NATIONAL SOLID WASTE MANAGEMENT STRATEGY FOR SWAZILAND

STATUS QUO ANALYSIS REPORT
29 AUGUST 2000

FINAL REPORT

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0. Executive Summary

This Status Quo and Needs Analysis Report has been produced in order to:

- Give the best possible description of the current waste management situation in Swaziland
- Identify and discuss the problems related to the current waste management situation
- Identify and discuss the needs for improvement of the waste management system

The description of the current waste management situation and the problems related to this, is presented in the following status quo analysis sections:

Section 3: Status Quo Analysis for household waste, commercial wastes and litter management
Section 4: Status Quo -Analysis for industrial waste, construction and demolition waste management
Section 5: Status Quo -Analysis for medical waste management

The description and analysis of the baseline situation are based on reports available within the authorities involved and specific targeted workshops executed during the inception period April-June 2000.

Furthermore, discussions with a wide range of stakeholders and site visits to waste producers, waste service providers, waste treatment facilities and governmental officials have taken place during this period. The information derived from these sources has added valuable input to the description and analysis of the waste management situation in the Kingdom of Swaziland.

This Status Quo Analysis Report reflects the information we have received from all stakeholders and may this opportunity be used to thank all stakeholders for their contribution. The problems within the management of solid waste can be summarised as follows:

The problems the people of Swaziland are facing, caused by the lack of awareness and training combined with the current weak waste management structures, can be divided into visible problems and problems creating serious damage to the health of the people and to the environment as such.

The lack of, amongst other things, an insufficient infrastructure to be able to manage waste has lead to a situation where the people of Swaziland is exposed to hazardous waste substances from for example specific industries/workshops, hospitals/health centres and the agriculture and mining sector.

Hazardous substances are disposed of, either by dumping at site or dumping at landfills together with other waste types. In some cases the hazardous wastes are

burnt (medical waste) either at a nearby dumpsites or in malfunctioning incinerators.

There is no budget specifically dedicated for waste management in either the local authorities, nor in the relevant government bodies.

The people of Swaziland experience absence or lack of sufficient waste collection systems, especially in the dense settlements in the peri-urban areas, at the commercial centres along the major roads and at the industries/workshops in the urban areas.

This lack of sufficient collection systems leads to uncontrolled disposal of all kinds of waste types and will inevitably lead to environmental pollution and health impacts on the population caused by exposure to hazardous substances, vermin and spread of diseases.

Raising of awareness is in many cases linked to the possibilities to act adequate when disposing of waste. When the population feels that waste collection and disposal facilities are readily at hand, then it is likely that public awareness raises simultaneously.

If no actions are taken the Government of Swaziland will ultimately be faced with environmental and social costs, due to surface and groundwater pollution which contribute to health hazards because environmental standards have not been applied and crude dumping practices have been allowed to persist.

The Government of Swaziland has taken substantial initiatives the last years to address the environmental problems it is facing. In 1992 the Government established Swaziland Environment Authority (SEA) as a co-operative body on environmental issues, subject to a ministerial Government Board with 16 members (8 Principle Secretaries, 4 NGO's and 4 members from the public).
The SEA Board gives advise to the Minister of Tourism, Environment and Communications (MTEC) on environmental issues.

In August 1997 the SEA issued the ***Swaziland Environmental Action Plan*** (SEAP) which clearly identified the need for development of a National Solid Waste Management Strategy (NSWMS).

In order to establish a framework for environmental protection and the integration of natural resources on a sustainable basis the SEA has drafted an Environmental Management Bill. The Bill is to be enacted during 2000.

The ***Environmental Management Bill*** makes the following principles clear:

- Generation of waste shall be minimised wherever practicable and waste must, in order of priority be reused, recycled, recovered and disposed of safely;
- Non-renewable natural resources should only be used prudently and renewable resources and ecosystems should only be used in a manner that is sustainable.
- The "Polluter Pays Principle" and the precautionary principle shall be adhered to.

Furthermore, the Bill specifies the role and functions of the SEA, the obligations of local governments and the duty of care of all entities regarding waste management.

The detailed regulations on waste management prepared by the SEA, is laid down in the ***Swaziland Waste Regulations 2000***, which came into force in April 2000.

Although the regulations have been discussed during drafting by a wide range of stakeholders, enforcement of the regulations is only in its very beginning.
Both the other ministerial actors (monitoring/controlling) occupied with the execution of waste management legislation (MHSW, MHUD, MEE, the Deputy Prime Minister's Office and the Ministry of Public Works and Transport), the local authorities in their role of executing bodies (City and Town Councils, Town Boards, Regional Secretaries and chiefs) as well as the population in general, do not seem to have a clear understanding of their role and responsibilities regarding waste management.

It is the challenge for the SEA to establish a co-operative spirit and a clear understanding of each entity's responsibility and duty.
The SEA itself has, with its present limited resources a huge task in the coming years as a facilitator for improvements within waste management in Swaziland.

As the institutional set-up within most waste management actors is "young" and in many cases weak, the future challenge for all the involved bodies is to establish sufficient organisational and capacity development to be able to install adequate and environmentally sound waste management systems in the Kingdom of Swaziland.

It will be the aim during the development of the National Solid Waste Management Strategy (the final version is scheduled to be launched in October 2002) to capture existing gaps and to establish the basis for implementation of a sustainable and realistic strategy.

Below a list of detailed problems identified is presented (not in an order of priority):

- Lack amongst the involved governmental bodies of a legal mandate to carry out their (perceived) duties within solid waste management. Clarity as to responsibilities and duties for each of the governmental bodies involved, would give all stakeholders the possibility for long term planning of its activities and the possibility of financial support to their activities
- Lack of enforcement of monitoring and control obligations amongst the involved governmental bodies
- Lack of sufficient and capacitated organisations at all levels to operate waste management systems according to regulations
- Lack of sufficient standards and guidelines for all waste types regarding the execution of sustainable waste management

- Lack of awareness amongst all stakeholders of the obligations in the Waste Regulations 2000, i.e. import/export and trade of waste, waste management planning, waste licenses, waste control areas etc. (Section 2.7.1)
- Lack of co-operation and co-ordination between governmental bodies regarding waste management in order to avoid "crisis management" and improve planned and co-ordinated actions
- Lack of incentives to promote waste minimisation, reuse, recycling and recovery of materials
- Lack of reliable information relating to generation of all waste types and fractions, as a basis for waste management planning at all levels of government
- Lack of adequate collection systems and disposal facilities for all waste types both non-hazardous and hazardous
- Lack of management and operational skills amongst the operators of waste management collection schemes and on disposal sites
- Lack of implementation of the "Polluter Pays Principle"

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LIST OF ABBREVIATIONS

CSO	Central Statistical Office
DANCED	Danish Co-operation for Environment and Development
DFID	(British) Department for International Development
DPM	Deputy Prime Minister
EMA	Environmental Management Act
EMB	Environmental Management Bill
EIA	Environmental Impact Assessment
HW	Hazardous Waste
IW	Industrial Waste
MEE	Ministry of Enterprise and Employment
MHSW	Ministry of Health and Social Welfare
MHUD	Ministry of Housing and Urban Development
MNRE	Ministry of Natural Resources and Energy
MOAC	Ministry of Agriculture and Co-operatives
MWPT	Ministry of Works and Public Transport
MTEC	Ministry of Tourism, Environment and Communications
NDS	National Development Strategy
NEP	National Environmental Policy
NGO	Non-Governmental Organisation
NHDS	National Health Delivery Service
NSWMS	National Solid Waste Management Strategy
PBC	Public Budget Committee
RHM	Rural Health Motivator
RSA	Republic of South Africa
SEA	Swaziland Environment Authority
SEAP	Swaziland Environmental Action Plan
SEDCO	Small Enterprises Development Company
SME	Small and Medium-sized Enterprise
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
WHO	World Health Organisation
WM	Waste Management

1 Background

In 1992 the Swaziland Environment Authority (SEA) under the Ministry of Tourism, Environment and Communications (MTEC) was established and authorised, by Act No. 15 of 1992. The SEA shall, according to the act, prepare environmental audit reports, create partnerships and act as a co-operative body on environmental issues.

Through a consultative and participatory process the National Development Strategy (NDS) "A Twenty-five year Vision" was developed (September 1997) by the Ministry of Economic Planning and Development /1/. The NDS cover the period 1997-2022. This long-term development strategy is followed up every three years by more detailed planning. The latest development plan covers the period 1997/98-1999/00.

Based on the guiding principles in the National Development Strategy (NDS), the Swaziland Environmental Action Plan (SEAP) was developed during 1997 and issued August 1997 by Swaziland Environment Authority (SEA). The SEA co-ordinated the development of the SEAP using a consultative and participatory process involving a wide range of stakeholders.

The SEAP clearly identified the need for development of a National Solid Waste Management Strategy (NSWMS). The development and implementation of a waste management strategy is, in other words, one of the priority areas within the environmental field, the coming years. The point of departure for development of the NSWMS is the guiding principles laid down in the SEAP.

A draft National Environmental Policy (NEP) was drawn up in January 1999. This policy still needs Cabinet approval.

Furthermore an Environmental Management Bill (EMB) has been drafted. This bill is waiting for political decision. When the EMB is passed the Environmental Management Act (EMA) will be the enabling legislation for the development and implementation of the National Solid Waste Management Strategy.

The Swaziland Waste Regulations 2000 (No.31 of 2000) were developed during 1998/99, and are very important for future waste management. The waste regulations were published in the Gazette of 21 April 2000 and are now in force.

During 1999 a project was launched by the Danish Co-operation for Environment and Development (DANCED) in close co-operation with the SEA. The project was established in order to assist Swaziland with the development and implementation of its NWSMS.

The project started on 1 April 2000 with financial support from DANCED and the Danish consultant RAMBØLL will during the next 2½ years assist its counterparts within the SEA in conducting the activities and tasks laid down in the Project Document (April 1999) and in the Tender Dossier dated October 1999. The methodology outlined in the Project Proposal (November 1999) will be used as a basis for the project implementation. Any

changes in the project implementation plan will be documented throughout the project in the DANCED project monitoring reports i.e. the Inception Report (after 3 month) and the six-monthly Progress Reports.

The development of the NSWMS is to be based on the core principles, the policy instruments and the implementing strategy given in the above-mentioned policies, strategies, plans and regulations.
The joint SEA/DANCED project for development of National Solid Waste Strategy for the Kingdom of Swaziland is designed to cover two components:

- Development of the National Solid Waste Management Strategy
- Development of the Capacity Development Plan to support the Strategy

1.1 Development Objective

The development objective of the project is as follows: -

Reduced adverse impact of all forms of solid waste, so that the social and economic development of Swaziland, the health of its people and the quality of its environment and its resources, benefit.

1.2 Immediate Objectives of the Project

The immediate objectives of the project are two-fold: -

A final Solid Waste Management Strategy is prepared, presented and accepted.

Capacity is developed in the various institutions according to the draft Solid Waste Management Strategy, and a sustainable plan exists for development of capacity according to the final Solid Waste Management Strategy.

1.3 Immediate Objective for the Status Quo and Needs Analysis

The objective of this report is: -

To give the best possible description of the waste management situation in the Kingdom of Swaziland. Strengths and weaknesses of the current waste management situation will be highlighted and needs identified. During a thorough participatory process the report will be scrutinised and the needs of the people of Swaziland will be reflected in the final needs analysis.

1.4 General Approach

The project is divided into 3 phases: -

- The Design Phase
- The Pilot Implementation Phase
- The Fine-tuning Phase.

The Design Phase includes execution of activities leading to the Draft National Waste Management Strategy and the Draft Capacity Development Plan and will cover the period from April 2000 to January 2001. The Pilot Implementation Phase is to be executed during 2001 up to June 2002, and the Fine-tuning Phase will end in October 2002.

The Status Quo and Needs Analysis forms the first part of the Design Phase. During September and October 2000 a Needs Analysis and a Preferred Solution Document will be issued, giving the background for discussion of different strategic solutions to the waste management problems. Different strategic solutions will be discussed in a workshop in November 2000 (10 November) and the workshop will give guidance to the development of the Draft National Solid Waste Management Strategy to be launched in February 2001.

A first draft of the Draft National Strategy will be available for written comments 12 January 2001.

During the month June to December 2000 the Swaziland Environment Authority will start the preparation of the Pilot Projects to be carried out from February 2001. The results of the Pilot Projects will be documented before the end of June 2002.
During the pilot implementation phase the major elements of the Draft National Solid Waste Management Strategy will be tested. The Final National Solid Waste Management Strategy will reflect the conclusions of these pilot projects.

During all three phases a comprehensive participatory process will be carried out to ensure that the final strategy for waste will be realistic, easy to implement and in line with the principles laid down in the legislation and regulations.

1.4.1 Delimitation of the Project

All non-hazardous solid waste types as well as all hazardous waste types as defined in the Waste Regulations 2000 will be covered by the project. Initially waste from the mining and the agricultural sectors were not included in the project, but it has become clear that there is a strong feeling amongst the stakeholders that, especially specific waste fractions from these sectors should be included. The Inception Report (17 July 2000) makes provision for this amendment to the project, but decision has not yet been taken.

Residues of pesticides used in the agricultural sector are nevertheless touched upon in the Status Quo Analysis Report, as problems with residuals are reported in several cases.

It is important to note that solid waste dissolved in liquid going directly to the receiving environment through point sources e.g. sewage sludge, falls out of the scope of work of this strategy.

On the other hand solids coming from de-watering of e.g. sewage sludge and with low liquid content (e.g. less than 20%) are covered by the strategy.

Furthermore all secondary solid wastes That includes wastes from incineration of waste e.g. ashes from medical waste incinerators, are also covered in the strategy.

Waste is defined in the new Swaziland Waste Regulations 2000 (in force 21 April 2000) and in this project as follows:

"waste" means any substance or thing that the holder discards or disposes of, or intends or is required to discard or dispose of, irrespective of its value to anyone, and any substance or thing deemed by a regulation to be waste;

"holder" means a person in possession of the waste, or a person whose activities produced the waste, or a person who carried out pre-processing, mixing or other operations that changed the nature or composition of the waste.

2 Institutional and Legal Framework

The institutional and legal framework for the management system for solid waste in Swaziland is very much in the making. The Swaziland Environmental Action Plan (SEAP) developed by Swaziland Environment Authority (SEA) (issued August 1997) laid down the basic guiding principles for the development of National Solid Waste Management Strategy (NSWMS). The National Environmental Policy (NEP) has been drawn up and the Environmental Management Bill will when it is enacted be the enabling legislation for the implementation of the NSWMS. Furthermore the Swaziland Waste Regulations 2000 (No.31 of 2000) in force from 21 April 2000 outline the responsibilities and duties of the waste generators, the SEA and the local authorities.

In principle, the current institutional framework involves five different ministries directly, none of which are exclusively dedicated to solid waste. One of them, the Swaziland Environment Authority within the Ministry of Tourism, Environment and Communications has been designated with a co-ordinating role within the waste management field, as well as other, environmental fields.

A number of the main institutional actors are young in terms of years, and some are still in the throes of organisational changes, internally as well as constitutionally. Most of the actors are still in the formative stages of developing their systems or tools to deal with their individual solid waste responsibilities. Formalised mechanisms and rules for interactions between the various components of the institutions are not yet in place.

Although the distribution of responsibilities at this point in time is still rather diffuse, an effective redistribution, specification and reorganisation of the framework can not be realised by the involved actors alone, but would require a decision at Cabinet level.

A Budget Outlook Paper, presented every year in August sets outs to set up the macroeconomic and government financial framework for the following year. Once Cabinet approval has been given, the detailed budgeting process can begin and in January the Cabinet is presented with draft estimates for the following financial year.

To the extent that the National Solid Waste Management Strategy implies changes in manpower requirements, capital investments and/or recurrent costs such a strategy would need the endorsement of the Public Budget Committee[1] (PBC).

[1] This committee comprises the three Principal Secretaries from the Ministries of Labour and Public Services, of Economic Planning and Development, and of Finance, respectively. PBC, or its working group, may meet during the year to consider particular policy issues, or to prepare supplementary estimates, but meets most frequently during the budget cycle (September – December), to advise on budgetary and manpower allocations for the following year, and the planned capital allocations in the rolling development plan.

Thus it is crucial that the three ministerial members of this committee be involved at the stage when the budgetary ramifications of a strategy begin to crystallise. These "commanding" ministries are: The Ministry of Labour and Public Services, The Ministry of Economic Planning and Development, and the Ministry of Finance, for the issues of manpower, capital investment and recurrent costs respectively.

It should be strongly emphasised, that financial support to the implementation of the Pilot Project Implementation (February 2001 - July 2002) should be provided by the Government of Swaziland in time before the implementation phase starts.

This means, that the co-ordinated (between SEA and the involved governmental and non-governmental bodies) effort to provide fully developed Pilot Project Proposals should be accelerated.

2.1 Division of Responsibilities and Duties between Ministerial Actors

The division of responsibilities for solid waste management at the level of national ministries has hitherto been carried out according to which "waste generators and handlers" these ministries would have under their auspices in their general sector capacities. Thus:

- The Ministry of Health and Social Welfare (MHSW) is the ultimate authority responsible for monitoring and control of waste management regulations for waste generated from hospitals, health centres and clinics and medical retailers under its auspices; Specifically this responsibility includes the medical waste. Furthermore the Ministry is responsible for regulating, enforcing and monitoring health standards including solid waste management performance of food supplies intended for human consumption.

- The Ministry of Housing & Urban Development (MHUD) is similarly responsible for monitoring and control of the household and commercial waste management regulations under the auspices of the urban local government bodies such as City Councils, Town Councils and Town Boards, while

- The Ministry of Enterprise & Employment (MEE) is responsible for monitoring and control of the execution of the waste management regulations in the specially designated "Industrial Townships"; It is the general perception, that this responsibility covers not only Matsapha Industrial Estate and other industrial estates, but also activities securing monitoring and control of the execution of the waste management regulations in the company towns.

- The Office of the Deputy Prime Minister is in turn the ultimate authority responsible for monitoring and control of the waste regulations regarding the domestic waste generated in the rural areas. This includes the same duties in the peri-urban areas. These responsibilities are, however, not stated in any legislation falling under this office.

- The Ministry of Public Works & Transport (MPWT) having the jurisdiction over land occupied by public roads has the responsibility for waste management of any littering along the roads. This responsibility, however, may not be understood as such by the Ministry of Public Works and Transport.

