MISCELLANEOUS	EACH	5,000	5,000.00	5,000	5,000.00	5,000	5,000.00	5,000	5,000.00
SUBTOTAL EQUIPMENT			305,000.00		305,000.00		305,000.00		305,000.00
ANNUAL EQUIPMENT 10 YRS @	INTEREST	10%	49,638.75	15%	62,647.00	15%	62,647.00	20%	84,332.50
OPERATION & MAINTENANCE:									
UNIFORMS (5)	EACH	200.00	1,000.00	200.00	1,000.00	200.00	1,000.00	200.00	1,000.00
COMPACTOR	PER YEAR	16,800	16,800.00	16,800	16,800.00	16,800	16,800.00	16,800	16,800.00
MISCELLANEOUS SUPPLIES	PER YEAR	5,000	5,000.00	5,000	5,000.00	5,000	5,000.00	5,000	5,000.00
SUBTOTAL ANNUAL O & M	PER YEAR		22,800.00		22,800.00		22,800.00		22,800.00
TOTAL ANNUAL COST OF COLLECTION	PER YEAR		127,135.57		140,143.82		125,324.50		147,010.00
ANNUAL COST PER SUBSCRIBER (1,550)			82.02		90.42		80.85		94.85
MONTHLY COST PER SUBSCRIBER			6.84		7.53		6.74		7.90

TABLE 4.1

PPSS SWAZILAND
 COST ESTIMATES (PER TRUCK)
 MANZINI

	UNITS	ALTERNATE NO.1 PUBLIC W/UDP		ALTERNATE NO.2 PUBLIC WO/UDP		ALTERNATE NO.3 PRIVATE W/UDP		ALTERNATE NO.4 PRIVATE	
		UNIT COST (E)	TOTAL COST (E)	UNIT COST (E)	TOTAL COST (E)	UNIT COST (E)	TOTAL COST (E)	UNIT COST (E)	TOTAL COST (E)
LABOR:									
1 DRIVER	PER DAY	29.00	9,425.00	29.00	9,425.00	22.00	7,150.00	22.00	7,150.00
6 COLLECTORS	PER DAY	132.00	42,900.00	132.00	42,900.00	102.00	33,150.00	102.00	33,150.00
HOUSING ALLOWANCE	(%)	12.00	6,279.00	12.00	6,279.00	0.00	0.00	0.00	0.00
OVERHEAD (PENSION,MEDICAL)	(%)	15.00	7,376.85	15.00	7,376.85	12.00	3,978.00	12.00	3,978.00
SUBTOTAL LABOR			65,980.85		65,980.85		44,278.00		44,278.00
ADMINISTRATION & PROFIT	(%)	15.00	9,897.13	15.00	9,897.13	25.00	11,069.50	25.00	11,069.50
TOTAL ANNUAL LABOR	PER YEAR		75,877.98		75,877.98		55,347.50		55,347.50
EQUIPMENT:									
1 COMPACTOR TRUCK	EACH	260,000	260,000.00	260,000	260,000.00	260,000	260,000.00	260,000	260,000.00
6 6 CU. METER CONTAINERS	EACH	8,000	48,000.00	8,000	48,000.00	8,000	48,000.00	8,000	48,000.00
MISCELLANEOUS	EACH	5,000	5,000.00	5,000	5,000.00	5,000	5,000.00	5,000	5,000.00
SUBTOTAL EQUIPMENT			313,000.00		313,000.00		313,000.00		313,000.00
ANNUAL EQUIPMENT 10 YRS @	INTEREST	10%	50,940.75	15%	64,290.20	15%	64,290.20	20%	86,544.50
OPERATION & MAINTENANCE:									
UNIFORMS (7)	EACH	200.00	1,400.00	200.00	1,400.00	200.00	1,400.00	200.00	1,400.00
COMPACTOR	PER YEAR	16,800	16,800.00	16,800	16,800.00	16,800	16,800.00	16,800	16,800.00
MISCELLANEOUS SUPPLIES	PER YEAR	5,000	5,000.00	5,000	5,000.00	5,000	5,000.00	5,000	5,000.00
SUBTOTAL ANNUAL O & M	PER YEAR		23,200.00		23,200.00		23,200.00		23,200.00
TOTAL ANNUAL COST OF COLLECTION	PER YEAR		150,018.73		163,368.18		142,837.70		165,092.00
ANNUAL COST PER SUBSCRIBER (2,150)			69.78		75.99		66.44		76.79
MONTHLY COST PER SUBSCRIBER			5.81		6.33		5.54		6.40

TABLE 4.2

The above comparison is also based on the assumption that all revenue from user fees is realized. Given the existing conditions this is a major assumption and user fees could be a significant constraint in the transition period from public to private operation of the collection systems. This will be addressed in more detail in Section 5.

4.3 Disposal

In addition to the collection systems, the two councils should consider privatizing their future landfill operations. Proposed landfill sites have been identified in both cities by the UDP project and construction of the landfills is included in the UDP project budget. The designs of the landfills by the UDP consultants will include operations manuals which would become the basis of tenders for landfill operations. Based on the current UDP projections, the landfills are scheduled for construction in 1995. If the councils wish to privatize landfill operations, they should issue tender documents at least four months prior to the completion of construction, to permit adequate time for preparation of tenders and negotiations with the selected contractor. Issues to be addressed in the tender documents and contract agreements include the following:

- Operating Specifications
- Public Supervision
- Acceptable wastes
- Payment
- Environmental Regulations
- Environmental Monitoring
- Environmental Liability
- Insurance

Estimated capital and operation costs are included in the UDP reports. Since neither existing landfills are properly operated as a sanitary landfill it is impossible to make a cost comparison between public and private operation. When the landfill designs are completed and final cost estimates prepared, the above issues should be considered by the councils before moving forward with the privatization of the landfill operations.

4.4 Recycling

4.4.1 General

The recycling of materials from the waste stream offers significant opportunities to the private sector, especially in Mbabane where little recycling is occurring. Local markets currently exist for paper and beverage cans and regional markets in Johannesburg are within a reasonable access, based on available quantities. In addition to these existing markets, several industries in the Matsapha industrial complex may offer additional local markets.

4.4.2 Paper

Although the Swazi Paper Mill operates a collection system in both cities, it is not well organized or managed. The opportunity exists for a small business to organize and operate

a more efficient paper collection system in Mbabane. This could be included as part of the private refuse collection contract, or as a separate operation.

Each commercial generator of paper or cardboard waste should be contacted to insure separation of the paper from other waste. Collection points consisting of wire cages or other suitable containers should be located in high generation areas such as the downtown business district, the Mall and Plaza. Under the current system the shopkeepers mix the waste and place it at the curb or in waste storage areas. Swazi Paper Mill trucks periodically will remove recyclable paper and cardboard from this waste, leaving the remainder for city council collection. If the council collection truck gets there first then it all goes to the landfill.

Many offices in Mbabane already have paper separation programs to separate high quality office paper, computer paper and newsprint. This paper is stored in "sugar sacks" and placed in storage until Swazi Paper Mills makes a collection. It was reported, but not confirmed, that Swazi Paper Mills pays E 4.00 for a full sack of paper. However, many offices, including the USAID office, were not aware of this service offered by Swazi Paper Mills. With a little advertising and a local storage depot, paper recycling in Mbabane could be expanded. This could provide income to a local small business or the private collection contractor, while reducing the amount of waste requiring collection and disposal.

4.4.3 Beverage Cans

The majority of beer and soft drink cans used in Mbabane and Manzini are bi-metal with bottom and sides made of steel and the top made of aluminum. This bi-metal composition makes the used container less valuable than an all aluminum can which has a much higher recycle value. Regardless of the value of the bi-metal cans, a viable market exists at the Matsapha brewery for recycling these cans and a brewery sponsored foundation is working in the communities to collect the cans. As stated in Section 3, the Sabil foundation is very active in Manzini but apparently ineffective in Mbabane as measured by the amount of cans observed in the waste at the landfill and along roadsides in Mbabane.

An opportunity exists in Mbabane for a small private business to organize a more efficient beverage can collection system. As with paper recycling, the objective would be to make it convenient for the waste generators to separate the cans from the other waste. An initial investment in storage containers placed at public places, markets, bars, restaurants, hotels and office buildings could yield significant returns. An efficiently run storage depot and transportation system to Matsapha would also be required. Transportation efficiencies could be improved by partially crushing or baling the cans in Mbabane prior to shipping to Matsapha to increase the number of cans per shipment.

This potential should be coordinated with the Brewery, but due to the apparent ineffectiveness of the existing system in Mbabane, the brewery may welcome a new alternative.

4.4.4 Plastic

The waste stream in Mbabane and Manzini contains a high percentage of plastic, primarily high density and low density polyethylene in the form of bags, packaging and beverage containers. These are common industrial plastics and are used by several industries in

Matsapha to produce new products. The plastic removed from the waste stream must first be processed into clean pellets before it can be reused, which requires special equipment. This equipment exists at a plastic reprocessing facility in Johannesburg but not in Matsapha.

The plastics manufacturing plants in Matsapha should be contacted to determine the types and quantities of plastics used in their processes. If there is significant interest in using recycled material, then a study should be undertaken to determine the types and amounts of plastic in the waste stream. The study should look at neighboring regions as well as Swaziland and should also consider shipping waste plastic to Johannesburg for processing. The plastics companies in Matsapha may be interested in funding such a study.

If the study indicates favorable economics, the collection of plastics should be coordinated with paper and beverage can collection. Due to the low density of the material, a compaction baler would be necessary prior to shipping the material to either Matsapha or Johannesburg. The baler would also be beneficial for paper and can transportation to Matsapha.