- If and when it is decided to include wastes from the agricultural and the mining sectors, the Ministry of Agriculture and Co-operatives (MAC) and the Ministry of Natural Resources and Energy (MNRE) should be included in the list of ministerial actors responsible for monitoring and controlling the current waste management regulations.

The co-ordinating body, however, is

- Swaziland Environment Authority within the Ministry of Tourism, Environment and Communications. With respect to waste management the Authority's main function can be described as that of the *conceptual lead agency*.
  This involves amongst other tasks, enforcement of the regulations issued by the Authority, co-ordination of the activities of the above mentioned ministries, development of waste management policies and strategies, and setting of standards. The Authority is furthermore responsible for the waste management of those institutions and economic agents that are not covered by the above i.e. hotels.
  In general, the Swaziland Environment Authority (SEA) is the lead agent for development of environmental policies, strategies, setting up environmental regulations, including Environmental Impact Assessment Projects (EIA's) and ensuring enforcement of the duties of the monitoring responsible parties.
  More specifically the assessment of Environment Impact Assessment Documents from e.g. larger development projects is included in the duties of SEA. These projects often demand co-ordination between different ministries (e.g. MTEC/SEA, MHUD, MEE).

2.2 Ministry of Health and Social Welfare (MHSW)

A short description of responsibilities and duties concerning medical waste management is presented below and the main problems that the Ministry is exposed to are identified. Please refer to Annex I for a detailed institutional profile of the Ministry's responsibilities and duties.

As the Ministry of Health and Social Welfare is responsible for the performance of the hospitals, the health centres and the clinics, the ministry is also responsible for the safe and environmentally sound management of all wastes produced at these sources. Safe handling means both handling inside the hospitals and in connection with treatment and disposal. In other words the Ministry of Health and Social Welfare has a responsibility to secure that i.e. no risk waste and infectious waste creates health or environmental problems from generation to final disposal.

The waste management tasks carried out by the Ministry are regulated by the Public Health Act No. 5/69. This Act is presently under revision and a new bill was drafted in 1999, but the Act needs Cabinet approval.

Although the monitoring responsibilities of the Ministry is not clearly specified in the legislation the Environmental Health Inspector in the Ministry is aware of the waste management problems.

The MHSW's monitoring responsibilities concerning waste (medical waste as well as other waste produced on hospitals, health centres and clinics) are neither specified in the Public Health Act from 1969, nor in the drafted Bill.

Health inspectors employed by the Ministry of Health and Social Welfare, operating throughout the country, are responsible for regulating and enforcing health standards including solid waste management performance in:

- Areas of commerce such as shop establishments in rural areas
- Areas under the jurisdiction of Town Councils
- Areas under the jurisdiction of the Town Boards
- Company Town areas.

The new Public Health Bill does not mention the responsibilities within waste management. The nearest one comes to addressing waste management issues is, that it is spelt out in the drafted Public Health Bill, that it is the duty of every health officer or any health officer authorised by the Minister:

- To take all lawful necessary and reasonable and practical measures to ensure that all food or food supplies intended for human consumption is or are clean, wholesome, sound and free from any disease, infection or contamination and not stale or expired.
- To take samples of food for examination or analysis for examination or analysis.
- To close any food shop that fails to comply with the regulations and provisions specified by the authorised health officer.

The **main problem** identified seems to be that the health officers, both at governmental and local level, do not have specific legal mandates to enforce improved medical waste and other waste management. This seems to lead to lack of budgeting of improvements of medical waste management and leaves the officers in a position where they cannot introduce improvements and plan for their activities.

As a consequence of the fairly young institutional framework the co-ordination between the Ministry of Health and Social Welfare and the SEA seems to be weak. Good working relations exist but on ad hoc basis. Improvements leading to preventive actions should be formalised.

Although the health inspectors are aware of the severe waste management problems (especially within the medical waste management) there are no incentives offered for staff working with waste issues. There is a lack of training opportunities for staff and it should be investigated whether the number of staff is sufficient to carry out their duties. Guidelines for good waste management practices are lacking and tools and equipment enabling the Ministry of Health and Social Welfare to upgrade the monitoring and enforcement system, should be developed.

Practices and routines for co-operation between ministerial bodies and between these bodies and the local authorities and the public should be improved.

Furthermore, the awareness amongst the waste producers (hospitals, health centres, clinics, pharmaceuticals as well as slaughterhouses, butcheries and food retailers) seems to be low. And even if there is awareness amongst stakeholders, there is no system in place that gives directions, as how to manage the waste safely. This fact does not ease the work of the health inspectors.

2.3 Ministry of Housing and Urban Development (MHUD)

Below a short description of responsibilities and duties concerning waste management is presented and the main problems that the Ministry is exposed to are identified.

The Ministry of Housing and Urban Development (MHUD) is responsible for administering the Urban Government Act of 1969. This act is the instrument used for establishing and administering all urban areas, i.e. City Councils, Town Councils and Town Boards.

The Ministry of Housing and Urban Development facilitate the provision of urban infrastructure and facilitate and monitor the implementation of the development of local authorities. The local government and the infrastructural sections work hand in hand to ensure that the above-mentioned functions are performed.

Implementation of solid waste management is performed at the local authority level and the MHUD's role is to facilitate the provision of the waste management services and assist with capital funding where possible.

Local authorities are expected to provide solid waste management services and collect user fees from property owners. This activity is supposed to be performed at a self-sustainable level. City Councils and Town Councils are permitted by the Urban Government Act to establish by-laws regarding any activity within their areas and this may include the revision of solid waste management fees and introduction of other relevant activities.

The Health Inspector in the MHUD deals with solid waste management for urban areas outside the city councils and town councils, but provides assistance to the cities and towns, when required. Note that there is an overlap of the duties and responsibilities between the

MHSW and MHUD.

The **main problems** and constraints identified are first of all, that there is no section or department within the MHUD that has responsibility over environmental management issues.

There is no dedicated unit or staff group to monitor and advise local authorities on environmental management issues or policies.

A specific problem is that the responsibility of physical and environmental planning for company towns is not defined. The company town itself feels insecure of duties when they introduce e.g. new waste management systems or new developments, because they have no guidance from government.

Furthermore there seems to be a shortage of staff, especially because the MHUD has a lot of duties and responsibilities. For example both physical urban planning, development planning and environmental planning (hereunder overall waste management planning) falls under it's auspices. These duties include taking up an active co-ordinating and facilitating role in order to ensure sustainable strategic physical and environmental planning in Swaziland.

Plans for training of staff should be elaborated to secure that "crisis management" changes to preventive and planned management. There seems to be a lack of simple guidelines and tools to upgrade the waste management in the urban areas. The natural developer of these guidelines would be the MHUD. It should be investigated whether sufficient funds are allocated to waste management issues in the Ministry.

A constraint seems to be, that there is no well defined solid waste management structure in the Ministry, that is capable of handling the needs of all urban local authorities.

One Health Inspector (Mr. Steven Khumalo) in the Urban Government Department is responsible for solid waste management issues for the Town Boards. There are no other staff dedicated to waste management. There is within the Physical Planning unit a physical (and environmental) planning officer employed (Ms. Busa Masina).

As a consequence of the fairly young institutional framework the co-ordination between the SEA and the Ministry of Housing & Urban Development seems to be weak. Good working relations exist but on ad hoc basis.
Improvements leading to clarification of specific duties and responsibilities and jointly planned actions should be formalised.

Poor public awareness of the consequences of insufficient waste management makes it difficult for the officers to improve the situation. Initiatives leading to a common and higher understanding of the problems should be taken.

2.4 Ministry of Enterprise & Employment (MEE)

Below a short description of responsibilities and duties of the Ministry of Enterprise & Employment concerning waste management is presented. The link to the Matsapha Town Board is also given in this section.

The Ministry of Enterprise & Employment plans for and administer industrial estates as a delegated function from the Ministry of Housing and Urban Development. This means that the waste management performance operated by the industrial townships is to be monitored by the Ministry of Enterprise & Employment.

In the industrial estate Matsapha the Matsapha Town Board has the duty, amongst other things, to operate the waste management system in the estate. The waste management system comprises collection of non-industrial waste and landfilling at the Matsapha Industrial Landfill site. The industry itself is responsible for collection and transport of industrial waste to the Matsapha Industrial Estate.

The Town Board has contracted the non-industrial collection services out to a private company. The Ministry of Finance is paying for the services through the trading account, established by the Ministry of Enterprises and Employment.

The **main problem** identified is that there are uncertainties about responsibilities and duties between governmental actors and the industries need guidance to whom they should approach when environmental and waste management issues are on the agenda.

Furthermore, there is a lack of enforcement of waste management regulations and monitoring of the performance is not yet functioning on a regular basis. The current situation can be characterised as crisis management.

Co-ordination between the SEA and the Ministry of Enterprises & Employment seems to exist. Some working relations exist, but on a case to case basis and not as strategic and pro-active actions. Improvements leading to clarification of specific duties and responsibilities and jointly planned actions should be formalised.

It is recognised as a problem that responsibilities and duties concerning monitoring and control of the execution of the waste regulations in company towns are not clearly described.

2.5 The Office of the Deputy Prime Minister

As understood by the stakeholders, the Deputy Prime Minister's Office is responsible for waste management in rural areas (Swazi Nation Land). This office can serve as a channel

between Government and communities through Tinkundla centres and the chiefdoms. The Regional Secretaries can play a pivotal role in co-ordinating waste management efforts in rural areas. The Community Development Section of the Deputy Prime Minister's Office is in the forefront in direct contact with the communities. However, the Community Development Section in the Deputy Prime Minister's office does not have a legal mandate supporting their activities within environmental health management. A detailed profile of the Deputy Prime Minister's Office is seen from Annex I.

The department is involved in training and awareness programmes and it is the vision of the department to improve the living standards in the communities by using available resources to facilitate their self-reliance.

The department is mainly involved in making the communities aware of environmental health as well as cleanliness in their homes. The officers promote awareness on the needs to have pit latrines and to dig holes for the disposal of their household waste.

The Community Development Section brings awareness to the beneficiaries through the influence of trained community development workers.
The community development workers employed by the Section assist in identifying needs and help to prioritise these needs.

The **main problems** identified are that a number of areas within the jurisdiction of the Deputy Prime Minister's Office are dense settlements in the peri-urban areas.
In these areas waste management services are often scarce, due to the lack of sufficient infrastructure. It is therefore difficult to access these areas with waste collection equipment and waste is therefore not collected.

The financial and economic support to upgrade the waste management services in these areas is not available. The unclear situation, where the residents within a residential area, do not know if they should be provided with some kind of waste services, is widespread.

Staff shortage within the Community Development Section is also a major problem. The efficiency of the section would increase if for example community development workers were placed in each of the Tinkhundla centres with, amongst others, the task of upgrading waste management in the rural areas.

Furthermore, improvement of co-ordination between the health inspectors employed by the other ministries (Ministry of Health and Social Welfare and the Ministry of Housing and Urban Development) and the community development workers should be encouraged.

2.6 Ministry of Tourism, Environment and Communications (MTEC)

The Swaziland Environment Authority (SEA) was established in 1992 through the enactment of the Swaziland Environment Authority Act, No. 15 as a statutory body to the Ministry of Natural Resources and Energy. When the Ministry of Tourism, Environment and Communications (MTEC) was created in 1997, the Department of Environment being the secretariat for the SEA was attached to this new ministry.

The objective of SEA is to ensure that Swaziland's development is environmentally, economically and socially sustainable, by means of promoting sound environmental policies, practices and development, which meet appropriate national and international standards.

The potential scope of SEA's responsibilities is quite wide, but may essentially be summed up as being a *facilitator* and *catalyst* of good environmental practices throughout Swaziland. Generally the Authority's main responsibility is to

- Develop sustainable environmental policies and strategies
- Establish the legal framework for environmental protection
- Co-ordinate issues relating to the environment between different bodies
- Enforce SEA regulations, standards, guidelines, procedures and codes of practice
- Monitor environmental quality and design and institutionalise mechanisms which ensure that considerations for the environment are taken into account in the decision-making and management of development by other actors

The specific functions of SEA regarding waste management are listed in Section 44 of the drafted Environmental Management Bill. The SEA shall according to the Bill:

a) Prepare a national waste strategy;
b) Give general or specific directions to:
    - local authorities regarding its functions relating to the collection and disposal of waste;
    - relevant authorities responsible for waste management in a waste control area[2] regarding its functions relating to the management and disposal of waste.
c) Issue special waste management licences, special waste carrier licences, and waste management licences;
d) Inspect waste disposal, handling and recovery facilities considering that a waste management licence is in force;
e) Monitor compliance with licenses issued under the Act;
f) Take enforcement action where necessary;
g) Review and monitor the implementation of waste management plans by local authorities in urban areas and by the relevant authority in waste control areas;

[2] The term "waste control area" is defined in the Waste Regulations, 2000. Please refer to Section 2.8.5

h) Collect and analyse statistical data on waste produced and waste composition and include the findings and recommendations in the annual report of the SEA.

The Swaziland Waste Regulations 2000 complement Section 44 of the Environmental Management Bill and expands on the following issues:

1. The SEA shall monitor the management of waste in waste control areas;
2. The issue of waste recovery licenses and waste separation permits; and
3. The regulations concerning management of waste and special waste.

A detailed profile of the Swaziland Environment Authority is given in Annex I.

The **major problems** related to the current institutional set up relate to the fact that the institution and the legal framework for duties and responsibilities of the SEA are still immature. The SEA has not yet created the full understanding of their future role amongst the stakeholders.

The SEA is on its way to establish itself as a co-ordinating body meeting the task of lifting the future challenges as a co-ordinator of all environmental issues within the government demands a streamlined organisation, where every staff member has clearly defined duties and responsibilities.

Not only is it the duty of the small SEA to establish and maintain the waste management policies and strategies and to establish the legal framework for a sustainable waste system in the country, it is also the responsibility of the SEA to create a good basis for partnerships between enforcement actors, the monitoring actors, operational actors and the waste generators.
Being able to perform these duties in a cost-effective way, depends on the co-operative spirit of all the actors, whether local or national, and a widespread understanding of their roles, duties and responsibilities.

The main challenge for the SEA is for that reason to establish the right platform for executing its duties and thereby put environmental issues on the agenda in future development of the society.

2.7 Pertinent Waste Legislation and Regulations

The legislative cornerstones determining the current framework for waste management are:

1. The Waste Regulations 2000 in force from 21 April. These regulations specify the duties and responsibilities of the waste generators, waste collectors and waste disposers. Furthermore the regulations specify the role of the SEA and the different local authorities.

2. The Environmental Management Bill of 1999, which, when enacted, will be the enabling legislation for the National Solid Waste Management Strategy.

3. The Environmental Authority Act of 1992, which constituted the SEA.

4. The Urban Government Act No. 8/69. The Act is presently under revision. A revised version exists and will be submitted to Parliament before the end of 2000.

5. The Public Health Act No. 5/69. The Act is presently under revision. A new Bill was piloted to Cabinet.

It is symptomatic of the current flux and dynamics in the field of waste management legislation and institutional set up, that only one of these cornerstones have been passed recently (21 April 2000), while the rest all are under revision and review by the Cabinet.

2.8 The Swaziland Waste Regulations 2000

The Waste Regulations are in accordance with Section 18 of the Environment Authority Act 1992. The Waste Regulations were published in the Gazette of 21 April 2000 and are now in force in terms of Legal Notice No. 31 of 2000.
The Regulations regulate the management of solid waste and liquid waste disposed of on land. The Waste Regulations are detailing the specifications in the Environmental Management Bill. The Regulations came into operation on the date of publication.

Besides general provisions (Part II), the regulations cover administration (Part III), storage, collection and disposal of waste in urban areas (Part IV) as well as in waste control areas (Part V), carriage of waste (Part VI), regulations concerning waste disposal facilities (Part VII), special waste (Part IX), recovery of waste (Part X), littering and abandoned vehicles (Part XI), enforcement provisions (Part XIII) and final provisions (Part XIV).
Additionally they introduce new regulatory instruments such as waste management licensing (Part VIII) and waste management plans (Part XII).

2.8.1 General Prohibition regarding Waste Management

The general prohibition and duty of care regarding waste management is stated in Section 41 of the Environmental Management Bill:

1. No person may collect, transport, sort, recover, store, dispose of or otherwise manage waste in a manner that results in an adverse effect, or create a significant risk of an adverse effect occurring;
2. Every person who imports, produces, collects, recovers, transports, keeps, treats or disposes of waste shall take all reasonable measures to prevent any other person contravening subsection (1) in relation to waste;

3. No person shall dispose of waste in such a manner that it becomes litter or is likely to become litter.

According to Section 46 in the Environmental Management Bill the Director of the Swaziland Environment Authority may serve a ***site restoration order*** on a person, who has deposited waste in any place in breach of the Act or of a condition of a licence.

2.8.2 Import, Export and Trade in Waste

The specific regulations regarding ***import, export and trade in waste*** are stated in Section 43 in the Environmental Management Bill.
No person shall import, export or trade in waste without the written permission of the Swaziland Environment Authority and subject to the terms and conditions imposed by the SEA; and that no person shall import hazardous waste into Swaziland.

2.8.3 Waste Generators' Obligations concerning Disposal of Waste

The regulations clearly state (Section 5) that no person shall dispose of: -

1. Commercial or industrial waste, or household waste produced in urban areas, except at an approved waste disposal facility;
2. Special waste except at an approved waste disposal facility;
3. Any household waste produced in a waste control area except at a local waste disposal site or a local waste collection site designated by the relevant authority or at an approved waste disposal facility.

Furthermore the Regulations state (Section 9) that every occupier of *premises* ***in an urban area*** shall provide suitable waste receptacles for each kind of waste (household waste, industrial and commercial waste, waste for recycling and special waste) produced upon the premises, and the owner shall ensure that the waste is deposited in these waste receptacles.

Generators of commercial or industrial waste shall arrange for the waste to be collected and transported to an approved waste disposal facility (Section 11).

2.8.4 Local Authorities Obligations concerning Waste Management

The definition of local authority is seen from the Urban Government Act of 1969 (under revision): A local authority means a municipal council or a town council established under Part II of the Urban Government Act of 1969, or a town board established under Part XIII of the same Act, and in relation to a company town, means the company that controls the town or any other organ of government duly established under any law.