4.5 Local Business Resources

Privatization of municipal services will only be successful if the business capacity exists to perform the required tasks. Certainly such resources exist to perform refuse collection and landfill operations in the larger urban areas of South Africa. However, the larger companies are not likely to be interested in the smaller scale, one or two truck privatizations being considered in Mbabane and Manzini, especially given the constraints to privatization, which will be discussed in Section 5.

Although there is generally no substitute for specific waste management experience, the collection of refuse or recycle materials, and operation of a landfill are "low-tech" operations and related business are often able to perform these services, given some specific waste management training. Existing trucking and hauling businesses should be able to adapt to collecting and hauling refuse and local excavation contractors often make excellent landfill operators.

A review of local businesses has indicated that local resources exist to perform the technical functions required to operate a refuse collection system and a landfill, but these local businesses individually lack the financial resources to capitalize the equipment necessary to perform these tasks.

Several of the local trucking companies have formed an association under the guidance of the Swazi Business Growth Trust (SWGTT), a USAID funded program designed to promote local business. The association, known as the Swaziland Truckers Association, has had some success in joint marketing efforts in Swaziland and neighboring countries. This association or individual members may be able to secure the required capital financing or equipment leases through the SWGTT.

A related but separate USAID program may also offer some assistance to local businesses in their consideration of this project. The Swaziland Training and Institutional Development (STRIDE) could offer specific technical and management training to Swazi businesses or assist in project start-up activities.

An alternative approach to the above would be to prepare the tender documents to permit joint ventures between local Swazi businesses and the larger South African based collection companies. This would bring both financial resources and specific waste management experience to the project.

5.0 Constraints to Privatization

5.1 General

The opportunities for privatization of waste management services have been outlined in Section 4. If the privatization program is to be a success, the preliminary evaluation must also seek out and fully evaluate the constraints to privatization as well. If the opportunities and constraints are not balanced through the tender and contract processes, the chances for success are low.

The success of the privatization project will also depend on the definition or specification of the task being proposed. A task which can be specifically defined and measured, will have a much greater chance of success than one which is poorly defined or one where performance cannot be measured. Several of the following constraints to privatization will affect the ability to define and measure the desired service.

5.2 Regulations and Bye-laws

Regulations regarding solid waste management are very general and are included in several separate sections of national legislation delineating responsibilities of town councils and ministries. The general regulations dealing with solid waste appear to be based on the definition of a public health "nuisance" which gives health inspectors a wide range of authority to either enforce regulations or to ignore them. Specific detailed bye-laws regarding solid waste management do not exist in either City.

Prior to implementing privatization of solid waste management services, a specific set of solid waste bye-laws should be enacted by each City. These by-laws are necessary to define the level of service which the contractor is expected to meet, the manner in which waste will be presented for collection and the payments to the contractor for providing the service. Without this definition and guarantee of payment, the private sector will be reluctant to commit resources to the project. Likewise, the City Council needs to define a uniform level of service that the contractor is expected to meet.

The following issues should be addressed in the new by-laws:

- Legal authority of the Council to contract for collection and disposal services.
- Definition of acceptable wastes
- Waste storage and use of dust bins or containers
- Times and manner of setting out dust bins on days of scheduled collection
- Establish authority and manner of determining user fees, including collection methods

- Hazardous Waste
- Medical Waste
- Trade Wastes
- Waste Sorting Activities
- Designated disposal sites
- Sorting and scavenging
- Littering and illegal dumping
- Waste disposal in unplanned developments
- Bye-Law enforcement
- Penalties and fines

A sample set of bye-laws is included as Appendix I for review and consideration by the Councils. These bye-laws were developed for another city in southern Africa and all sections may not apply.

5.3 Enforcement

In addition to enacting new bye-laws, each Town Council must be prepared to enforce them. Without enforcement, the bye-laws are meaningless. Although limited enforcement procedures can be transferred to the collection contractor, such as the issuing of violation notices, or suspension of service for non-payment, the actual issuance of citations and penalties must remain with the City Council and their representatives as defined in the bye-laws.

Existing enforcement of regulations varies from community to community. Littering and illegal dumping is much more prevalent in Mbabane than in Manzini, primarily due to the greater number of unplanned residential developments, which makes standard waste collection impossible. The hilly topography among Mbabane's residential areas also contributes to illegal dumping rather than using the council's collection system.

Another major difference between Mbabane and Manzini is the operation of waste management system. In Mbabane the collection and disposal are operated by the cleansing department of the City Engineer's office rather than the Health Department as it is in Manzini. The cleansing department is not authorized to issue citations for health violations and health inspectors are reluctant to issue citations for illegal waste dumping which they no longer control. This division between operation and enforcement has led to limited enforcement in Mbabane.

5.4 Dust Bins

The lack of enforcement regarding the use of dust bins could be a significant constraint to privatization of collection services. Without the uniform use of dust bins or suitable containers, the level of collection service desired from the contractor cannot be adequately defined. Collecting waste which is contained within a covered dust bin is far more efficient than having to collect the same amount of refuse that has been placed at the curbside in loose piles or in plastic bags which are often ripped open by animals.

The problems caused by the lack of dust bins is particularly evident in multi-unit flats where there is insufficient space to store a dust bin in individual flats. Rather than put up with a dust bin in the kitchen or on the front porch, many flat owners prefer to simply dump their refuse over the nearest bank.

The uniform use of dust bins in the private service area will be necessary in order to define the level of service desired. The private contractor should not be required to collect refuse that is not contained in a dust bin or other suitable container. The enactment of bye-laws with local enforcement should solve the dust bin problem.

5.5 User Fees

Perhaps the biggest constraint to privatization of both collection and disposal in Mbabane and Manzini is the existing user fee system. Both councils have made it clear that their primary goal for privatization is to remove the costs of these services from the Council responsibility and transfer them to the private sector thus avoiding having to subsidize the solid waste income when the user fees fail to meet expenses. The current user fees for water, sewer and solid waste are combined and collected by the Swaziland Water and Sewer Board (SWSB) which is a department within the Ministry of Housing and Township Development. A proposal to separate the water and sewer board into an independent parastatal organization is pending and scheduled for vesting in April 1994.

The existing user fee issue is further complicated since one fee is collected for both collection and disposal. If collection is partially privatized but not disposal, how will the division be made between collection and disposal? A current proposal to remove the cost of disposal from the user fees and pay for it through rates will clarify this issue.

The UDP report estimates that only 80% of the users receiving service are actually invoiced and the collection rate is only 75% of those invoiced, resulting in an effective income of only 60%. Even with 100% income, the current rates charged are not sufficient to cover the costs of providing the service. Requests to increase user fees must be submitted to the Prime Minister and Cabinet who may take several years to approve the request. The mere privatization of the services will not solve this problem and major revisions of the user fee system are necessary before privatization can occur.

The vesting of the SWSB to a Parastatal status and the transfer of disposal costs from user fees to rates will certainly simplify the user fee situation as it effects privatization of collection services. Although the SWSB vesting date is scheduled for April 1994, revision of the user fees may take several more months to finalize. Even after revision to the system, it

is anticipated that increases in user fees, either public or private will still require cabinet approval. If the Councils wish to implement privatization of collection services in 1994 they should be prepared to offer guarantees to the private contractor that their operating costs will be paid, regardless of the user fee structure.

6.0 Conclusions and Recommendations

6.1 System Improvements

Regardless of whether the City Councils proceed with privatization of the collection systems or continue the existing publicly operated system, the following actions are recommended:

1. Enact specific solid waste bye-laws.
2. Increase enforcement of illegal dumping.
2. Require the use of Dust Bins or other suitable containers.
3. Require all flat owners to provide storage areas for dust bins for all occupants.
4. Larger flats of 8 or more units should be required to use a 6 M³ container in lieu of individual dust bins.
5. Establish user fee categories based on the level of service.
6. Convert existing tractor hauled containers to compactor rear load containers.(subject to the purchase of new compactor trucks)
7. Place more containers along footpaths and dumping areas in unplanned developments.

6.2 Privatization

6.2.1 General

The evaluations performed in this report have indicated that the current refuse collection systems are efficiently operated and managed but are not properly financed due to an inefficient user fee system which relies on funding from the City Councils to make up for shortfalls in user fee revenue. Current deficits in both local and national budgets have reduced funding to only operating costs, and capital funding is being deferred. Without capital financing the existing publicly operated systems will continue to decline and will ultimately fail. The decentralization of these services and private operation could provide a more balanced and efficient financing through a private user fee system that reflects actual costs of service.

However, the privatization of refuse collection systems will only be successful if the Government of Swaziland (GOS) revises the current system of user fees and allows increases in fees to reflect documented increases in the cost of service. These revisions to the user fee system are anticipated in 1994 when the Water and Sewer Board becomes an independent parastatal with a GOS directive to become self sustaining. The methodology and time frame of these changes are unknown at this time.

If the either city wishes to pursue collection privatization before the user fee system is revised. they should be prepared to offer guarantees to the contractor to pay for the full cost of service.

6.2.2 Collection Service Areas

The methodology for establishing privatized service areas in each City has been presented in Section 4.2. Each city council will be responsible for defining the service area it wishes to privatize based on the criteria presented and their own evaluation of collection routes.

Full privatization of the collection systems is not recommended at the initial phase due to the potential of creating a monopoly or obtaining a substandard contractor who is unable to perform. During the initial years of privatization, the public sector should retain the ability to resume collection in the privatized area if a default should occur in the private service contract. After the initial partial privatization has proved successful and the councils are confident in their ability to manage and oversee the private contractor, then the privatization could be extended to the entire system.