The obligations of local authorities regarding waste management *in urban areas* are given in the draft Environmental Management Bill in Section 45 as follows:

a) Within its area of jurisdiction each local authority shall collect and dispose of, or arrange for the collection and disposal of, all household waste;
b) Ensure that waste is collected and disposed of in accordance with the Act;
c) Promote and support the minimisation and the recovery of waste, particularly at the point at which it is produced;
d) Provide litter receptacles in public places;
e) Prepare and submit to the SEA for approval, a long-term plan for the management of waste that conforms to the requirements of the SEA; and
f) Report annually to the SEA on the types of wastes and the quantity of each type of waste, generated and disposed of within its area of jurisdiction and on the implementation of its waste management plan;
g) Create awareness campaigns;
h) Secure that regular clean-ups takes place;
i) Issue spot fines, etc.

The Waste Regulations 2000 furthermore state (Section 10) that: ***Every local authority*** shall ensure that skips or common receptacles are placed along access routes ***in urban areas*** which are inaccessible to waste collection vehicles, and the residents shall transport their household waste to these skips. Every local authority shall ensure that all household waste is collected at least once per week.

2.8.5 Waste Management in Rural Areas

If the Minister considers that disposal of waste in a non-urban area is resulting in an adverse effect, the Minister may by notice in the Gazette designate the area as a waste control area in terms of Part V, Section 12 (1) of The Waste Regulations 2000 promulgated under Act No. 15 of 1992 (The Swaziland Environment Authority Act 1992).

The obligations of the organ of Government or public body that has primary responsibility for waste management in ***waste control areas*** are given in Section 48 of the Environmental Management Bill and in Sections 12 and 13 of the above-mentioned Waste Regulations, as:

- Shall prepare and submit a plan for management of waste in the waste control area to the SEA for approval;
- Shall designate one or more local waste disposal sites or local waste collection sites within each waste control area;
- Shall inform the public of the location of these waste disposal and waste collection sites;
- May request the Minister to prescribe guidelines for the disposal of waste; and
- Shall report at least once annually to the SEA on the implementation of its waste management plan.

The relevant authority in a waste control area may, with the consent of the Minister, delegate some or all of its functions mentioned above to another organ of Government, public body, chief or traditional authority, or to an organisation which is representative of the people in the waste control area.

Furthermore, the Waste Regulations 2000 list the duties of producers of waste in waste control areas (in rural areas) (Section 13):

Every person shall dispose of any household waste
a) in a local waste disposal site or at a local waste collection site; or
b) within the boundaries of the site which they occupy, by burying the waste in a pit in the ground which is located at a safe distance from human living areas and drinking water sources.

2.8.6 Carriage of Waste

The Waste Regulations specify in Sections 14 and 15 the obligations related with transport of waste as follows:
Transport of special waste (except waste oil from motor vehicles) must happen under and in accordance with a special waste carrier license issued by the SEA and by use of a system of consignment notes for special waste further described in Section 15.

2.8.7 Obligations for Construction and Operation of Waste Disposal Facilities

Regulations regarding ***Waste Licenses*** are described in Section 42 in the Environmental Management Bill. Sections 17-20 in the Waste Regulations specify the obligations of obtaining waste management licences. The main provisions are:

- A landfill site, incinerator or other waste disposal facility must not be constructed, owned or operated without the possession of, and in compliance with, a written approval from the SEA according to Section 32 (Environmental Impact Assessment).
- Special waste must only be kept, treated or disposed of in accordance with a special waste management licence issued by the Director of the SEA (please refer to Section 21-24 in the Waste Regulations).
- Special waste must only be transported in accordance with a special waste carrier licence (Please refer to Sections 21-24 in the Waste Regulations)

Furthermore, the Waste Regulations (Section 16) specify the requirement for an environmental compliance certificate from the SEA for construction and operation of waste disposal facilities, other than a local waste disposal site or a local waste collection site.

2.8.8 Obligations concerning Special Waste Management

Special waste is clearly defined in the Waste Regulation 2000. According to Sections 21 - 24 special waste must be managed as follows: - Special waste must be separated from other waste and stored in separate containers by the producer of special waste. The SEA will decide on the classification of special waste. Storage, treatment or disposal of special waste must be under, and in accordance with, a special waste management licence issued by the SEA in terms of the provisions in Section 23. Medical waste generators must comply with

Section 24 giving directions for storage of medical waste in heavy-duty plastic bags or other containers prescribed by the SEA.

2.8.9 Waste Separation

Waste separation at approved waste disposal facilities must be performed in accordance with Section 25 of the Waste Regulations. Commercial waste recovery activities must be in accordance with a waste recovery licence issued by the SEA in terms of Section 26. Waste collection for recovery purposes must be approved/permitted by the waste regulation authority for the area.

2.8.10 Littering

Sections 28 and 29 in the Waste Regulations deal with littering and receptacles for litter in public places. These sections are analogous to Section 41 of the Environmental Management Bill. The regulations expand on the issue of abandoned vehicles giving the local authority the warrant to remove the vehicle or vehicle scrap, if the owner cannot be identified or if the owner is not removing the vehicle upon written notice.

2.8.11 Local Authorities Obligation to submit Waste Management Plans

According to the Environmental Management Bill (Section 45 e) local governments within urban areas shall prepare and submit to the SEA for approval, a long term plan for management of waste that conforms to the requirements of the SEA.

The content of ***the waste management plans*** (Section 31 of the Waste Regulations) the waste management plans shall include:

1. The quantity and composition of household, commercial and industrial waste currently produced in the area;
2. Projections of the quantity and composition of solid waste generation over the next 10 years;
3. Current methods of solid waste management, including collection, transportation, recycling, intermediate processing and disposal;
4. Capacity and remaining life of existing disposal facilities; and
5. A timetable for upgrading current waste management facilities and goals for the management of solid waste over the next 10 years.

2.8.12 Enforcement of Waste Management Related Regulations

The SEA is responsible for enforcement of waste management related regulations issued by the Ministry of Tourism, Environment and Communications.

Enforcement functions of *the SEA* are described in Part IX of the Environmental Management Bill, where Sections 61 - 67 state, among other things, that a senior inspector

of the SEA may lay charges and may prosecute any charge laid under the Act or the Regulations.

Furthermore, the Director of the SEA may serve a prevention order, a protection order, a compliance order or a cost order on any person who is believed to conduct an activity resulting in an adverse effect.
Any inspector of the SEA, who observes the discharge of a contaminant into the environment constituting a risk to human health or causing adverse effects, may serve an emergency protection order on the responsible person.

According to the Enforcement Codicils of the Waste Regulations (Sections 32 - 35), the Director of SEA may designate any public officer, official of a municipality or representative of a traditional authority as an authorised officer for the purpose of enforcing the Regulations.
Sections 33 and 34 cover enforcement notices served by the SEA concerning non-compliance with any license or permit granted under the Regulations. Revision of a licence or permit can be performed by the SEA if necessary. The SEA can serve a written notice on any person who is contravening any provision of the Regulations according to Section 36.

2.8.13 Transitional Provisions

The transitional provisions state, that within 90 days from the date of commencement of the Regulations (21 April 2000):

- Any person operating an existing waste disposal facility must apply for a waste management licence;
- Any special waste generator shall apply for a special waste management license;
- Any medical waste producer shall place all medical waste in colour coded plastic bags or containers;
- Any person engaged in waste separation shall apply for a waste separation permit;
- Any person engaged in commercial waste recovery shall apply for a waste recovery licence; and
- Any person maintaining containers for the purpose of sorting, storing and collecting recyclable materials shall apply for permission.

2.8.14 Strengths and Weaknesses of the Waste Regulations 2000

The **main strengths and weaknesses** of the Waste Regulations are identified as follows:

The strength of the Waste Regulations is that they give clear definitions of the different waste types and fractions. The Waste Regulations are comprehensive and give clear statements as to the waste generator's responsibilities and duties. Both the Environmental Management Bill and the Waste Regulations clearly indicate the role, responsibility and duty of the SEA and the local authorities. This relates both to waste collection, transport, sorting, storage and disposal of waste. But the comprehensiveness of the Waste Regulations is also their weakness. Implementation of the regulations will put great demands, not only

on the local authorities and other stakeholders, but also on Swaziland Environment Authority (SEA). Such demands seem greater than the SEA can currently meet with its present staff complement.

The whole institutional set-up is not developed to a degree where all governmental and local authorities (and the public) know exactly what are their role, duty and responsibility.

This is one of the main challenges of the coming National Waste Management Strategy to close these gaps.

The question of cost recovery of the waste management systems is not addressed in the Waste Regulations. It must be considered as a weakness, that this issue is not addressed and maybe further developed in the Waste Regulations despite the Polluter Pays Principle is one of the main principles of the Environmental Management Bill.

The transitional provisions giving 90 days from the date of commencement of the Regulations (21 April 2000) seems to be extremely short in spite of the fact that the Waste Regulations do not seem to be common knowledge amongst the stakeholders.

Furthermore, it is considered a problem that the regulations do not require data reporting, provision of litter receptacles, collection of waste and promotion of waste prevention and recovery for example in the waste control areas in rural settlements.

It should also be noted that the Waste Regulations do not seem to set a cut-off date for the first waste management plans to be submitted to the SEA.

2.9 Swaziland Environmental Management Bill

The Environmental Management Bill 2000 is currently being processed. The Bill gives legal effect to the principles of the National Environment Policy. The Bill is expected to be enacted during 2000.
It provides a comprehensive framework for environmental management and its principal objectives are:

- To establish a framework for environmental protection and the integrated management of natural resources on a sustainable basis;
- To transform the Swaziland Environment Authority (SEA) into a body corporate; and
- To establish the National Environment Fund.

In terms of waste management instruments the Bill has a number of key elements, which are outlined below.

Principles to be applied are, among others, that the generation of waste shall be minimised wherever practicable; waste must, in order of priority, be re-used, recycled, recovered and

disposed of safely; non-renewable natural resources should only be used prudently and renewable resources and ecosystems should only be used in a manner that is sustainable.

Furthermore, the Polluter Pays Principle and the Precautionary Principle should be adhered to. The Minister may according to the Bill, on the advice of the Board of the SEA, establish and publish standards, codes of practice, guidelines and procedures.

The Bill also purports to clarify the existing responsibilities of the SEA, introducing detailed regulations covering a number of key activities, including waste management. In terms of general waste management some of the key elements are a) promulgation of policies of re-use, recycling, recovery and disposal of waste, plus adherence to the Polluter Pays Principle, and Precautionary Principle, b) designation of the Minister, pending advise by the SEA Board, as the regulator of standards, codes of practice, guidelines and procedures, and c) institution of economic and/or administrative measures.

The functions of the SEA are, according to the Bill, among others;

- to develop in co-operation with other organs of Government, as appropriate,
- to introduce economic measures that encourage sustainable development and environmental protection;
- to administer licenses issued under the Act;
- to prepare a national waste strategy;
- to give directions to local authorities regarding their functions relating to the collection and disposal of waste in urban areas;
- to promote training, education and public awareness programmes;
- to recommend environmental standards, codes of practice, guidelines and legislation; to publish guidelines, codes of practice and other information;
- to conduct inspections and take other measures to monitor compliance with the Act and to conduct investigations into alleged contraventions of the Act; and
- to take all reasonably practical measures, to enforce the Act.

The SEA's specific functions regarding waste management are listed in section 44 of the Bill, while the obligations of the local government are given in section 45. In addition it empowers the Minister to designate a non-urban area as a *waste control area* if the waste disposal there is resulting in an adverse effect.

The basis for the Waste Regulations are found in Section 47 of the Bill:

The Minister may make *regulations* to regulate waste management and waste disposal, among others to classify waste; to regulate licences; to restrict the locations for waste disposal and waste management; to require gathering of data and reporting from persons involved in generation, management and disposal of waste; to require compliance with plans; to require and regulate the control of litter; to require and regulate the payment of charges and administration fees, to establish mandatory standards for the disposal of waste; to require the separation of types of waste; to prohibit or regulate the movement and carriage of any category of waste; to require and regulate deposit and return systems for products and for packaging; to require, regulate and restrict the use of notices, marks and

labels on products and packaging; to regulate and promote waste reduction, reuse, recycling and recovery; to require take-back of products and packaging by importers, manufacturers, distributors and vendors; and to impose responsibility for any stage of hazardous waste or medical waste management upon the generators, transporters, handlers and receivers of the waste.

2.9.1 Strengths and Weaknesses of the Environmental Management Bill

The Environmental Management Bill lines up some very useful principles for the future drafting of the National Solid Waste Management Strategy, such as, the waste hierarchy i.e. the generation of waste shall be minimised wherever practicable; waste must, in order of priority, be re-used, recycled, recovered and disposed of safely; non-renewable natural resources should only be used prudently and renewable resources and ecosystems should only be used in a manner that is sustainable.

Another important issue introduced in the Bill is the Polluter Pay Principle.

The various provisions of the Bill complement supplement and overlap those of the new Waste Regulations 2000 reviewed above. When the Bill is enacted it may be necessary to consolidate its waste management roles with those already in force.

2.10 The Environment Authority Act 1992

The main purpose of this Act was to establish the SEA and to confer general powers and functions upon it. Amongst such functions were the regulatory ones of..... *"establish [ing] standards and guidelines relating to the pollution of the air, water and* ***land*** *as well as .....control[ing] all forms of environmental pollution including pollution caused by the discharge of toxic waste into the air, water and* ***land*** *".....*

2.11 The Urban Government Act of 1969

The Urban Government Act, currently under revision, contains regulations dealing with different types of waste, different types of premises, provision of refuse receptacles, right to charge fees etc.

These regulations have a number of gaps and weaknesses for example that some of the sections do not apply to Town Boards but only to City and Town Councils. This is a distinction, which is not up-held in the proposed Environmental Management Bill.

The Urban Government Act seems unnecessarily fragmented as to the specific obligations of the Ministry of Housing and Urban Development and the operational bodies (Cities, Town Councils and Town Boards) concerning waste management issues. The risk is that

adequate budgeting for the waste management duties to be carried out by the governmental authorities are not taking place.

2.12 Public Health Act of 1969

The Public Health Act of 1969 gives regulations as to the Ministry of Health and Social Welfare and local authorities' duties and responsibilities to take measures for, among other things, preventing the occurrence of any nuisance or condition liable to be injurious or dangerous to health.

It does so primarily by way of defining and prohibiting a “nuisance”. Specifically in the case of food hygiene the Public Health Act lays down measures in regulations 73 for solid refuse produced in the course of a food business.
The Public Health Act seems to be very fragmented when it comes to specific regulations on duties and responsibilities of waste producers and waste disposers as well as of the actors concerned with compliance monitoring and enforcement.

2.13 General Comments to the Legal and Institutional Set Up

Even though some impressive legislation has been put in place there is a “blind spot” in the institutional set-up, since these instruments can not be applied to some of the places where waste problems are most conspicuous, namely the peri-urban areas, and to a lesser degree, the industrial townships.
Due to the nature of waste management services, the recovery of costs for such services are not possible on a voluntarily basis[3], but only when payment can be secured through an effective tax or fee-collection system. Such powers of effective cost-recovery are provided to the local governments for the formal urban areas, but not for the settlements which are officially situated in rural areas.

It is therefore not likely that the authority vested in SEA to declare a non-urban settlement for “a waste control area” will be exercised, and if so, that it will be effective. Because unless SEA is able and willing to cover the costs itself, it will be resisted by those authorities which are tasked with the responsibility.

In contrast, the Ministry of Housing and Urban Development has indeed the authority to declare such formally rural locations for towns, what that entails in terms of changed legal status. However, time has proved that such moves have and will be frustrated as long as those that control the rural resources in question will loose by such a move. In short: The issue of coverage of waste legislation and responsibilities of ministries in relation to the

[3] This is termed the “free rider problem” in theoretical literature. Compare with water supply services: it would typically be easy to sanction non-payment for services by cutting of supply. In contrast it is not an effective sanction to cease waste collection to punish non-payments.

peri-urban and industrial settlements, warrants some rethinking and restructuring of incentive structures.

As there is not yet a clear decision on institutional responsibilities and duties there is an urgent need to clarify these responsibilities and duties amongst the different bodies involved in waste management. The people of Swaziland should be able to address the right national, regional or local authorities when needed, and the employed staff should have a clear understanding and training in its responsibilities in order to perform his/her duties.

An institutional and legal framework need to be devised by the Government. This institutional and legal framework should give clear lines of responsibilities for the various ministries for waste management. The regulatory framework needs to include the monitoring, enforcement and implementation aspects. The necessary tools must also be developed within these institutions to enable them to fulfil these obligations e.g. legal, training, staffing, budgets etc.

A strong effort should be made to educate and inform all relevant institutions about the Environmental Management Bill as well as the Waste Regulations 2000. The implications of the legal instruments should be fully understood by the stakeholders. It is important that the Polluter Pays Principle be incorporated in waste management practices on a daily basis. Waste management services must be delivered on a full cost recovery basis. The actual cost of different services should be aimed at being

Provision should be made for the incorporation of waste management on the planning requirements for the Development Planning. This should include informal development. Lastly, the privatisation of waste management services should be investigated by Government.