Our analysis indicates that four compactor trucks will be required to service Mbabane and three trucks required in Manzini. If the councils elect to pursue privatization, we recommend that 50% of Mbabane (two trucks) and 33% of Manzini (one truck) be considered for the initial privatization.

Due to the potential difficulties in collecting service fees, we recommend that the service areas to be privatized include the central business districts and higher income residential neighborhoods where user fee collection efficiencies are anticipated to be higher.

6.2.3 User Fees

As mentioned above, revision of the user fee system will be a prerequisite to a successful long term privatization project. Since the current user fees are too low to adequately finance the collection system the councils should be prepared for a major rise in user fees. Our analysis indicates that monthly fees between E 6.74 and E 7.90 will be required to properly finance the collection systems. This assumes that disposal costs are transferred to rates and that 100% of the fees are collected.

The current uniform user fee does not recognize the differences in the type or frequency of service. Under the privatization proposal we recommend that several user fee categories be established as follows:

1. Basic residential service, twice per week
2. Basic commercial service, twice per week
3. Special commercial service, three times per week
4. Special commercial service, daily service

The types of user fee categories will be established in the tender documents.

6.2.4 Bye-Laws and Enforcement

As presented in Section 5.2, current regulations do not provide sufficient definition of solid waste services and new bye-laws and increased enforcement will be required if privatization is to be successful.

6.3 Continued Public Operation

A review of the existing collection and disposal systems has indicated that system deficiencies are primarily related to the lack of adequate funding to purchase and maintain equipment. The collection efficiencies, measured in collection stops per day, in both cities, given the equipment constraints and street patterns, are commendable.

If the user fee system is revised to reflect the true cost of service, as it must to support privatization, then the existing public systems would also benefit. With newer, upgraded equipment, as outlined in the UDP report, there is a good potential for the publicly operated system to perform at an equal level with a private contractor.

6.4 Recommendations

Based on the evaluations performed during this study, the current constraints to privatization are greater than the benefits and it is our recommendation that the privatization of the collection systems be delayed for at least 6 months. This recommendation is based primarily on the difficulties in establishing and collecting user fees and the lack of solid waste by-laws. Both of these issues will place high risks on the private contractor which would prohibit them from tendering for this work.

During the 6-month period the councils should enact specific solid waste by-laws, and increase enforcement of illegal dumping and use of dust bins. Most importantly, they must establish a process of equitable user fees that reflects the true cost of service and removes the long time frame between increases in costs and increases in fees. These issues should be pursued regardless of whether privatization is implemented since they will benefit public operation as well as privatization.

APPENDIX I - SAMPLE SOLID WASTE BYE-LAWS

SAMPLE SOLID WASTE BYE-LAWS

(date)

ARRANGEMENT OF BYE-LAWS

Part I *Preliminary*

BYE-LAW

1. Citation
2. Interpretation

Part II *Solid Waste Generation and Storage*

3. Waste Storage and Receptacles
4. Hazardous and Trade Waste Generators
5. Medical Waste Generators
6. Special Wastes
7. Sorting
8. Scavenging
9. Violation of Storage Time

Part III *Solid Waste Collection and Transport*

10. Refuse
11. Unplanned Areas
12. Other Wastes

Part IV *Solid Waste Disposal*

13. General
14. Prohibitive Materials
15. Separation of Wastes
16. Facility Operating Plans and Rules
17. Sorting
18. Scavenging
19. On-Site Disposal

Part V *Miscellaneous*

20. Littering
21. Offences and Penalties
22. Burning of Refuse

Part I Preliminary

Citation

1. These Bye-Laws may be cited as _____ City Council (Solid Waste) Bye-laws.

Interpretations

2. In these Bye-laws, unless context otherwise requires-

"commercial/industrial waste" means solid waste materials originating in wholesale, retail, institutional, or service establishments such as office buildings, stores, markets, theaters, hotels, warehouses, industrial operations and manufacturing processes;

"council" means the _____ City Council;

"council area" means the area under the jurisdiction of the council;

"facility operating plan" means a written plan describing the operation of a council facility;

"facility rules" means the rules established in a facility operating plan which carry the jurisdiction and enforcement of bye-laws;

"hazardous waste" means any waste which by reason of chemical reactivity or toxic, explosive corrosive or other characteristics, cause danger or are likely to cause danger, to human health or the environment, whether alone or in combination with other wastes;

"mechanical collecting vehicle" means a refuse compaction vehicle equipped with devices to load refuse storage receptacles;

"medical waste" means any wastes generated by hospitals, clinics, nursing homes, doctor's offices, medical laboratories, research facilities and veterinarians which are infectious or potentially infectious. Medical waste is further defined to include the following categories:

(a) microbial wastes including cultures and stocks of infectious wastes and associated biologicals that can cause disease in humans;

(b) human blood and blood products, including serum, plasma and other blood components;

(c) pathological wastes of human origin, including tissues, organs and body parts removed during surgery or autopsy;

(d) contaminated animal wastes including animal carcasses, body parts and bedding which have been exposed to infectious agents during medical research, pharmaceutical testing or production of biologicals;

(e) isolation wastes associated with animals or human beings known to be infected with "highly" communicable diseases;

(f) contaminated and uncontaminated sharps including hypodermic needles, scalpels and broken glassware;

"occupier" means, in relation to any lot or premises-

(a) any person in actual occupation of such lot or premises and

Part II *Solid Waste Generation and Storage*

Waste Storage and Receptacles

3. (1) Every occupier of premises in the council area shall, within 14 days of occupying said premises, provide sufficient and suitable refuse receptacles of the size and type stipulated below, for the reception and storage of refuse upon such premises.

(2) Every occupier shall cause such receptacles to be covered at all times except when refuse is being deposited in or discharged therefrom.

(3) Every occupier shall cause all refuse receptacles in use on his premises and covers thereof to be kept as clean as practicable and maintained in good order and condition.

(4) Every occupier shall cause all refuse that has been spilled on the ground by overturning by animals or other cause to be returned to the receptacle as soon as practicable.

(5) Every occupier of a plot containing up to 8 residential dwelling units shall provide refuse receptacles not exceeding a capacity of 150 litres each, constructed of metal or high strength plastic.

(6) Every occupier of a plot who generates commercial/industrial waste or a plot containing nine (9) or more residential dwellings shall provide refuse receptacles not exceeding a capacity of 210 litres each. If, based on twice per week collection, the volume of waste exceeds 410 litres (two receptacles) and the plot is located in a council area using mechanical collection vehicles, the occupier of said plot shall provide receptacles not to exceed a capacity of 6.11 cubic metres, of materials and configuration suitable for mechanical collection by the council or their designated collection contractor. Said receptacles may be provided by the council or their designated collection contractor. The council or designated collection contractor may charge a fee for providing the refuse receptacles which will be equal to the invoice cost of the receptacle plus reasonable cost of transporting and placing the receptacle at said plot.

(7) In council areas not utilising mechanical collection vehicles, occupiers of plots who generate commercial/industrial waste or a plot containing eight (8) or more residential dwellings shall provide a sufficient number of receptacles not exceeding a capacity of 210 litres each.

Hazardous and Trade Waste Generators

4. (1) Every owner or occupier of any plot or premises, on which hazardous or trade waste is to be generated, wishing to dispose of said waste at a council solid waste management facility, shall make application in writing to the council for permission to do so and shall submit to the council the following information:

(a) the chemical composition, nature and volume of the waste;

(b) a description of the industrial process or trade giving rise to the waste;

(c) the number of persons employed on the premises; and

(d) any other such information, including testing and laboratory analysis which the council may consider necessary.

(2) Upon receipt and evaluation of an application to dispose of a hazardous or trade waste at a council solid waste management facility, the council may by written notice to the owner or occupier of the plot or premises from which the waste is generated, require him to execute at his expense any of the following;

(a) dispose of the waste in the same manner as other solid waste;

(b) dispose of the waste in refuse receptacles, using special containers or labeling as directed by the council;

(c) transport the waste to a council disposal or processing facility as directed by the council, employing special containers and handling, and placing the waste in a specific area of the facility as directed by the facility operating plan;

(d) transport the waste to a facility specifically designed to dispose of hazardous waste;

(e) cause the waste to be processed on the plot or premises of generation, thus rendering it non-hazardous;

(f) any other measures relative to transportation and disposal of the waste as determined by the council to be required to protect human health and the environment;

(g) pay an additional fee for collection and disposal of said hazardous or trade waste;

(3) The determination of whether a particular waste is or is not hazardous rests solely with the council.

(4) All owners or occupiers of plots or premises generating a hazardous or trade waste on or before the effective date of this bye-law are granted interim permission to continue transporting and disposing of said waste in the manner utilized prior to the effective date of this bye-law. Within sixty (60) days after the effective date of this bye-law all generators of a hazardous or trade waste shall submit an application for disposal as stipulated in Section 4 (1) above. Failure to submit an application for disposal within the sixty day interim period will subject the generator to a fine or other action as stipulated herein.

(5) All permits issued by the council for the transportation and, or disposal of a hazardous or trade waste shall remain in effect for a period of five (5) years. Any significant change in the volume or nature of the waste during the permit period shall require written notification to the council by the person generating the waste. The council reserves the authority to alter the permit during the five (5) year permit period for cause, and to adjust the fee based on documented increases of the council's cost to transport or dispose of said waste.