3 Status Quo Analysis – Household & Commercial Waste and Litter

3.1 Technical and Financial Issues

3.1.1 Definitions

Definitions of different kinds of waste types and fractions are given in the newly gazetted Swaziland Waste Regulations 2000, April 2000 as follows:

Household waste *means waste from any of the following premises: a home, that is to say, a building or self-contained part of a building which is used wholly for the purpose of living accommodation, or a caravan or a mobile home; premises forming part of a university or school or other educational establishment; and premises forming part of a residential home, hospital or nursing home.*

Trade waste *means a non-hazardous waste, generated in whole or in part in the course of a trade, industry, or research, other than normal solid waste generated by office workers or employees of the trade, industry or research facility.*

Commercial waste *means waste from premises used wholly or mainly for the purposes of a trade or business or for the purpose of sport, recreation or entertainment, but excluding: household waste; industrial waste; waste from any mine or quarry and waste from premises used for agriculture.*

Litter *means any waste that is discarded in any public place or vacant land, other than in a waste receptacle.*

Special wastes *means wastes which due to their nature, require special or separate handling, including, but not limited to tyres, demolition debris, construction waste, motor oil, bulky metal goods, e.g. discarded white goods – refrigerators, stoves etc., hazardous wastes and medical wastes.*

Hazardous waste *means any waste which is listed in Part I of Schedule Three in the Waste Regulations 2000 and to which a six digit waste code has been assigned in that Schedule, and which displays any of the properties specified in Part II of Schedule Three; or which displays any of the following hazardous properties as defined in Part II of Schedule Three: highly "flammable" (only liquid substances and preparations having flash point below 21°C), "irritant", "harmful", "toxic", "carcinogenic" or "corrosive", unless the waste does not exceed any of the threshold criteria for certain hazardous properties set out in Part III of Schedule Three.*

Medical waste *means any wastes generated by hospitals, clinics, nursing homes, doctors' consulting rooms, medical laboratories, medical research facilities and veterinarians,*

which are infectious or potentially infectious. Medical waste may be further defined to include the following categories:

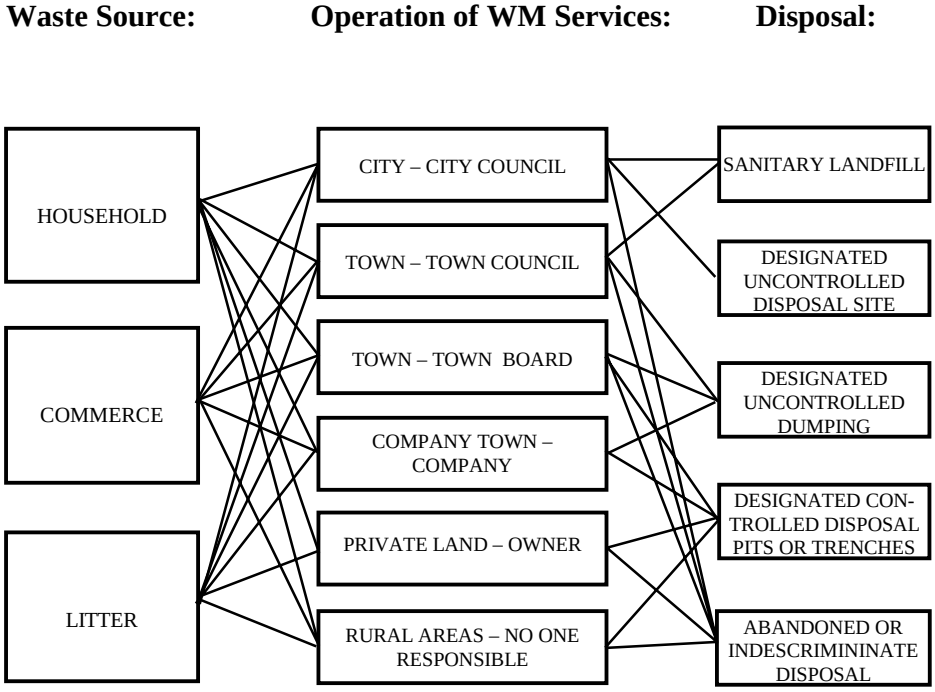
1. *microbial wastes including cultures and stocks of infectious wastes and associated biologicals that can cause disease in human being;*
2. *human blood and blood products, including serum, plasma and other blood components;*
3. *pathological wastes of human origin, including tissues, organs and body parts removed during surgery or autopsy;*
4. *contaminated animal wastes including animal carcasses; body parts and bedding which has been exposed to infectious agents during medical research, pharmaceutical testing or the production of biologicals;*
5. *isolation wastes associated with animals or human beings known to be infected with "highly" communicable diseases;*
6. *contaminated and uncontaminated sharps including hypodermic needles, scalpels and broken glassware.*

Note that medical waste, containing radio-active material is not mentioned in the definition of medical waste, and that all sources for medical waste generation is not included in the definition. For example medical waste is produced in domestic homes, and although this might be smaller amounts, this waste should be handled carefully when disposed of.

3.1.2 Overview of Waste Flow – from Source to Final Disposal

Below is given a brief overview of the main flow of the household waste, the commercial waste and the litter. It is seen from the illustration that the operation of the collection systems is in the hands of many operators. Within each area of jurisdiction the local governments operate their own collection system. There are no common standards for collection and there is no or only a minimum of co-operation between the different operating entities. Furthermore, nearly all the waste collection systems for household and commercial waste involve collection of all waste types and fractions simultaneously, - no source separation takes place.

The illustration also indicates that waste is disposed of by landfilling, dumping, trenches or pits. Standards for disposal of waste is included in the Environmental Management Bill and when enacted enforcement must take place.



3.1.3 Generation of Household Waste, Commercial Waste and Litter

As only a few statistical data are available on waste arising in Swaziland, it is necessary to verify the data available regarding waste generation from households and commerce. The verification is carried out on the basis of number of inhabitants in specific areas multiplied with an estimate of the waste generation per capita.
The verification has furthermore been evaluated against the valuable information gathered for the last couple of years on Mbabane Sanitary Landfill Site.

3.1.3.1 Population

The population of Swaziland was 751,000 people in 1991. According to the 1991 demographic and housing survey 76% of the population lived in rural areas, while 24% lived in urban areas. According to the Swaziland Population and Housing Census from the Central Statistical Office (CSO), the total population in 1996 was 980,722. This corresponded to an increase in population of 24% in 6 years. Rural to urban migration has been occurring at a rate of 3-5% per annum

Region	1991	%	1996	%
Manzini	217,790	29	292,100	30
Hhohho	202,770	27	269,826	27
Shiselweni	165,220	22	217,100	22
Lubombo	165,220	22	201,696	21
Total	**751,000**	**100**	**980,722**	**100**

Table 3.1 Reworked Census Data (number of inhabitants) derived from the Central Statistical Office/7/

The urban areas comprise: -
2 City Councils: Mbabane and Manzini,
3 Town Councils: Nhlangano, Piggs Peak and Siteki, and
7 Town Boards: Hlatikulu, Mankayane, Lavumisa, Vuvulane, Ezulwini, Matsapha and Ngwenya.

There are ten company towns in operation in Swaziland; one related to mining (Bulembu); two (Bhunya and Mhlambanyatsi) related to the pulp industry; four related to the sugar industry (Big Bend, Lusoti and Ngomane (Simunye), Mhlume), and three related to railways (Mlawula, Mpaka, Sidvokodvo)**.**

Despite the relatively high economic growth since independence, the benefits have not reached all. The result has been increasing poverty and income inequalities. In 1995 the CSO estimated that 66% of the population received incomes below the poverty datum line, whilst the rich 10% of the population accounted for 43% of total consumption.

This means that the generation of waste per capita will differ according to the demographic group being analysed. There is a lack of good waste demographic data consequently it has been assumed that the rich 10% of the population mainly live in the urban areas, while the

poorest part of the population live in informal settlements and rural areas. This assumption is based on experience in other developing countries in Africa, e.g. Botswana, Kenya, Malawi, Nigeria and South Africa. As demographic differences cannot be dismissed and as such data are not available in Swaziland, waste generation rates for two similar residential areas near Durban in RSA, are presented below.

High Income Residential Areas	**Domestic**
Category	**Mass (kg)**
Hard Plastics	40
Soft Plastics	98
Glass	45
Tin plate steel/aluminium	40
Other Metals	-
Cardboard	28
Other Paper	53
Putrescibles	270
Garden Refuse	-
Sponge Rubber	5
Textiles	-
Polystyrene	-
Wood	-
Other	-
Total	**579**
Average/sample point	**11.8**
Average kg/capita/day	**0.5**

Table 3.2.A Durban North – High Income and Low Density Residential Area /6/

Low Income Residential Area	**Domestic**
Category	**Mass (kg)**
Hard Plastics	30
Soft Plastics	63
Glass	31
Tin plate steel/aluminium	85
Other Metals	-
Cardboard	60
Other Paper	58
Putrescibles	49
Garden Refuse	-
Sponge Rubber	-
Textiles	30
Polystyrene	19
Wood	-
Other	-
Total	**425**
Average/sample point	**8.5**
Average kg /capita/day	**0.2**

Table 3.2.B KwaMashu Unit E – Low Income Formal Housing /6/

The data reported below are taken from the Waste Stream Analysis Report prepared for the Durban Metropolitan Area by SKC Inc et al /6/. The samples are taken over a seven days period from 49 households and 50 households, respectively. The estimated average size of a household is estimated to 3.3 and 5.3 persons for the two areas.

3.1.3.2 Waste Generation in Mbabane

The area within the city boundaries has a population of 60,000 according to the 1996 Census Data.

The Mbabane City Council has estimated that it collects 90% of the household waste generated in the formal urban area. This represents waste collection of 40% in the full Mbabane urban area.

The waste tipped at the Mbabane Sanitary Landfill has been recorded since June 1998. All trucks are weighed at the weighbridge where the waste mass and its source are recorded. In order to be able to use the data the hand-written information about waste arriving to the landfill was transformed to computer and the City Council is in the future able to use spreadsheets as a basis for waste management planning.

The table below reports the tonnage of domestic waste, bulky waste, commercial waste, industrial waste and waste from building and construction going to the Mbabane Sanitary Landfill.

Waste Category	**Annual Input to Landfill 24,000 people (1)** **(40%)**	**Average Month Input to Landfill**	**Estimated generation of waste in tonnes/year 60,000 people (100%)**
Domestic	4,800	400	12,045
kg/capita/day	**0.55**		
Bulky	60	5	150
Commercial	480	40	1,200
Industrial	1,440	120	3,600
Building & Construction	200	17	500
Total waste amount	6,980	582	17,495

Table 3.3 Waste Collected and Tipped at Mbabane Landfill in tonnes in 1999
(1) Collection rate estimated to 40% of the full Mbabane City area

3.1.3.3 Waste Generation in Manzini

The Manzini City Council states that it collects household waste from 100% of the formal urban area. The population census revealed that 47,000 people live in Manzini. Waste collection services are provided to 30,000 people living in urban areas and commercial waste is collected from the city centre. Three peri-urban areas have recently been

incorporated into the urban area. These areas are served by skip-loaders trucks and trapezoidal skip bins.

The peri-urban areas cover informal settlements on the city/town boundaries and dense settlements in the rural areas adjacent to the towns. 60,000 people are living in the peri-urban areas outside the city are not serviced by the City Council.

There is no data available for the waste generated in these areas but very poor people are presumed to live in these areas and the waste generation rate is estimated to be as low as 0.20 kg/capita/day or 4,380 tonnes per year. Shops and markets are concentrated near road crossings in the rural areas, but the amount of commercial waste generated by these shops is difficult to establish.

These residents in these areas are presumed to burn their wastes and bury the residues in pits. The collection of domestic and commercial waste in Manzini has been estimated by the City Council through the volume of collection vehicles and receptacles as seen below.

Category	**m^3/week (1)**	**Estimated Density**	**Tonnes/year Urban i.e. 30,000 people**	**Tonnes/year (2) Urban i.e. 47,000people**
Domestic MCVs/bins	780	0.135	5,475	8,578
Domestic waste	53	0.135	372	582
Sub-total Domestic	**833**		**5,847**	**9,160**
kg/capita/day			**0.53**	
Special, garden & others	20	0.300	312	489
Pvt domestic/commercial	15	0.135	105	165
Street bins	5	0.135	35	55
Sub-total Other	**40**		**452**	**709**
Total waste amount	**873**		**6,299**	**9,869**

Table 3.4 Waste Collected and Tipped at Manzini Landfill in tonnes in 1999
Note that (1) is estimates provided by Manzini City Council and (2) is estimates of the total waste generation in Manzini Urban areas based on 1996 data.

3.1.3.4 Generation of Waste within Town Boards Areas

Matsapha has 13,000 residents in its housing areas. The domestic waste from Matsapha has been estimated to 386 tonnes/month, corresponding to 1,898 tonnes per year on the basis of the 1994 Swaziland Technical Consulting Services Report on the Matsapha Disposal Site.

The amount of waste generated per capita is estimated to be slightly less than that generated in the city areas and corresponds to 0.4 kg/capita/day. This means that it is estimated that the generation of domestic and commercial waste is in the magnitude of 3,650 tonnes/year.

3.1.3.5 Waste Generation in Company Towns

Five of the company towns are inhabited by some 25,000 people, which average out as 5,000 people in each centre or 3,650 tonnes per year at an average generation rate of 0.4 kg/capita/day.

3.1.3.6 Waste Generation in Rural Areas

The domestic and commercial waste generation rate in these areas is estimated at 0.2 kg/capita/day.

Some 710,000 people live outside the urban areas but if the peri-urban demographic grouping is deducted from this total then the rural population estimate reduces to 572,000, because it is estimated that 138,000 people live in the peri-urban areas on the boundaries of the larger centres. The total domestic and commercial waste generated in rural areas is thus estimated to be 51,830 tonnes per year.

The estimation of waste generation per capita per day is based on data derived from the Waste Stream Analysis prepared for the Durban Metropolitan Area by the Consulting Team, headed by SKC Inc /6/. The table below gives the distribution of different waste fraction within a rural area similar to the rural areas in Swaziland.

	Domestic
Category of Waste	**Mass (kg)**
Hard Plastics	34
Soft Plastics	51
Glass	22
Tin plate steel/aluminium	18
Other Metals	5
Cardboard	62
Other Paper	61
Putrescibles	460
Garden Refuse	-
Sponge Rubber	-
Textiles	36
Polystyrene	8
Wood	-
Other	-
Total	**757**
Average/sample point	**6.3**
Average kg/capita/day	**0.2**

Table 3.5 Estimates of waste generation per capita per day (Ntuzuma Section A - Very Low Income High Density /6/ - South Africa)

3.1.4 Summary of Waste Generation in Swaziland

The total amount of domestic waste, commercial waste and litter is estimated overleaf. The table shows a synthesis of the estimation of waste generation in the different urban and rural areas.

It is seen from the table that it is estimated that **a total amount of 86,323 tonnes of household and commercial waste is produced per year in Swaziland.** These estimations are evaluated against generation of waste in similar areas and seem to be the best available data.

The household and commercial waste generation in urban areas are estimated to 44,567 tonnes per year, while the waste generation in the rural areas are estimated to 41,756 tonnes per year.

Area	**1997 Number of Residents**	**Waste Generation Rate kg/capita/day**	**Total amount of waste Generated tonnes/year**
Mbabane Urban Serviced	24,000	0.55	4,818
Mbabane Urban Unserviced	36,000	0.40	5,256
Mbabane Peri-urban Unserviced	78,000	0.20	5,694
Sub-total Mbabane	**138,000**		**15,768**
Manzini Urban Serviced	30,000	0.53	5,804
Manzini Urban Unserviced	17,000	0.40	2,482
Manzini Peri-urban Unserviced	60,000	0.20	4,380
Sub-total Manzini	**107,000**		**12,666**
Matsapha	**13,000**	**0.40**	**1,898**
OtherTown Boards	**25,000**	**0.40**	**3,650**
Company towns	**65,000**	**0.40**	**9,490**
Sub-total Urban/Peri-Urban	**370,000**	**0.33**	**44,567**
Sub-total Rural	**572,000**	**0.20**	**41,756**
Total Domestic Waste	**942,000**		**86,323**

Table 3.6 Estimated Waste Generation in Swaziland based on Southern African Waste Demography

The **main problem** related to estimation of the generation of household waste, commercial waste and litter is the lack of reliable data.
Mbabane landfill is the only place where the weighing of waste is taking place. All local authorities are supposed to report waste amounts arising within their areas of jurisdiction to the SEA.

However, reliable information will only be obtained through the maintenance of weighbridge records at the larger landfill sites, good volume estimates at the small sites and regular surveys of different waste types and waste fractions from specific waste sources.

Reliable data of waste generation is needed in the future in order to make realistic and affordable waste management plans.

3.1.5 Projection of Generation of Household, Commercial Waste and Litter

Table 3.6 below gives an estimate of the waste generated from households, commerce and litter:

	Household and Commercial Waste Generation 1996
Urban Areas	44,567 tonnes
Rural Areas	41,756 tonnes
Total	86,323 tonnes

Table 3.6 Estimated waste generated from households, commerce and litter

For the projection of waste quantities from households and commerce, the point of departure would be the expected growth in population combined with the expected development in private consumption.

In 1991 the total population of Swaziland was 751,000 people. By 1997 the population had grown to 942,000, and the total population was estimated to be about 1 million people in 1998.

The population growth rate was 3.2% in 1997 and 3.1% in 1998. It is difficult to forecast future population growth rates. If the 3.1% growth rate per year continues, the population will be 1.44 million in 2010.

According to the United Nations “Common Country Assessment” of June 1998 the remarkable growth of the economy in the eighties, which conferred a lower-middle income status on the country, has since experienced a slow-down. The rapid population growth has grave implications for sustainable human development.

Other concerns related to the population trends, besides the high fertility rate, are the incidences of HIV/AIDS amongst the youth. Although the 1996 HIV Sentinel Surveillance Report put HIV prevalence amongst antenatal clinic patients at 26%, Swaziland seems to be in a relatively early stage of the epidemic. Therefore, the NDS population trends analysis from 1997, forecasts that in the foreseeable future HIV/AIDS will not necessarily lead to negative population growth rates.
An estimate of projected population in 2010 could be 1.1-1.2 million people, corresponding to an increase in population by 10-20% over the next 10 years is foreseen.

Based on the estimated lower but positive population growth rate anticipated above and provided that the population growth will take place among the poorer part of the population, the generation of household waste could be expected to increase by about 15,000 to 30,000 tonnes (100,000 – 200,000 people at 150 kg per year) in 2010.

This corresponds to a growth in household waste, commercial waste and litter of 9 to 17 % in the next 10 years due to population growth.

According the Annual Report of Central Bank of Swaziland for the financial year 1998/99, the performance of the Swaziland economy declined further in 1998 when an economic growth rate of 2.3% was recorded compared to 3.7% the previous year. On average, private consumption expenditure has shown an annual growth rate of 16.9% between 1991 and 1998. If this increase in private consumption continues, the waste generation from households and commerce in the urban areas will also increase. It has not been possible to obtain information on expected future private consumption expenditure, and therefore, it is not possible to estimate the future change in household and commercial waste generation resulting from change in private consumption.

Despite of this an increase in waste generation of 1 - 5 % over the next 10 years can be foreseen due to increase in private consumption. A rough estimation of the **waste generation in the year 2010** would be that the household and commercial waste generation would be **between 100,000 tonnes and 120,000 tonnes**.

3.1.6 Waste Management Planning

No integrated waste management planning covering the full waste management system is taking place in cities or towns. But the Manzini City and Matsapha Town have been surveying waste amounts for the planning of a future common landfill.

The Waste Regulations state that each urban local authority should prepare Waste Management Plans to be approved by the SEA in the future, but there are no guidelines for waste management planning to assist local authorities at this time.

It can therefore be seen that a uniform overview of waste generation and management in Swaziland cannot be obtained by the SEA at this time. The SEA needs to prepare guidelines for these waste registration and waste management planning activities.

3.1.7 Waste Prevention

Waste generation per capita is generally quite low in Swaziland, compared to other countries in the world. Maybe this is due to low private consumption and a low level of industrialisation.