*Medical Waste
Generators*

5. (1) All owners or occupiers of plots or premises which generate a medical waste shall place all such medical wastes in color coded heavy duty plastic bags or other suitable color coded containers as follows:

(a) all medical waste which has not been sterilized and rendered non-infectious shall be placed in heavy duty red plastic bags at the point of generation, regardless of whether the medical waste will be sterilized on-site, off-site or disposed of at a council disposal or processing facility in an unsterilized condition;

(b) all medical waste which has been sterilized by autoclave, microwave, chemical or other non-burning method, shall be placed in heavy duty yellow plastic bags prior to disposal;

(c) all sharps, whether sterilized or not, shall be placed in rigid, sealed, plastic containers clearly marked "Medical Waste - Sharps" in red lettering;

(d) ashes from the incineration of medical waste may be disposed of without special containers or markings;

(2) All medical wastes shall be sterilized prior to final disposal at a council disposal or processing facility using one of the following methods:

(a) autoclave

(b) microwave

(c) chemical treatment

(d) incineration

(3) Sterilization of medical waste may be performed on the premises where the waste was generated or at an off-site location. The above requirements for color coded containers shall be strictly adhered to for all movement and transportation of medical waste either on the premises of generation or in transit to an off-site sterilization or disposal facility.

(4) Every owner or occupier of a plot or premises, where medical waste is generated, shall provide periodic training on proper medical waste handling procedures to all employees who may come in contact with medical waste.

(5) The provisions of this bye-law shall be enforceable sixty (60) days after the effective date of this bye-law.

Special Wastes

6. (1) All owners or occupiers of plots which generate special wastes shall provide storage in a manner that will not create a public nuisance or endanger the public health or environment.

(a) tires shall be stored in areas away from open fires or other ignition sources, not to exceed twenty five (25) in number;

(b) brush, demolition debris and construction waste shall be transported to a council disposal or processing facility as soon after generation as practical and may be stored on the premises of generation up to thirty (30) days, after which it must be transported to a designated disposal facility;

(c) waste oil shall be stored in leakproof metal, plastic or concrete containments which are not subject to fire or

accidental spillage. The storage or disposal of waste oil in earth pits or upon the ground of any plot, street or public area within the council area is prohibited.

Sorting

7. (1) The council shall support and encourage the sorting of refuse at the point of generation for the removal of materials from refuse which are recyclable or have value for other uses.

(2) Any person wishing to place specialized containers on any plot, council street or public place, for the purpose of sorting, storing and collecting recyclable materials such as paper, plastic, tins or glass bottles, or food waste for animal consumption, shall make written application to the council including the following information:

- (a) description of materials to be sorted;
- (b) description of containers, bins or skips for storing said materials;
- (c) the specific locations of all sorting containers for which application is being made;
- (d) the schedule and method of collecting the materials;
- (e) a plan to be employed to control litter around the sorting container;

(3) Upon receipt and evaluation of an application for maintaining sorting containers, the council, may by written notice;

- (a) accept and approve of the application as submitted;
- (b) modify the request in terms of the number or type of containers to be placed;
- (c) reject the application and order the removal of any or all existing sorting containers;
- (d) require the applicant to perform other measures as determined by the council to protect human health or the environment;
- (e) require a fee for the location of sorting containers;

(3) All persons maintaining sorting containers within council areas on the effective date of this bye-law are granted an interim permit to continue maintaining said sorting containers for a period of sixty (60) days. Within sixty days (60) of the effective date of this bye-law, all persons maintaining sorting containers shall make application to the council as stipulated in Section 7(1) above.

Scavenging

8. No person shall separate refuse for the purpose of removing food waste for human consumption.

Violation of Storage time

9. Any owner or occupier of a plot or premises that allows refuse, special wastes or other solid waste to be stored on his plot or premises for longer than 30 days may be notified in writing of a violation of these bye-laws and given 15 days to remove said waste. If, at the end

of 15 days after receiving the notice, the owner or occupier has not removed said waste the council may remove said waste and charge the owner or occupier of the plot or premises for the cost of removal, and assess other fines or penalties as stipulated herein.

Part III *Solid Waste Collection and Transport*

Refuse

10. (1) All refuse generated within all council areas having streets which are accessible by collection vehicles shall be collected by the council or its assigned agents or licensed private haulers. In general, for the purpose of refuse collection, refuse shall not include hazardous wastes, trade wastes or special wastes as defined herein unless a permit has been obtained in accordance with these bye-laws. Collection frequency shall be at least twice per week in residential, commercial and industrial areas. Frequency of collection may vary depending on the volume and type of waste generated. Collection shall be in the manner and at the times designated by the council or its designated agent. The council may set fees from time to time for providing collection service in the council area, and may designate an agent for the purposes of collecting said fees.