There are many ways that waste prevention could be promoted. A good starting point is the relatively low private consumption. The careful consideration of technology used, when new industries are established, would be another route to go.
The utility associated with the increased reuse of bottles through deposit and return schemes should be carefully evaluated prior to the introduction of regulations enforcing these schemes.

Home composting of organic domestic and garden waste should be considered, as this would reduce the need for waste services, and reduce the pollution created by open burning.

3.1.8 Waste Collection

Waste collection is only established in the formal urban areas including cities, towns and company towns. Waste management services are provided by the urban local authority, which in the company towns means the company itself. The Ministry of Housing and Urban Development (MHUD) provides guidelines for urban development including waste management. In this respect, the MHUD facilitates co-ordinates and helps to raise funds for these activities.

The collection of domestic waste in urban areas is normally based on regular collection rounds using a variety of vehicles – tractor drawn trailers, trucks with flat-decks and raised sides, tipper trucks and mobile compaction vehicles in the cities and larger centres. In urban areas commercial waste is generally collected with household waste using the same services and systems, which are mostly provided by the local authorities. There are a few small private contractors.

3.1.8.1 Collection in the Cities

Mbabane:
The Mbabane City Council's waste management division has three trucks doing seven rounds a week for kerb-side waste collection. The trucks were provided by the Urban Development Project.

Two tractors drawing scissors-lift trailers service the 34 skips that are strategically located throughout the city within market areas and formalising residential areas, which are difficult to service using the trucks. Litter and street cleaning is not the responsibility of the waste management section but has been transferred to the public works section because of a history of waste being swept into storm-water drains by street cleaning staff.

The monitoring of illegal dumping and the enforcement of the provision of litter and refuse bins is the responsibility of the City's Environmental Management Unit, which is also tasked with the collection of bio-hazardous waste.

The area within the city boundaries has a population of around 60,000 people. About 40% of the wastes in Mbabane are collected. More waste would be collected if access roads were

established and if awareness was raised among people encouraging them to use the skips or other systems. A serious litter problem exists in this city. According to the City Council the residents think that it is the City Council's problem, not their own problem.

Manzini:
The City Council's Environmental Health Department and the Engineering Department are responsible for solid waste management. They supervise the owners of premises in the use of acceptable refuse containers – plastic or galvanised dustbins are provided with a tight-fitting lid. The owners of the premises must provide their own bins. Eight health attendants work on a door-to-door basis in the townships. They instruct residents on good waste management practices.

The City Council administers 25 townships including the central city area. Some 47,000 people live within the city boundaries. Waste is collected from 20 of the townships where a twice a week service is provided in emptying the 90 litre bins provided by the City Council.

Household waste is collected twice a week and hospital waste is collected everyday Monday to Fridays by three refuse trucks. It is taken to a landfill site next to Manzini Cemetery. Waste bins from densely populated areas are collected once a week and are also taken to the dumpsite. Household waste disposal costs the household owner E 7.00 per month, which is charged through the Water bills.

Medical waste is collected once a week and taken to the incinerator. The collection of medical waste is free. Private medical practitioners have special skip containers, which are also collected once a week for disposal.

Industrial waste is dumped in a landfill site by the industries themselves. Chemicals are buried in the dumpsite in containers.

The dumpsite is manned by a staff complement of four - two drivers and two payload excavators.

Five townships have recently been incorporated into the urban area and do not yet have dustbins, instead the City has placed skips near the places that residents dump their wastes. The City Council services 80% of its townships. Street litter bins, waste from restaurants and hotels is collected daily. Other commercial wastes are collected every second day.

The collection services are provided by 4 trucks from the City Council. All waste collected in Manzini is transported to the landfill. About 60,000 people live in Manzini's informal areas where there is need for planning of roads for access, water, sanitation, and waste management. These areas will be included within the city boundaries at some stage, but negotiations are still in progress on cost recovery. The City Council believes that the cost of formalising an informal area should be recovered from the Urban Development Project.

3.1.8.2 Waste Collection – Town Councils

Town Councils collect waste from households and commerce themselves or by means of contractors. The waste is disposed of at uncontrolled dumpsites with the exception of Pigg's Peak, which was assisted by the Maguga Dam Development to establish a clay lined landfill.

3.1.8.3 Waste Collection – Town Boards

Matsapha Town Board manages waste collection from approx. 13,000 residents. Domestic waste collection is carried out with a mobile compactor vehicle collecting waste on a three collection round cycle per day of the three operational days of the week. Waste is transported to the Matsapha Landfill site.

In another Town Board area, domestic waste collection is carried out with flat deck trucks with raised sides or tipper trucks collecting waste on a three collection round cycle per day of the three operational days of the week. The wastes are transported to open dumps located in the open or in dongas (eroded drainage axes). Similar waste management systems are seen within the other Town Board Areas.

3.1.8.4 Waste Collection – Company Towns

Below the collection systems in Bhunya and Mhlambanyatsi are described as examples of collection systems in company towns.

In residential areas of the SAPPI Usutu Company towns of Bhunya (3,000 persons) and Mhlambanyatsi (1,000 persons) domestic waste is collected from waste bins using a tractor drawn scissor-lift system, which can also handle the waste skips that are placed in public places. The company employs community service people as domestic waste contractors.

Domestic waste from Bhunya is disposed of at the company's landfill, whilst domestic waste from Mhlambanyatsi is transported to an area outside the town where it is tipped into specially excavated trenches that are 2m wide, 2 m deep and 15 - 20 m long. When the trench is full the waste is covered with soil and a new trench is excavated. The same system for waste disposal is operated by the Sun International Hotel Group in the Ezulwini Valley.

3.1.8.5 Waste Collection – Rural Areas

Outside the urban areas waste is disposed randomly in small dumping areas. Women groups have a waste collection system in practice in many areas. But settlements in the rural areas usually have no waste collection services, which results from the local authorities' lack of means for providing services. Waste management in these areas is the responsibility of the Deputy Prime Minister's Office. Health officers are employed by the Ministry of Health and Social Welfare to educate the Rural Health Motivators (RHM's) and promote good waste management practices. Other stakeholders are also involved in education and promoting good waste management practices. The waste is burned and the residues are buried in pits in the backyards. In some cases the waste is littered in backyards or public places. Widespread littering is seen in many of these areas, particularly along roadsides.

Rural Health Motivators are voluntary workers elected by the community, trained and paid (150 E per month) by the Ministry of Health & Social Welfare. Together with Home Economic Extension Workers from Ministry of Agriculture and co-operatives they promote clean-up campaigns, the use of pit latrines and improved waste handling.

3.1.9 Main Problems with Collection Systems

The collection systems are generally inadequate in densely populated settlements in urban and peri-urban areas. Nevertheless, in some places collection is provided based on resident initiative, but in most places collection is not taking place.
A standardised household waste storage system is required. This could be the 90 litre dustbin, the 80 litre plastic bag or whatever system is deemed suitable by the community at large. The financing of the establishment of collection systems with full coverage of all areas is a very important issue.

3.1.9.1 Litter Problems

The waste regulations state that littering is not allowed, thus a waste collection service must be given to all the residents in urban areas. However, in densely populated areas where no collection service exists, the litter problem is immense.

The residents in these formalising areas do not enjoy the skip system. It is not very well used in less formal areas because people do not want to walk long distances to place waste in the skips. The skips are usually located on kerb-sides adjacent to the major roads. It is often the young children that are given the responsibility of carrying the refuse to the bin and they have difficulty in placing waste in the bin because they cannot reach the lid or edge of the bins. The result is a proliferation of informal dumping areas.

The population, in general, is very much aware of problems related to the conservation of natural resources, e.g. soil erosion and desertification. However, there seems to be less awareness of water pollution, waste problems and litter, all of which are related to aesthetics and health issues. It may be that there is inadequate emphasis on brown environmental issues in the education system.

Among the adults there must be an awareness of pollution problems because of the work of the employees of the Deputy Prime Minister's Office; the Health Officers from the Ministry of Health and Social Welfare and the associated Rural Health Motivators, as well as the Home Economic Extension Workers from Ministry of Agriculture – all of whom promote clean-up campaigns and good waste management practices.

However, the litter problem along the roadsides suggests that this awareness is not being translated into action by local people, although some places local residents have taken initiatives for cleaning up. This may be a symptom that some people take "ownership" of the litter problem, but in many areas littering is still a problem.

Thus, litter may be associated with a lack of awareness compounded with the absence of waste collection services in many densely populated settlements.

Another very visible environmental problem is the ubiquitous plastic carry bags. The fact that these plastic bags (given out for free at shops) can create severe problems e.g. to the cows and other animals when grazing. The heavy use of plastic bags creates the mentality of "use and throw away", which is not sustainable.

Change of attitude within the authorities and the people in general concerning littering in open spaces is needed. In some areas you see no littering at all, so people in these areas must be able to solve the problem; in other areas you see littering and scattered dumping everywhere.

The problems in these areas could be solved by capturing experience from the well-managed areas and then focus on the specific problem for e.g. half a year.

Development of capacity amongst the refuse collection crews, to make them report back to the local authority on the waste management problems to be solved (e.g. illegal industry waste disposal, scattered scrap car waste for example in residential areas etc.)

3.1.10 Waste Recycling

There are no formal or public recycling schemes operating in Swaziland. Only private and informal recycling initiatives exist. The private recycling initiatives mostly deal with industrial waste and do not cover domestic waste. Informal recycling activities in the form of waste picking at the landfills and dumpsites is widespread. The materials sorted out are primarily cans and cardboard, but food wastes and metals are also collected.

Mbabane City Council indicated that they would like to sort their waste for recycling in order to conserve landfill airspace, but no additional staff is available for this task. At Mbabane landfill scavenging is partially organised, in that waste pickers sort out flint glass, paper, cardboard, aluminium cans and tin-plate steel cans before the waste is compacted. The recyclable materials are sold through the SABIL Foundation, which in 1999, collected approximately 26 tonnes of cans and 13 tonnes of cardboard (craft) per year. The tonnages were estimated because not every load is weighed. No information was available for flint glass. There are no markets for coloured glass or recycled plastics.

Manzini and Matsapha landfills have many waste pickers and scavenging is uncontrolled.

Rural Areas dumpsites have very few waste pickers perhaps, because there is very little of value to be picked from the rural waste stream. There are no estimates available for tonnes being recycled in the rural areas.

<u>Recovered Materials:</u>

- Tin-plate steel and aluminium cans are collected from the waste pickers by the SABIL Foundation, which is a NGO organised by Swaziland Brewers Ltd. Until recently the can recovery rate in Swaziland averaged a reasonable 48% but it declined to 35% in 1999 when only 506 tonnes of bailed cans were returned to Collect-a-Can in South Africa. The estimation of can recovery rates is complicated by the movement of the 450 ml beverage can into Mozambique from Swaziland. However, Collect-a-Can is active throughout Southern Africa and better estimates of the tonnage of cans recycled may be obtained with more research.
- Flint glass is collected by Ngwenya Glass, which is totally dependent on recycled flint glass and uses 60 tonnes/year of this material. A new glass kiln is planned at Ngwenya Glass and this will facilitate the recycling of coloured glass. Some glass bottles and cans are bought by the Swaziland Brewers.
- Paper and cardboard are collected by Swazi Paper Mills and used for production of liner and fluting.
- Considerable amounts of organic waste from food processing industries are collected for domestic animal feeding.

3.1.11 Problems with Recycling

The limited recycling relates to a lack of regulatory or economic incentives for recycling. The market for recovered materials in Swaziland is also limited to Ngwenya Glass and the Swazi Paper Mill at Matsapha. Other recycling activities relate to the export of recovered material to South Africa, e.g. cans and used oil (when this may be legitimised through implementation of the Basel Convention regulations in Swaziland's waste regulations).

The potential for recycling specific materials in Swaziland requires research. The composition of the waste stream must be assessed in order to initiate realistic and viable recycling schemes. It is extremely important to evaluate the whole cycle from source separation to demand for the recycled material before recycling schemes are considered. Only if the benefits (environmentally and economically) are good and sustainable, these schemes must be supported.
A three-day survey (1997) was carried out in Manzini by the Manzini City Council to determine the composition of the local waste stream collected from households and commerce. The survey was based on estimations of volumes.

Plastics	8%
Cardboard	14%
Papers	6%
Cans	19%
Metals	1%
Ashes	0.5%
Glasses	1%
Bottles	2%
Garden refuse	4%
Clothes	0.6%

Condemned shop-stuffs	2.4%
Condemned meat and meat products	10%
Hospital waste	1%
Hazardous waste	1%
Others	29.5%

Table 3.7 Composition of Household Waste - Manzini (volume).

The situation is exacerbated by the fact that collection and tipping fees are not usually charged for waste disposal at landfill sites or dumps which means that there is no incentive to control costs by recovering resources and reduce waste.

It could be considered to give strong incentives for recycling – existing initiatives are scattered but private activities take place. The recycling activities will partly be dependent on incentives through legislation or regulation, which could direct e.g. commercial organisations and industry to minimise, reuse and recycle wastes, and thus to minimise waste for disposal. Specific attention should be given to retailers in order to improve recycling in this sector. This could be promoted through e.g. taxation, producer responsibility laws, high disposal costs, etc.

The potential for increased recycling should be assessed through waste composition analysis, the costs for collection of recyclable materials should be estimated, the environmental benefits of recycling compared to disposal at landfill sites should be evaluated and the outlets for the recovered products should be assessed.

New recycling initiatives should be based on these findings. Furthermore, it would be important to perform a demonstration project on source separation in order to assess the willingness of residents, commercial enterprises and industries to separate recyclable materials from the residual waste.

Recycling opportunities for waste from markets could be explored. The waste falls into two distinct categories, namely a food waste and a paper and plastic based packaging waste. If source separated, these market wastes could be recycled and composted. Regulations are required if recycling is to be encouraged.

In the short term increased control of waste picking at landfills and dumpsites, in order to improve the health and safety of the waste pickers by ensuring the use of protective clothes, gloves and shoes and in order to ensure a appropriate landfilling operation.
In the long term waste picking at landfills and dumpsites should be phased out through establishment of recycling schemes based on source separation of recyclable waste. This would mean that very small amounts of recyclables would be disposed of at landfills, and waste picking would not be profitable.

There is need for intensive education in "entrepreneurship" to promote recycling. And furthermore, there is a need to investigate possibilities for the establishment of more

recycling plants like Ngwenya Glass in Swaziland - for other fractions. The glass recycling should be further encouraged.

Awareness campaigns could be considered especially towards plastics and tins but other materials should be considered. The existing scrap metal industry should be investigated in order to streamline the recycling of scrap metal and used cars from Swaziland.

3.1.12 Waste Treatment and Disposal

Incineration of domestic and commercial waste does not take place in Swaziland. The only sanitary landfills in Swaziland are located in Mbabane and Piggs Peak. The Mbabane landfill is operated by Mbabane City Council. Manzini City Council operates an uncontrolled landfill for domestic and commercial waste. Piggs Peak landfill has been opened recently. There is no weighbridge at this landfill. Waste amounts is recorded by volume and divided into commercial waste and household waste.

Outside the two cities, and the town of Piggs Peak, all waste is usually tipped at dumps established without any measures to protect surface or ground water. No compaction or covering of the waste takes place and landfilling is not controlled.

All the company towns solve their waste disposal problems individually. Some towns dispose of the household waste at new landfills or old dumps for industrial waste. Some towns have dedicated solutions for domestic waste, e.g. by waste disposal in excavated trenches, where the domestic waste is burned to reduce its volume before being covered with soil. Waste trenches are used at the SAPPI Usutu company town Mhlambanyatsi and at the Swazi Sun Hotel.

In rural areas domestic waste from homesteads is usually thrown into pits where it is burned. Commercial waste from markets and shops are often dumped at uncontrolled dumps in the open.

Mbabane's sanitary landfill was established in 1998. This development was financed through a World Bank loan to the Ministry of Housing and Urban Development. This landfill has a projected operational life of 25 years but it has been forecasted that its design life is shorter. Ezulwini and Ngwenya Town Board recently approached the Mbabane City Council to use the Mbabane landfill. Mbabane City Council foresees that they will agree to receive waste from nearby towns, and the City will have to charge these towns tipping fees. Mbabane will need to assess the expected amounts and types of waste from these towns before it agrees to accept these wastes.

The site is relatively well engineered with stormwater diversionary drains, gas vents have been built-in to the design and the site is lined with both a primary and secondary leachate capture system. The leachate storage dam appears to be inadequate relative to periods of high rainfall although the freeboard appeared adequate at the time of the site inspection that took place in Mid-June 2000, i.e. the dry season.

In the wet season excess leachate is used to irrigate the adjacent Eucalyptus saligna forest, which is illegal. Two fenced areas have been set aside off-site – one for the composting of garden refuse and agricultural waste (a new initiative), and the other for the stockpiling of large elements of scrap metal, e.g. automobile bodies and old white goods (stoves, refrigerators, washing machines etc.).

Seven landfill staff work on the landfill for entry control, spreading, compacting and covering of waste, and for collection of litter in the surroundings. The disposal fee is calculated to be 150 E per tonnes including costs for the rehabilitation of the area after disposal has come to an end.

Two landfill compactors are working on site – a large BOMAG and smaller Agrico unit. A rubber-tyred loader is used from time to time to place cover and assist with site work.
Part of the site was not covered and had pools of water lying on top of the landfilled waste. The site receives an average daily waste input of 19 tonnes. The waste entering the site is weighed and classified. The information is recorded and the site office can provide detailed data from its last two years of operation on daily, monthly or annual basis. Waste data is recorded in five categories with further subdivisions.
At the working area of the landfill the waste is spread and visible scrap metal is recovered.

Ten waste sorters recover materials from the waste delivered to the landfill. It was originally specified that waste picking would not be allowed on this site, but the Ministry of Enterprise and Employment intervened to allow the development of new employment opportunities. The Ministry undertook to provide protective clothing for the waste sorters but this has yet to happen.

There is no market for plastics in Swaziland. Flint glass bottles are sold to Ngwenya Glass, paper and cardboard to the Swazi Paper Mills at Matsapha, aluminium and tin-plate steel cans are sold to the SABIL Foundation. The stockpiles of recycled materials are segregated from the landfill by some large rocks adjacent to the weighbridge and office buildings and the recovered materials are neatly stored in large woven polypropylene bags.

Medical waste received at the site is stored under a roofed area and only landfilled after the waste sorters have left the site at the end of the daily operations. At that stage the waste is compacted and covered before the landfill site crew leave the site.

A problem with this site is its location near a small stream, which is a local source of potable water.

Piggs Peak has established a new sanitary landfill in June 2000. This development was financed through a Development Bank of Southern Africa loan under the Maguga Dam Project to Ministry Housing and Urban Development through the Piggs Peak Town Council.

The first three cells of the landfill site have a projected operational life of 3 years capacity. The site receives an average daily waste input of 30 m^3 per day. Incoming trucks register at the entrance to the site and the skips that enter the site are estimated as having a nominal capacity of 6 m^3 each. 19 skips are in use and one tractor drawn scissor-lift trailer is used to service the skips. Two categories of waste are recorded – domestic and commercial.

The landfill site is fenced and has one access gate. The site has a liner and leachate is collected. The leachate is stored in a septic tank and removed by tanker for treatment at the Pigg's Peak wastewater treatment works.

6 staff members are employed at the landfill for entry control, spreading, compacting and covering of waste, and for collection of litter in the surroundings. No disposal fee is charged. A padfoot roller is used for compaction being drawn behind the tractor used for collection. Recycling of cardboard, flint glass bottles and cans is carried out at the site.

At **Manzini**, the waste from households and commerce is tipped at a dumpsite 2 km from the city centre within the urban area and adjacent to the Manzini By-Pass Road. The site is 21 years old and it is anticipated that it will remain open for another five years. There are no stormwater diversionary drains on site. There is a spring at the top of the hillside on which the disposal area is sited next to the local cemetery. Water from this spring seeps into the landfilled waste. The damp areas of covered waste, noted further down the site, suggest that this spring is day-lighting at that point in the form of leachate which, may be entering a significant tributary of the Usutu River. This tributary drains the valley invert below the site. There is no leachate capture or storage system on site. This site is poorly managed with the application of cover taking place non-routinely. The heavy rainfall has led to the waste not being compacted and covered for a considerable period of time and a large area of open refuse was exposed at the time of the site visit. However, soil cover was being spread at the time that the site was visited. A small Furukawa Rubber-tyred Loader was being used for this purpose at the time.

About twenty informal waste pickers were active at the site. The waste picking does not appear to be organised or controlled. Cans, bottles, glasses, plastics, paper and cardboard are recovered at the site.

Matsapha has a dumpsite where the waste from households and industries is tipped. The solid waste site is located 500 m south of the industrial estate, adjacent to Matsapha airport. There are no stormwater diversionary drains, no leachate capture or storage facilities exist and the site is not lined. However, there are maturation ponds or extended aeration ponds below the site, associated with the Matsapha wastewater treatment plant, and these could accept leachate and contaminated groundwater if interception drainage could be engineered at the toe of the batter slope of the landfill.

The Matsapha Industrial Landfill site is a very poorly managed site. The Caterpillar D6 bulldozer was parked at the site office and not in use at the time of the visit. More than one hundred tip pickers were seen on site. Some of these were young children. Condemned

food, e.g. yoghurt was being salvaged. Whilst on site, a covered truck arrived with, what appeared to be, condemned chickens and meat on board. Food was being prepared, sold and eaten on the site.

The site has very steep batter slopes towards the site boundary in the original valley invert. Two of these steep batter slopes were burning at the time of the visit. This is extremely dangerous with respect to toxic smoke inhalation for the tip pickers and any staff on the site. Apart from other potentially hazardous substances of industrial origin, both polyurethane and polystyrene wastes were noted on site and these materials will produce dangerous emissions in smouldering refuse fires. Such conditions can result in serious injury and death through the immolation of people and the destruction of trucks and plant by fire, because sinkholes will develop when the waste fill collapses as it becomes undermined by the slow combustion process. The site was not being covered although there was a small stockpile of cover. It will be a difficult, dangerous and expensive exercise to extinguish the fires. If the fires spread the smoke will also be a potential hazard for the airport. The steep batter slopes will require engineered corrective measures to improve the stability of the site.

Historically, the operation of the site has been poor. In an effort to upgrade its operation, the site was redesigned in 1992 with an operating plan and a closure plan. The landfill was redesigned again in 1994 and has a residual capacity of about 12 years. However, it was decided by the relevant Swaziland Government Ministries that the site should close. The motivation for site closure is as follows: -

- the location is adjacent to the international airport (the smoke and birds associated with the current practices at the waste site may endanger the safety of landing planes),
- the waste site is within 500 m of local residential and industrial areas (the smoke, odour, flies and visual intrusion due to poor operational procedure may influence human health and quality of life), and
- the land use compatibility of the waste site and its resident waste pickers to the adjacent airport and expanding industrial site is problematic,
- lack of facilities for hazardous wastes,
- lack of waste systems in rural areas particularly at the growing commercial sites,
- no appreciation of the seriousness of the danger posed by medical waste (from hospitals, health centres and clinics etc.).

Manzini City Council and Matsapha Town Board have decided to plan a common waste disposal facility, which could also include some of the neighbouring towns. The City has prepared a new planning scheme with a demographic profile of Manzini and Matsapha Industrial Estate has plans for the establishment of a new solid waste landfill and the closure of the existing dumpsites.

Furniture was being made of scrap. Perhaps this is something that could be encouraged, if the waste was separated at source.

Whilst visiting the Matsapha Industrial Area, the Swazi Paper Mills (located close to Matsapha on the Southern side of the Usutu River) was observed. It appeared to have its own disposal site and this site was burning on the day of the visit.

3.1.12.1 Waste Disposal Problems

The **main problems** concerning disposal of waste in Swaziland are the following: -

- The Mbabane landfill site has a leachate storage dam capacity problem because the leachate generation rate was underestimated and the existing storage dam overflows during the wet season. Neither the irrigation of the adjacent *Eucalyptus saligna* forest with excess leachate nor re-circulation of the leachate to the landfill site solves the problem because of the very high rainfall (normally 2000 mm. per year) and the potential to pollute the nearby river. The leachate problem must be solved. The problem is expected to endure more than 25 years after the closure of the landfill. There is no treatment facility for sewage water or leachate near the site.
- Uncontrolled waste disposal by Manzini and Matsapha and the Industrial Estate should be stopped. A common sanitary landfill for these authorities should be established as soon as possible.
- The uncontrolled dumpsites at the other town councils and town boards should be improved. This might be achieved through development of guidelines for the operation of landfills in densely populated areas, including minimum requirements for the siting of disposal sites and the operation of landfills including the application of daily cover on compacted waste etc.
- Waste pickers are exposed to high health risks by working in close contact with the waste. This includes hazardous and medical waste. In the short term, waste picking at landfill sites and dumpsites must be controlled and organised with due consideration of the landfilling operation, and waste pickers must be equipped with protective gloves, shoes and clothes. In the long term waste picking at landfills and dumpsites should be replaced by separation of recyclable materials at source.
- Awareness on proper waste disposal in rural areas is relatively low, and the training of health motivators should put more emphasis on practical waste management in rural areas where no waste collection services exist.

Waste Treatment and Disposal in Urban Areas

- New landfill sites are urgently needed to replace the existing dumpsites that have been formal facilities for urban area waste. Location of new landfill sites should be sought where advantage can be taken of local favourable geology with in-situ low permeability clays. Furthermore, the future generation of leachate should be carefully evaluated and new landfill sites should preferably be located in those areas with the lowest rainfall.
- Until new controlled landfills have been established for all urban areas, appropriate upgrading (e.g. covering of waste with soil) and eventually closure of the existing dumpsites should be performed.
- On-the-job training of landfill staff in handling of waste and proper disposal technique should be a routine exercise.

- Development and implementation of minimum requirements/establishment of proper standards for licensing of controlled waste disposal sites must be elaborated. Such requirements are essential components together with the proposed introduction of new landfill sites. A proper managed landfill site should offer appropriate levels of operational control, coupled with necessary environmental controls to ensure protection of all environmental media, but especially ground water and surface waters. In due course, SEA will need to undertake their own independent monitoring to ensure compliance with approved requirements.
- 4- 5 disposal sites will be sufficient for all Swaziland economically speaking. But politically it might be difficult to share disposal facility. On the other hand, it is considered quite impracticable, without unlimited resources, to provide a safe and controlled disposal facility for each town in the country.

Waste Treatment and Disposal in Rural Areas:

- There is a need for proper facilities to dispose of all types of waste. The plants should be properly managed (trained staff) and awareness amongst the users of the treatment plants and the monitors of the plants, should be raised gradually.
- Development of guidelines for local waste disposal sites in waste control areas (or in all densely populated settlements) must be elaborated.
- Awareness campaigns on proper waste handling in rural areas outside waste control areas should be carried out. These awareness campaigns should specifically pinpoint potential environmental problems.
- There is a need for a system for waste management in more densely populated rural settlements – e.g. a common way of disposing off waste. Guidelines or by-laws for waste management could be developed for rural areas and demonstrated.
- In the growing market and shopping areas in highway or road junctions, there is a need to establish proper waste disposal sites, or to ensure collection of the primarily commercial waste at local transfer stations for transport to well managed landfill sites.
- Real rural areas i.e. in the scarcely populated areas there is a need for awareness raising, motivation and education and a need for introduction of some kind of penalties or incentives to secure sustainable waste management within the area. The surrounding areas seem to be no ones responsibility. A pilot project showing sustainable waste management within a rural area could be proposed. The chief is the entry point for such a project. A proposal for a pilot project must go through the Nkhundla. The chief must be the leader of a project in order to motivate the people. The community police could also be involved to discipline people, who do not follow the rules. Waste management must be everybody's responsibility. The community health motivators reach all the people within a chiefdom and they and other groups could assist in motivating the people.
- There may be a need for each Regional Office to establish a Waste Management Department or Section with responsibilities and duties for ensuring safe waste collection and disposal in dense settlements and larger shopping/market places in rural areas, and ensuring safe waste management practices in other rural areas through the traditional system.

3.1.13 Household & Commercial Waste Management Costs

In cities and towns revenue for waste collection is collected through rates and property tax.

A full cost recovery programme has been initiated in order to secure cost recovery of the collection systems and disposal facilities. The programme includes suggestions to incentives for recycling and reducing waste. Seven economic instruments are recommended. The status and plans for implementation of some of the strategic elements of the programme were not available for the project group by the time of reporting, but this issue will be investigated during the next phases of the project.

Every **Mbabane** household in the formal areas pays 142 E per dustbin per year for a twice a week waste removal service, whilst commercial undertakings in the city centre are provided

with a daily waste removal service. It is government policy that city councils must progressively rely on local rates and taxes rather than state subsidies. The State does not budget for city council expenses according to needs, it merely disburses what it can afford. In the year 2000 the City Council of Mbabane received a grant of 2 million E from the Government and raised 27 million E from local property taxes. Further income is derived from user-related charges, e.g. waste disposal tipping fees and plan submission fees. All income and sales taxes benefit the national fiscus and not the local authority directly. The charge for waste collection is collected as part of the property tax.

The disposal fee at Mbabane landfill has been calculated to be 150 E per tonnes including costs for re-establishment of the area after disposal has come to an end.

In **Manzini** the households pay 96 E per dustbin per year. This waste management rate is paid through the water account. This rate has not been revised for a long time. The Manzini City Council collects a sum of 150,000 E on average per year. Privately collected waste is charged a tipping fee of 20 E per bakkie load at the landfill, which provides an annual income of about 10,400 E.

A separate account for waste collection fees is not maintained by the Manzini City Treasury as the rates are simply accumulated in the general account. It is not clear whether, or not, the fees cover the actual cost of waste collection or disposal.

The **Regional Office** *of the Deputy Prime Minister* in **Manzini** has (as the three other regional offices) a development fund for improvements in the rural areas. The fund is based on the payment of 70,000 E per year to each Nkhundla in the region. The fund has been used to provide drinking water systems and other infrastructure projects. The chiefs apply to the Tinkhundla Council, and a list of all requests is sent to the Regional Secretary for processing.

3.1.13.1 Problems related to Waste Management Costs

The **main problem** concerning cost recovery for waste collection and disposal services is the difficulties to get a full overview of the current cost for waste management services. A survey on full cost recovery has been initiated and should be promulgated.
Incentives for waste prevention, recycling, waste recovery and environmentally sound waste handling should be found and implemented in the waste regulations at all levels as well as in the National Waste Management Strategy.
Difficulties can be foreseen with recovering realistic rates for waste services in the peri-urban areas, because of the poverty of the people in these areas.

3.2 Institutional Set Up and Capacity related to Operation of the Waste Management Systems

As examples of the institutional set up and capacity related to operation and enforcement of waste management services, institutional profiles of the different bodies are given below.

Firstly, a description is given of the two City Councils, Manzini and Mbabane. Thereafter two Town Councils of Nhlangano and Pigg's Peak are described. Thirdly, the institutional set up and the capacity of Ezulweni Town Board are described as an example of the institutional set up in a town board, and finally an example of the institutional set up for waste management is given using Big Bend Company Town as an example.

3.2.1 Institutional Set Up and Capacity – Manzini City Council

The population of Manzini City currently stands at 31,382 according to information obtained from the 1999 Annual Report.

Manzini City Council was established to promote the development of the City and also generally to improve the efficiency and effectiveness of all services rendered to the public thus improving the quality of life of all the residents of the City.

An elected Council comprising of twelve members and four appointees of the Minister for Housing and Urban Development is responsible for enacting policies and regulations for the Institution. The Council continuously liases with the Ministry of Housing in its activities.

The emphasis of the Town Clerk’s office during 1998/1999 has been on organisational development and planning to improve the performance and overall functionality especially with regard to solid waste management.

The City Council remains financially constrained by the reliance on rates as the main source of income and anticipates that the Government will move forward on the fiscal decentralisation initiatives, which will lead to the development of the revenue/cost sharing formula to ensure fiscal sustainability of local Authorities. Furthermore, the City Council receives an annual subvention from the Central Government. The charges for services have not been revised for the last ten years, even though it is regulated that the City Council has to charge such fees to sustain their operations.

With regard to solid waste management, the City Council experiences some problems in discharging this responsibility effectively, mainly because there is a significant amount of unpaid rates, as a result, valuable resources are used to pursue outstanding debts.

The City Council has developed a participatory planning tool assisting in a lot of activities including solid waste management. These planning processes also involve the communities so that they can take part in decisions that affect their lives.

The Department of Health and Social Welfare in Manzini is charged with the responsibility for environmental sanitation, which include among others liquid and solid waste

management. This could be achieved through planned inspections and the collection of solid waste and refuse disposal from both the urban and rural areas.

A new solid waste disposal site initially proposed to be located in Nhlambeni was put on hold as a result of the Council's concern regarding imminent relocations of homesteads and the unsuitable geology of the area with relative cost implications. The Council is in the process of exploring possible options to get the project going.

Organisation of Work
The Manzini City Council's Department of Environmental Health Services works hand in hand with the Engineering Department regarding their duties within the disposal of solid waste. The Department of Environmental Health Services performs an advisory role in the duties of disposal of solid waste, while the operational responsibilities are handled by the Engineering Department.

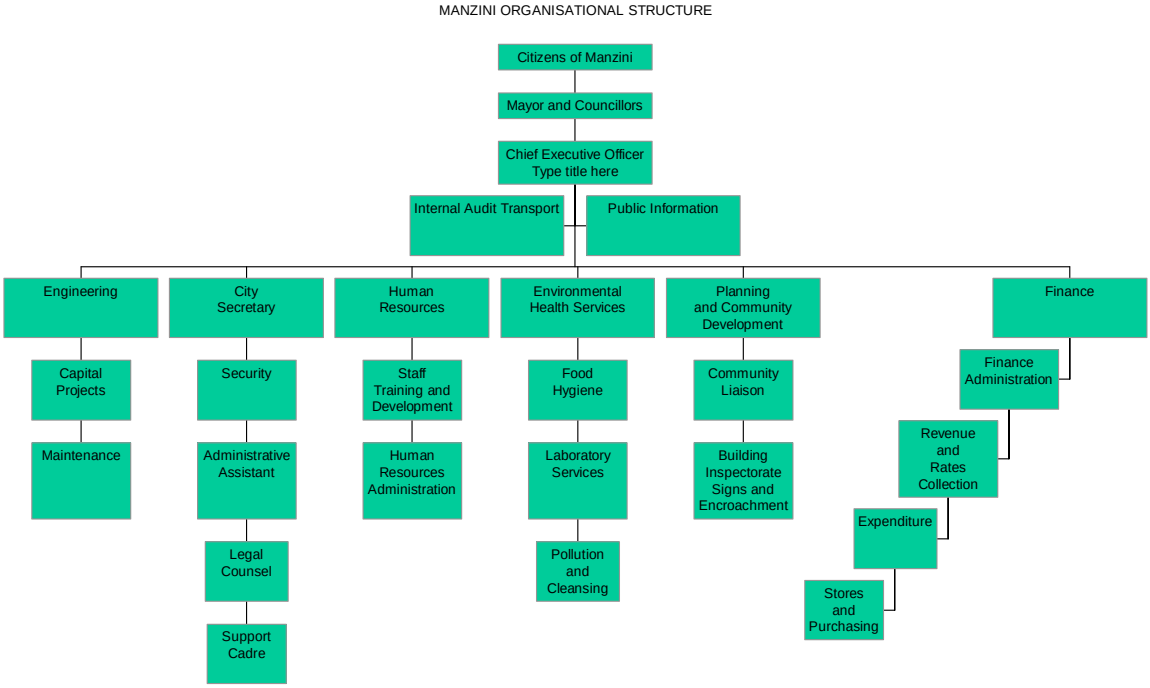
The solid waste management unit co-ordinates 8 Health Attendants, who inform households on how to store waste until collection. The Health Attendants are employed by the Department of Environmental Health Services. The waste collection is carried out by:

- 5 drivers
- 4 tindunas
- street sweepers
- 2 dumpsite attendants.
- 4 health inspectors

The health inspectors are responsible for ensuring that all solid waste in the urban area is properly collected and disposed and they control the illegal dumping of such waste. The health inspectors do a periodic check around the urban area to identify and remove any solid waste that has been dumped.
The dumpsite attendants are responsible for proper compacting of all solid waste, which has been deposited at the dumpsite. The Tindunas are responsible for the supervision of all the Street Sweepers involved in the collection of solid waste.

The equipment situation at Manzini City Council can be summarised as follows; three refuse collection compactor trucks (acquired in 1996), one refuse skip truck, one refuse compactor and one loader. Manzini City Council is still expecting one ten cubic metre truck.