(2) All occupiers of plots are required to place their waste receptacles at the curbside in front of their plot prior to 7:00 am on the assigned day(s) of collection as designated by the council or its agent. All empty receptacles shall be removed from the curbside by 9:00 pm on the day of collection

(3) Refuse being transported by any person over any council street shall be securely tied or covered during the transportation thereof. No person shall allow refuse to leak, spill, blow off or drop from any vehicle on any council street during loading, unloading or transportation of said waste.

(4) No person, other than council agents, shall use any vehicle for collecting, hauling or transporting refuse, hazardous waste or trade waste on any council street without first obtaining a vehicle permit from the council. A permit is not required to transport special wastes.

Unplanned Areas

11. All waste generated by occupiers of premises located in unplanned areas shall be collected by the council or its agent from collection containers placed along access routes to and from said unplanned developments. It shall be the occupiers responsibility to transport the waste from their premises to the collection container.

Other Wastes

12. (1) All persons collection and transporting demolition and construction wastes, brush and garden waste and other special wastes shall do so in vehicles which are in good repair and meet all vehicle registration and inspection requirements. The manufacturers load limits shall not be exceeded. Any wastes which contain dust or which may

spill, blow or otherwise become dislodged from the vehicle, shall be tied down or covered during transport.

Part IV *Solid Waste Disposal*

General

13. (1) All solid waste generated, produced and collected within the council area shall be disposed of only at such disposal or processing facilities as may be designated by the council. Said designations may differentiate between types of waste materials, persons, refuse collectors, waste sorters, as may be necessary to provide for the efficient and environmentally safe disposal or recycling of said waste. Waste generated, produced or collected outside of the council area shall not be disposed of at any council facility without written permission of the council.

Prohibited Materials

14. The following materials are prohibited from all council disposal or processing facility:

- (a) liquid wastes including latrine pumpings, sewage or sludge;
- (b) waste oil;
- (c) burning or hot ashes;
- (d) Hazardous or trade wastes for which no council permit has been issued;

Separation of Wastes

15. All persons delivering waste materials to a council disposal or processing facility shall separate said materials into the types of materials as designated in the facility operating plan and rules in effect on the effective date of this bye-law or as revised from time to time.

Facility Operating Plans and Rules

16. The council shall prepare facility operating plans for all designated waste disposal and processing facilities which shall govern the operation of said facility. Each facility operating plan shall include a set of facility rules which are by reference included as part of these bye-laws, carrying the same weight of jurisdiction and enforcement. All facility rules shall be adopted by the council and may be revised from time to time in the same manner as bye-laws.

Sorting

17. (1) Any person wishing to perform sorting of inert materials, for the purpose of recycling, at any council disposal or processing facility shall make application in writing to the council for permission to do so and shall submit the following information:

- (a) a description of the material(s) he wishes to sort;
- (b) the anticipated volume of said materials;
- (c) a description of the manner of sorting so as not to disrupt the normal operation of the facility;
- (d) the number of employees to be utilised;
- (e) a description of storage containers to be used, their location and frequency of collection;

(f) a health and safety plan for all sorting workers to include safety clothing and training;

(g) all sorting activities shall conform to the facility operating plan and facility rules;

(2) Upon receipt and evaluation of an application for sorting at a council disposal or sorting facility, the council may upon written notice:

(a) accept the application as submitted and issue a permit, or;

(b) amend the application after consultation with the facility operator, or;

(c) reject the application;

(d) if in the judgement of the council, the sorting activity will increase operating costs such as additional security, the council may impose a fee for the sorting permit;

(3) A permit issued by the council for sorting at a council facility shall be valid for a period of five(5) years and may be revised or revoked by the council, for cause, at any time during that period.

Scavenging

18. The unauthorized scavenging or separation of waste for materials or food waste for any purpose at any council disposal or processing facility is strictly prohibited.

On-Site Disposal

19. Any person occupying a premises in an unplanned, informal residential area which does not receive council collection services may dispose of inert materials only in dug earth pits or borrow areas, which must be covered on a periodic basis. Under no circumstances shall waste be placed in drainageways streams or lakes. All organic matter, food waste and plastic shall be disposed of in the nearest waste receptacle provided by the council of its agent. The storage of organic material and food waste for the purpose of creating compost for garden use shall be permitted on any plot.

Part V Miscellaneous

Littering

20. Any person who knowingly discharges waste on any street, plot or public place other than a waste receptacle shall be guilty of an offense.

Offences and Penalties

21. Any person who obstructs or hinders the council in the exercise of its duties under the provisions of these bye-laws or who fails to comply with any of the provisions of the bye-laws shall be guilty of an offence and shall be liable of first conviction to a fine not exceeding P100, or in default of payment thereof, to imprisonment for a term not exceeding 14 days, and on the second or subsequent conviction, to a fine not exceeding P200, or, in default of payment thereof, to imprisonment for a term not exceeding six months.

Burning of Refuse

22. The open burning of refuse, other than brush and untreated or unpainted wood is prohibited within the council area.