Structure
The Environmental Health Services Department comprise the following members of staff; A Chief Health Inspector, two Senior Health Inspectors, three Health Inspectors, two Supervisors (assistants to health inspectors) and a number of workers.
The structure of Manzini City Council is seen below giving the organisational set-up of the waste management operations.



A formal technical training and assistance programme is executed. This programme provides significant benefits to the staff. The programme is offered by Manzini ‘s Sister City, which is the City of Winstonnes-Salem, North Carolina, USA.

3.2.2 Institutional Set Up and Capacity – Mbabane City Council

The city has a population of 58,063, according to data extracted from the city council’s annual report of 1999. Around 50,000 people are dwelling in the city as they come to the city to work.

The Mbabane City is governed by a City Council. The 16 members are called Councillors – 12 of them are elected by the people of Mbabane, and 4 are appointed by the Ministry of Housing and Urban Development. The Council is chaired by a Mayor elected by the Councillors.

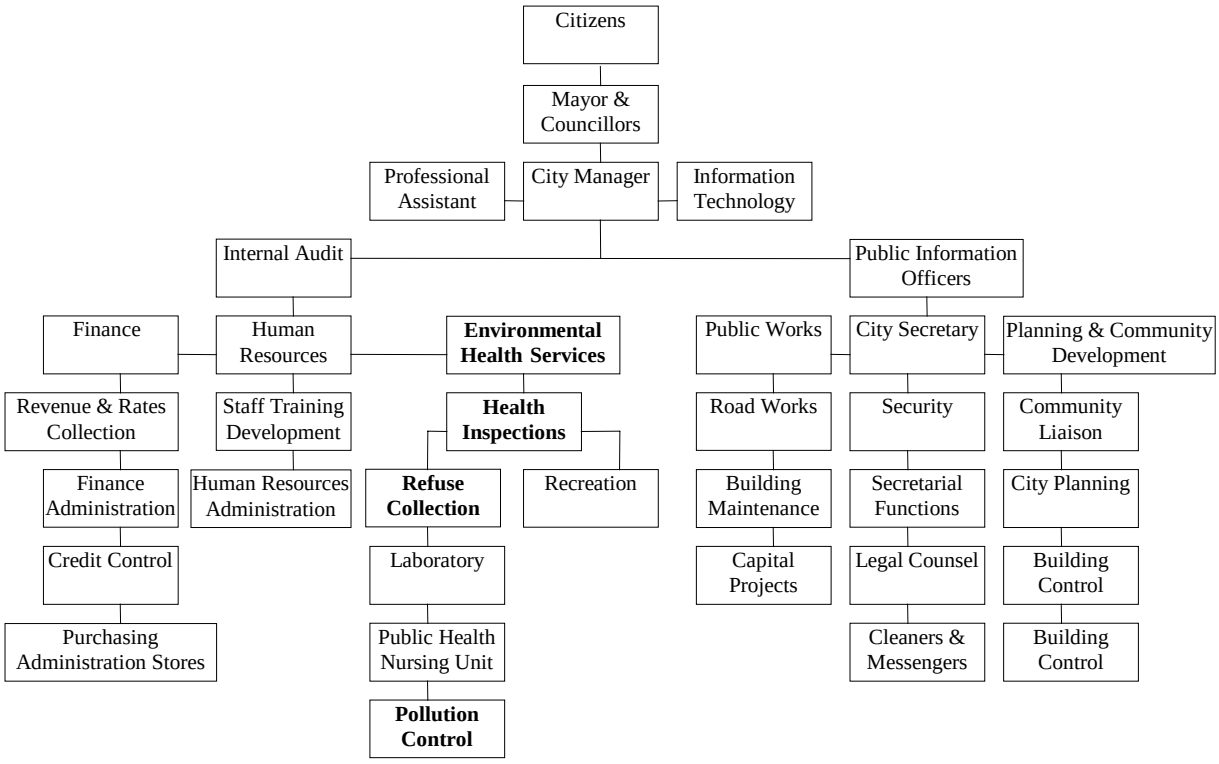
The City Council levy property tax on immovable property based on the market value of the property. This tax is called rates. It is through these taxes that local authorities can provide all the necessary service to residents, such as e.g. solid waste disposal.
Furthermore, the City Council charge street vending fees (monthly or annually), using the Urban Government Act of 1969, refuse collection fees, bio-waste collection fees, and abattoir’s operations fees. The City Council charges penalties on person(s) caught committing illegal acts.

Mbabane City Council operates a sanitary landfill site situated about 14 kilometres out of town - Mbabane Sanitary Landfill. The waste collection trucks collect household waste

twice a week, except for medical waste, which is collected daily. Household waste is collected using plastic bags of different types, cardboard boxes and standard dustbins, which have all proved unsuitable during the loading process.

Structure

The City Council of Mbabane has 329 employees in all. There are seven departments in the City Council.



3.2.3 Institutional Set Up and Capacity – Nhlangano Town Council

The Nhlangano Town Council is a relatively new council having been formed in 1994. Prior to the status of a Town Council, the town had a Town Board.

Presently there are about 1.280 stands with an average of 6 people per household. The population is therefore estimated at about 7.680 citizens. Nhlangano has an informal population of about 450 families living in an area. These families have no infrastructural services. During working hours, the population increases dramatically. The Town Council is governed by 8 councillors of which 6 are elected and 2 are appointed by the Minister of Housing and Urban Development.

Nhlangano's current dumpsite is located at MacAlpine three kilometres away from town. The town has not had a town clerk for 2 years. There is no co-ordinated policy for waste disposal and waste management in place and no strategy for medical waste management.

Nhlangano Town Council generates income through charging property taxes (i.e. rates). Approximately E 324.000 is collected every year from property owners.

Refuse collection charges are E 96.00 per annum, which is charged and collected through property rates once a year. Presently there are no user fees that the council collects for itself, but the City Council collects market fees and abattoir charges on behalf of the government. In other words, these responsibilities have not yet been fully passed over to the Nhlangano Town Council.

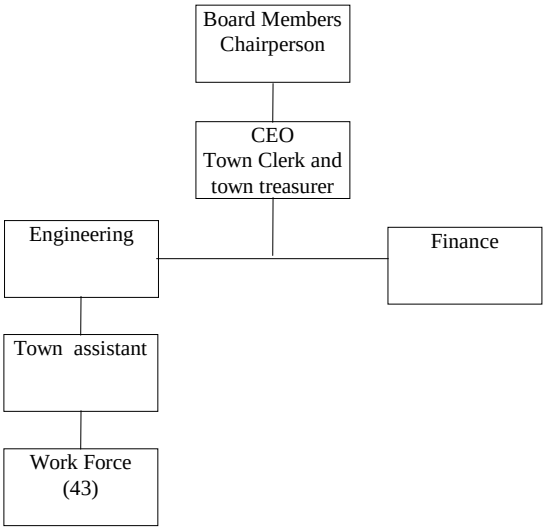
A large proportion of the Town Councils finance comes from the central government in the form of subventions. These subventions account for about 62% of the Council's total revenue. There is an urgent need to organise a well-managed dumpsite, but there are severe budget constraints.

The Nhlangano Town Council has one truck to collect refuse twice a week from residents.

The following staff is employed; six truck staff including the driver and one dumpsite attendant. The Town Council has three offices, two boardrooms and one reception area. The offices are equipped with two computers, two printers, one fax machine and a photocopier, which is old and needs to be replaced.

Structure
The work force of the Nhlangano Town Council has 43 employees in all. This includes three clerical staff, two electrical staff, ten street cleaners, five roads maintenance workers, two show ground maintenance workers, four cemetery / graveside maintenance workers and four market and bus rank maintenance workers.

Organisation of Work
The following organisational chart can be drawn up:



The staff is not properly trained in waste handling. From 1 April 2000 the Town Council adopted conditions, which include a training programme, a car loan scheme and affiliate pension schemes for workers within Council. Most of their staff is daily paid. However, 18 of the 43 staff members are civil servants.

The biggest problem in the council related to waste management is the lack of capacity in terms of personnel and machinery. Staff is not well trained to handle machinery in case one is bought. The dumpsite is located next to a residential area and there are many complaints.

3.2.4 Institutional Set Up and Capacity – Pigg's Peak Town Council

The Pigg's Peak Town Council is relatively new. The Town Council started functioning in 1996 and before then it functioned as a Town Board. The Council is governed by councillors of which some are elected and some are appointed by the Minister of Housing and Urban Development.

Pigg's Peak town has a population of about 8000 people. The Town Council generates its revenue through charging property taxes. However, the town council does not charge the town dwellers for waste collection or for using the landfill site. Furthermore, the council receives government subventions from central government.

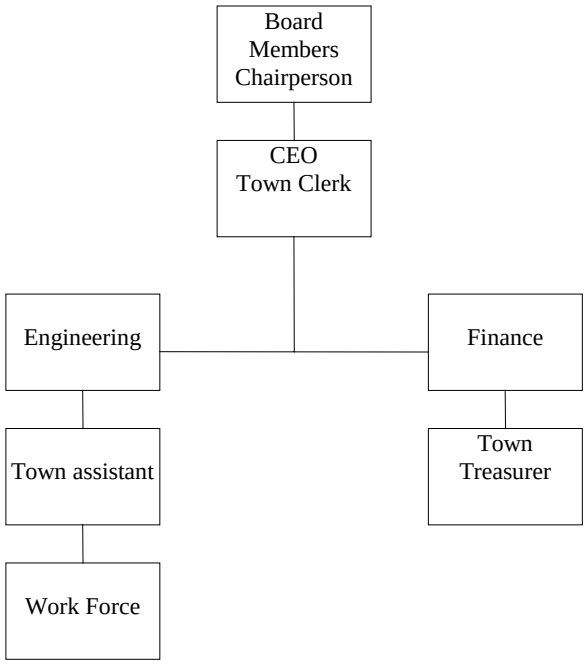
The waste collected is estimated at 30 m^3 per day - 20 m^3 from residential areas and 10 m^3 from commercial areas. The Town Council of Piggs Peak has contracted out the solid waste management services. This includes the collection of refuse and the management of its dumpsite. The contractor, KOBWA operates with one tractor and 19 skips i.e. large containers used for collecting and transporting the waste, one back loader, one compactor, one computer and one printer.

The landfill is next to the prison about 2½ km from the town centre. It is well organised and it has a fence and a guard controlling it.The contractor has 6 employees including the manager. Collection services are provided 3 times a week both in residential and commercial areas. The waste is tipped on the landfill and is covered with soil on a daily basis.

There are no problems in collecting waste from commercial areas; the problem in the residential areas is that people prefer to dispose of their waste and not put it out for collection. The problem is perceived to arise from the issue of tariffs, which have not been effected yet, but they are in the pipeline. At the moment the charges for refuse collection are included in the property tax.

The Town Council of Pigg's Peak supplements its revenue through subventions from the central government, which also pays rates to the Council for her properties around Pigg's Peak town. Hence a large portion of Pigg's peak revenue comes from the government subventions.

Organisational Structure
The following organisational structure is operating in Pigg's Peak.



The management structure above has not been officially formalised. This means that the town clerk carries out several functions e.g. as a town treasurer with the assistance of an Accounts Officer. A Senior Township Assistant carries out duties in the engineering office and no Town engineer has been employed.

Staff is not properly trained in waste handling. They do have protective clothing but little awareness on the dangers of the waste.

3.2.5 Institutional Set Up and Capacity – Ezulwini Town Board

Ezulwini area was declared a town in 1995 and started its operations in 1996. The Board consists of 5 members, 4 of whom were elected by the community of Ezulwini and one appointed by the Ministry of Housing and Urban Development.

The area is estimated to have a population of over 30,936 people. The Ezulwini Town Board is fully functional even though it is wholly reliant of government funding, in the form of subventions and implementation of capital projects (the Ministry of Housing and Urban Development funds).

The hotels and other businesses around Ezulwini Town collect and dispose of their own waste, using their own equipment at various points within and/or outside the town, as a suitable landfill site has not been identified. The Sun Hotels, however, do have an identified site within their property and the Board, through the assistance of the MHUD's Health Inspector, assessed this site on the efficiency and effectiveness and its compliance to the environmental health standards.

The Town Board has not yet facilitated the collection and disposal of wastes from the town. However, a survey is underway to determine the amount and type of refuse to be disposed of from the area with the possibility of contracting out the service. Mbabane City Council has already responded positively to assisting the Board in this regard.

The town clerk is employed by government on a full time basis and was posted to assist run Ezulwini Town until a fulltime town clerk is employed. The town clerk has a degree in Public Administration and Political Sciences, and has attended a course on local and regional planning in Kenya, as well as various other local governance seminars.

The two main problems regarding waste management in Ezulweni are that the residents urgently need a waste collection system and that Ezulweni does not have a suitable landfill site within the urban boundaries. An option would be to look for a suitable site on the bordering Swazi Nation Land.

3.2.6 Institutional Set Up and Capacity – Big Bend Company Town

As an example of the institutional set up and management of solid waste in a company town Big Bend is described below.

Household waste is collected twice a week in Big Bend. Each household has a standard waste bin, which is used to store domestic waste until collection. The company at Big Bend charges E 60 per month per household for waste disposal especially in the main village and Hlandze. Disposal of waste is carried out by company employees. The monthly charge is automatically deducted from the monthly salary schedule. Subordinate staff is not subjected to this monthly refuse collection charge.

3.3 Identification of Problems – Household, Commercial Waste and Litter

3.3.1 Generation of Household & Commercial Waste and Waste Management Planning

As planning within the context of the Solid Waste Management Strategy refers to holistic planning regarding waste management it is necessary to ensure that the appropriate trained and skilled staff is employed to take responsibility for the planning aspects of a specific institution.
Planning of future waste management e.g. prevention, minimisation, recycling/reuse, collection, treatment and disposal, links closely up with the availability of suitability of the institutions, that deal with waste management. The following questions are important to raise:
Are these institutions equipped with sufficient and sufficiently skilled staff to carry out the many administrative, technical and environmental duties, which are needed?
Are the needed administrative tools (guidelines and standards) available?
And is a sufficient budget available for the duties to be carried out?

Guidelines

- The Waste Regulations 2000 state that each urban local authority should prepare waste management plans for approval by the SEA in the future. No guidelines exist for the preparation of these waste management plans by local authorities at this time. It is therefore clear that a good overview of waste generation and management in Swaziland cannot be obtained by the authorities until it has prepared guidelines for waste registration and waste management planning activities.

Data

- The problem related to measurement of generation of household and commercial waste flows is the lack of reliable data. Mbabane landfill is the only place where actual weighing of waste amounts has been taking place. All local authorities must report the quantities of waste arising within their area of jurisdiction to the SEA in future. This can only be reliably carried out if, for example the masses of waste are recorded at the larger landfill sites, and if waste volumes are recorded at the smaller sites. Waste generation could also be determined by the records of the number and types of collection points in combination with records on the number of collection routes covered by the collection vehicles.
  In depth surveys on specific sources of generation of waste (divided into waste fractions) would also be a valuable tool to ascertain the potential for recycling in the future.

3.3.2 Household and Commercial Waste Prevention

Incentives

- There are, at present, no incentives to prevent waste being generated whether these be in the form of prescriptions on the nature of industrial processes allowed to become established in industrial areas or in the form of "Scheduled Trade Permits Conditions" etc, tax incentives to reduce waste generation or realistic waste collection and disposal charges which favour waste minimisation, re-use and recycling before ultimate disposal.
  Different tools could be used simultaneously e.g. creating awareness, strengthen enforcement by carrying out inspections and assisting with knowledge on waste prevention, and creation of incentives to minimise the use of materials, which when disposed of, creates environmental problems.

Awareness

- Waste prevention is not receiving enough attention and should be strongly linked to things like e.g. free plastic bags; packaging materials, and EIA's. An example on the latter is, that there seems to be no requirements to ensure sufficient technology assessment to promote waste prevention.

3.3.3 Household, Commercial Waste and Litter Waste Collection

Inadequate Waste Collection Systems

- The main problems concerning waste collection are the non-existing or inadequate collection systems in densely populated settlements in the developing urban areas of the two cities. The financing of the establishment of new collection systems in these areas is also an important issue.

  Development of minimum requirements for waste collection in urban and peri-urban areas could be an important tool to improve the collection systems. Furthermore, SEA/MHUD should make guidelines for waste management in town councils and town boards. Guidelines should be developed at the national level through co-ordination between MHUD and Ministry of the Tourism, Environment & Communications. However, regulations as the point of departure for guidelines must be established. The SEA should only be monitoring and play the part of a custodian.

  Mbabane/Manzini: raising awareness combined with actual improvement of collection in informal settlements (there are other solutions that will create jobs and provide a service that the ratepayers will pay for).

  Accurate data on the proportion of the population served by waste collection and controlled landfill disposal, and the frequency of service offered within urban and peri-urban areas is needed in order to assess the requirements and financial support for establishment of waste collection and proper waste disposal in all dense settlements.

Mapping of collection points will be a useful tool for future planning of waste collection routes.

The costs, efficiency and effectiveness of waste collection services and controlled waste disposal should be quantified in order to obtain data for future waste management planning.

The frequency of waste collection could be reduced to once weekly, if the households used bigger dustbins and if the compaction vehicles were supplied with mechanical lift systems. In this way the collection of domestic waste in currently serviced areas could be less expensive and the efficiency of the vehicles would be increased, so new residential areas could be serviced without the need of acquisition of new vehicles.

The potential for providing a more comprehensive collection service to all communities in densely populated settlements, both in urban and rural areas must be examined. This should be combined with raising the awareness of the public on environmental issues, especially on the reasons that collection should be supported and used by all residents in order to ensure a better understanding of the consequences of water pollution caused by uncontrolled dumping. There is a need to find the right enforcement tools to provide "bin/s for every household".

The pricing policy for collection of waste from the commercial sector and the industrial sector must be revisited in order to move towards cost recovery of the services provided.
Where local resources cannot be found through voluntary financial support or via local taxation/charges, then central government resources should be identified to provide funding for the required waste collection and management systems.

In the homestead areas in rural areas, domestic waste collection is not considered necessary. In these areas the first priority should be improved management of medical waste and, if there is any, on hazardous waste.

Dustbins

- A problem in urban areas is that standard size dustbin or garbage bag has not been defined.
- It is worthwhile to consider if it is necessary to collect household waste twice a week, as is the case many places. You could save a lot of money by reducing the frequency of collection to once a week from residents.

Collection from Garages

- A serious problem is the need for the collection of hazardous waste from garages (formal and informal ones), waste oil, car batteries, car scrap, scrap tyres, etc.

Awareness

- The problems causing litter is lack of awareness and the lack of waste collection services in many densely populated settlements.

3.3.4 Household, Commercial Waste Recycling

Two main problems arise from the current recycling:

- The recycling that takes place at landfills or dumpsites creates health problems. Initiatives to strengthen source separation should be encouraged.
- The potential for recycling of several waste fractions may be high but no incentives exist to encourage environmentally friendly recycling.

3.3.5 Household and Commercial Waste and Litter Treatment and Disposal

The **main problems** concerning disposal of waste in Swaziland are the following: -

Leachate

- A solution for the leachate produced by the Mbabane sanitary landfill must be found, either by treatment or by the application on suitable areas in order to prevent surface water pollution of the nearby river.

Waste Disposal Sites

- Uncontrolled waste disposal from Manzini City and Matsapha Town and Industrial Estate must be stopped. A common sanitary landfill for these two main generators of waste should be established as soon as possible.
- The uncontrolled dumpsites at the other town councils and town boards should be improved. This could be achieved through the development of guidelines for the operation of landfills in densely populated areas, including minimum requirements for the siting of disposal facilities, including landfill site, the operation of landfills including daily cover application on compacted waste.

Health Risks

- Waste pickers are exposed to high health risks by working in close contact with the waste, including hazardous and medical waste. In the short term waste picking at landfill sites and dumpsites must be controlled and organised with due consideration of the landfilling operation, and waste pickers must be equipped with protective gloves, shoes and clothes at all times. In the long term waste picking at landfills and dumpsites should be replaced by the separation at source of recyclable materials.
- Awareness of proper waste disposal practices in rural areas is low. Perhaps the training of health motivators should put more emphasis on practical waste management in rural areas, where no waste collection services exist.

Hazardous Waste Management

- Lack of facilities for hazardous wastes management systems.

Waste Management in Rural Areas

- Lack of waste systems in rural areas particular at the growing commercial sites.

Medical Waste Management

- There is no appreciation of the serious dangers posed by mismanaged medical waste.

3.3.6 Cost Recovery of Household, Commercial Waste Management

Cost Recovery

- The challenge related to payment for waste management services is to establish and implement a full cost recovery scheme for waste management.

4 Status Quo Analysis – Industrial Waste

4.1 Technical and Financial Issues

4.1.1 Definitions

Definitions of industrial waste are given in the Swaziland Waste Regulations 2000 that were gazetted in April 2000 as follows: -

Industrial waste *means waste from a factory or from any premises used for the purposes of, or in connection with, the provision to the public of: transport services by land, water or air; gas, water, electricity or sewage services; or postal or telecommunications services.*

Construction and demolition waste *has not been defined in the Waste Regulations, 2000.*

Special Waste *means wastes which due to their nature, require special or separate handling, including, but not limited to tyres, demolition debris, construction waste, motor oil, bulky metal goods, e.g. discarded white goods – refrigerators, stoves etc., hazardous wastes and medical wastes.*

Hazardous waste *means any waste which is listed in Part I of Schedule Three in the Waste Regulations 2000 and to which a six digit waste code has been assigned in that Schedule, and which displays any of the properties specified in Part II of Schedule Three; or which displays any of the following hazardous properties as defined in Part II of Schedule Three: highly "flammable" (only liquid substances and preparations having a flash point below 21°C), "irritant", "harmful", "toxic", "carcinogenic" or "corrosive", unless the waste does not exceed any of the threshold criteria for certain hazardous properties set out in Part III of Schedule Three.*

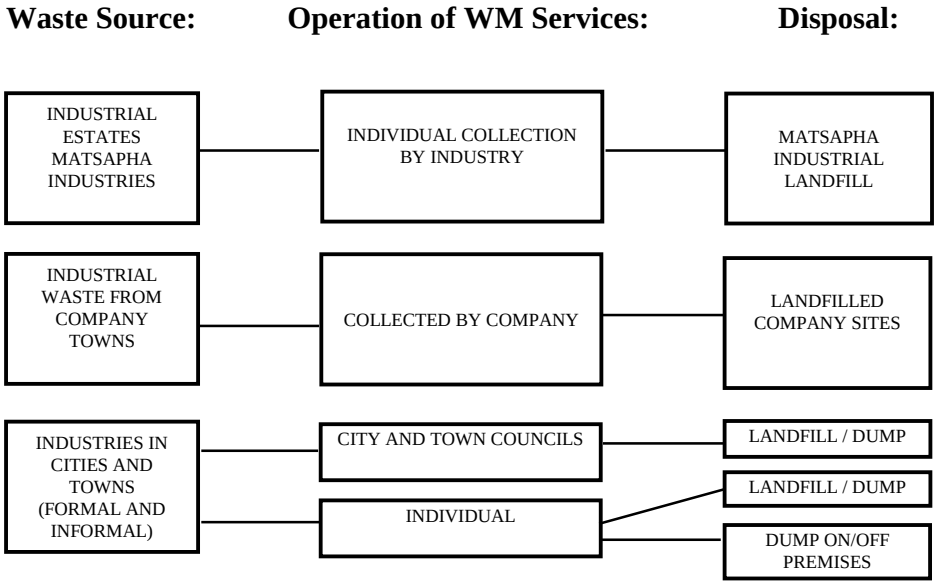
4.1.2 Overview of Industrial Waste Flow – from Source to Final Disposal

The illustration below gives a brief overview of the main flow of industrial waste from the source to the final disposal.

It is seen from the illustration that the operation of the collection systems often is operated by the industry itself, but in some cases, i.e. in the two cities and in some of the towns collection of industrial waste is catered for by the local authority.

There are no common standards for collection for industrial waste and there are no or only seldom co-operation between the different operating entities. Furthermore, the collection of hazardous waste is only on a voluntary basis separated from the waste non-hazardous waste streams.

The illustration also indicates that there is no sanitary landfill for industrial waste. In some cases companies towns have operates co-disposal sites (disposal of hazardous and non-hazardous waste). Mostly waste from industries is dumped an uncontrolled landfill sites or in dumps, on the premises of the industry or at a local dumpsite. Standards for disposal of different waste categories are included in the Environmental Management Bill and when enacted enforcement must take place.



4.2 Industrial Waste Generation

In this section both ***non-hazardous and hazardous industrial waste*** generation will be addressed. The generation and management of ***hazardous waste*** is not well documented due to the limited monitoring of the hazardous waste management by the industry consequently the information is limited to data from a survey carried out in Matsapha Industrial Estate /3/ and SAPPI - Usutu Pulp Company.
Information of the production and disposal of industrial waste, whether it is non-hazardous or hazardous, and ***demolition waste***, is in general limited. There is no information on the amount of demolition waste and its management. Therefore, this waste type is not specifically addressed in this status quo analysis. However, some information about demolition waste was obtained from the records kept at the Mbabane landfill, where 129 tonnes of builders' rubble and 70 tonnes of demolition waste were received at this landfill during 1999.

4.2.1 Industrial Waste Sources

Industry in Swaziland is characterised by a relatively small number of large (measured according to their production), generally foreign owned companies that are producing for export markets. In addition to these large companies there are a greater number of smaller and locally owned companies producing for the domestic and regional markets. A register of enterprises is available from the Ministry of Enterprise and Employment /2/. The register lists 306 companies, whether they are production companies, retail trade or/and commerce.

The list registers some 50 manufacturing companies. The number, size and line of production of industries within the informal sector is not known. Many of these industries are located in industrial estates but some large industries, e.g. Sugar Mills; a Pulp & Paper Mill; wood processing industries and mines are distributed throughout the country. In the cities and the towns and in the smaller communities several small-scale industries (mostly garages and light industries) are located. Some of these are formal industries, but several are smaller informal enterprises, some of which are expected to produce smaller amounts of particularly hazardous waste.
The larger and formal industries are organised in the Chamber of Commerce, with a special sub-group representing the industries in Matsapha Industrial Estate. Small and Medium sized Enterprises (SMEs) are not represented by industrial organisations. The Small Enterprises Development Company (SEDCO) deals with the SME's to some extent.

Matsapha Industrial Estate

This is the largest industrial area and it is located west of Manzini. The existing area is approx. 500 ha. There are plans to expand the estate area by another 70 ha, which indicates that new industries are expected to establish in future. Several of the larger industries in Swaziland are located in this industrial estate. A survey /3/ from 1995 aimed at investigating and characterising the waste stream from the Matsapha Industrial Estate indicated, at that time, that 604 tonnes of non-hazardous industrial waste was being produced per month. This translates to some 7,300 tonnes/year of non-hazardous industrial waste being tipped at the Matsapha industrial landfill, situated at the boundary of the industrial estate. The survey /3/ also indicated that the non-hazardous industrial waste produced, could be characterised as follows:

Category	**% *by mass***
Ash	32
Fabric	13
Cardboard	12
Organic	11
Wood Waste	8
Plastics	5
Tyres	5
Sawdust	4
Paper	2
Sand and Rubble	2
Metal	<2
Rubber	<1
Glass	<1

The Matsapha Town Board does not collect non-hazardous and hazardous industrial waste in Matsapha Industrial Estate. The industries transport their own waste to the Matsapha landfill themselves. There are 247 industries operating in the Matsapha Industrial Estate/4/ and approximately 13,000 people are employed in the area. Most of these employees live in the nearby township and in Matsapha town itself. There seems to be a distinct difference between the foreign owned and the Swazi-owned companies in their current levels of understanding and awareness regarding environmental management and pollution control. The larger companies are generally already planning for or adopting practices to meet international requirements concerning pollution control. The smaller companies have

limited environmental awareness/4/. An industrial survey /4/ was recently completed by the SEA (assisted by DFID) in the Matsapha Industrial Estate (1999/2000). Eighteen of the largest industries in Swaziland, i.e. those industries with the most significant individual environmental impacts (paper and pulp manufacture, food and drinks processing and textile companies) were approached to complete a comprehensive questionnaire. The questionnaire focused on broad environmental issues, but the current status of waste management was also addressed. The following results were drawn from the above-mentioned survey:

Name	Owner	Staff	Products	Industrial Waste	Current management of waste
Dulux	Swaziland	23	paints	production residues	Matsapha landfill
Parmalat	Swaziland	50	milk products	waste packaging, plastic bottles, PE-film, paper bags	Matsapha landfill
NATEX	Singapore	450	gin cotton and polyester	cotton, plastics, cardboard	some recycled to SA and Matsapha landfill
YKK	Japan	203	zips	tape and plastics, metal (Cu), dye and acid, caustic soda, soda ash	some burnt on site some recycled
Neopac	SA/SZ 90/10	100	corrugated cardboard	ash, plastics, small amounts of oil and chemicals	own on-site dump
Agrimech	Swaziland	21	agricultural machinery	waste oil, tyres	
Steel & Wire	Swaziland	150	galvanised steel coil & wire	waste oil, scrap steel & wire	waste oil in drums to SA, scrap recycled
Ngwane Mills	SA/SZ	260	flour and maize meal	dust, feed waste, packaging	paper bags collected by Sabil Foundation, feed waste?
Swazi Paper Mills	Swaziland	2000	tissue and craft paper	plastics, metal offcuts, packaging, sludge	sludge recycled
Cadbury's	SA/UK		milk & sugar products	wrapper waste, plastics (PVC), confectionery off cuts and dust	recycle wrappers (Freddy Osman) incinerate or burn on site, dust filter
Fridgemaster	Swaziland	2000	Fridges, freezers	plastics, metal, packaging	plastics to Matsapha landfill, some reused, metal recycled, packaging dumped
Bromor Foods	UK	150	sugar, jelly, fruit, custard powder	waste fruit, packaging (plastic and cardboard) boiler ash, solvents	fruit and ash to Matsapha landfill, plastics recycled (Osman), cardboard recycled (SPM), solvents is a problem
Tabankulu	SA		citrus fruit & sugar cane	drums with pesticides highly toxic, oil, plastic, reject fruit	drums burnt in gravel pits, oil sold to White River, plastics sold to supplier, reject fruit local market
USA distillers	US	110	96% alcohol	condensed molasses solids, domestic waste	animal feed and reused as fertilizer. domestic waste burnt in pit
Conco	US		Concentrates for Sprite, Coke & Fanta	oils, laboratory chemicals, $Al_2(SO_4)_3$, chlorine, fluorescent glass light tubes	dumping, would like to recycle
Swazox	UK (56%)	24	distribution of gases, welding machines	diesel spillages garden & domestic waste	sand bed filter
Shell Oil	UK	17	Oil & petrol, diesel & paraffin	storm water	separation tanks/pits, difficult to export to SA

Table 4.1 Production and management of industrial waste from 18 industries in Matsapha Industrial Estate /4/

There is a high level of foreign ownership in the industrial estate. These industries consider self-policing to be a good strategy but acknowledge that this will only be effective with credible enforcement. Many companies indicated a willingness to comply but only if enforcement was equitably applied to all the companies. Some of the companies noted above saw a problem in the very limited available infrastructure that has been provided to dispose of waste in the Matsapha Industrial Estate. Several companies expressed the concern that the relatively unstructured solid waste management system, particularly the management of used oils, contributed to a serious environmental problem. The companies seemed to be aware of the waste problems they created but many had limited or only basic facilities (domestic waste bins/pits) to deal with their own waste. Some companies requested that improved facilities should be made available.

4.2.2 Generation of Hazardous Waste – Matsapha Industrial Estate

The 1995 survey /3/ gave an indication of hazardous waste generation and disposal in the Matsapha Industrial Estate. It is understood that little change has occurred in the industries established in the industrial estate in the period from the survey in 1995 to the survey in 1999/2000 /4/. The types of industries reported /3/ as producing hazardous wastes were textile/clothing and shoemaking industries, wood and timber industries, printing and publishing industries, chemical industries and vehicles garages (12 factory workshops). It was estimated /3/ that approximately 23 industries in all produced hazardous waste.
The single most important hazardous waste producer was NATEX in 1994/95. This organisation produced 22 tonnes of dye waste a month. This waste stream is no longer produced due to changes in the production process /4/. If the elimination of the dye waste stream is deducted from the hazardous waste stream, the following hazardous waste amounts and fractions are produced:

Waste Category	**kg/year**
Glue	6,000
Varnish	1,200
Empty ink tins	240
Oil waste	2,880
Empty resin tins	240
Residual resin in bags	19,200
Total	**29,760**

Thus nearly 30 tonnes of hazardous wastes are produced per year in waste streams that have been declared. There are other waste streams where little information is available. More research is required to extract the required data. The above-mentioned amounts and fractions of hazardous industrial waste should be treated as an understatement because the most recent survey, undertaken in 1999/2000, indicates that a broader range of hazardous waste is generated in the area. Further, only Conco identified fluorescent light tubes as a hazardous waste, whereas every industry and most commercial undertakings use them and the disposal of these mercury containing wastes must be a serious concern given the proximity of most of the dumps to either drainage axes or water courses, if not rivers.

The handling, treatment and disposal of the above hazardous industrial waste depends on the nature of the substances. Some of these wastes are burnt on the premises and others are dumped at the Matsapha Industrial landfill. Some are sold, e.g. waste oil. No one seems to have a comprehensive understanding of the overall situation with respect to hazardous wastes that arise in the various industries.

4.2.2.1 Other Industrial Estates

Two other Industrial Estates have been planned for in Ngwenya and Nhlangano. Mpaka, Buhleni, Siphofaneni and several other areas have been declared as areas for industrial development, but none of these have yet been commissioned.

4.2.3 Company Towns

Information on industrial and domestic waste from the eight company towns has been difficult to obtain.

SAPPI-Usutu Pulp Mill

The pulp and paper mill is located in a forested area south east of Mbabane. The Mill occupies an area of 10 km^2 and there is some 640 km^2 under a company-owned afforestation scheme. The company employs 1,600 people and produces 200,000 m^3 of unbleached pulp per year. A fenced co-disposal landfill site is located close to the company town of Bhunya. During 1999 this landfill received: -

Waste Category	tonnes
Wood rejects & bark (dry mass)	54,600
Bark Boiler Ash	1,820
Green grids & dregs *	2,600
Coal ash	8,736
Domestic waste (Bhunya)	1,092

* The grids consist of the larger particles of lime, $Ca(OH)_2$ and $CaCO_3$/NaOH at pH of 11.

This landfill site is a hazardous waste disposal facility, where co-disposal of hazardous waste and general waste takes place. The new cell of the landfill is lined with bentonite to form a barrier to reduce leachate migration from site and control the pollution of the local groundwater supply. Leachate is re-circulated to the landfill. The recent heavy rains, and erosion, have contributed to the generation of excessive volumes of leachate, which invalidate the leachate re-circulation strategy. Another leachate management strategy is required. The landfill was redesigned in 1995 and the company plans to operate the landfill for the next 20 years. The company must, if they do not have a valid Environmental Compliance Certificate, conduct an environmental audit and apply for a Waste Management License (Section 38, Transitional Provisions in the Waste Regulations, 2000). The company must develop a Waste Management Plan for the approval of the SEA in order to comply with the same regulations.

4.2.3.1 Other Company Towns

The other company towns are associated with the three large Sugar Mills, which are located at Big Bend (Big Bend company town), Simunye (Lusoti and Ngomane company towns), and Mhlume (Mhlume company town).
The extraction of sugar from sugarcane results in a fibrous waste product called bagasse, which together with coal is used for raising steam for process energy at the Mills. Sugar Mills are self-contained industrial entities that have their own maintenance facilities, treat their own effluents and manage their own wastes. Soil and some organic residues accumulate in the base of the primary juice extraction plant (diffuser) in each mill and forms an odorous waste called "milo" which is rich in potassium and many of the essential micro-nutrients required for good cane production. The burning of bagasse results in the production of smuts, which together with coal ash is blended with the "milo" and other waste streams (e.g. sludge from the effluent treatment plants) and spread on the cane lands as a humus-enriching mulch/compost.

Domestic and commercial waste from the company towns is tipped into trenches and burned before being covered with soil. No well-functioning sanitary landfills has been observed.

Swaziland Railways also has towns, notably Mpaka, Sidvokodvo and Mlawula. These settlements are considered to produce small amounts of industrial waste. The amounts and the fractions produced are not known at this stage.

4.2.4 Agricultural and Mining Waste

Although agricultural and mining waste are elements outside the terms of reference of the brief of the project (please refer to Section 1.4.1 for further information), the production of pesticide waste and production of mining waste is addressed in this Status Quo Analysis Report, as both sectors produce waste that can do substantial damage to human health and the environment.

Hazardous wastes in the form of laboratory chemicals, fluorescent tubes, pesticide residues, empty containers and expired materials are a concern. Extension officers from the Ministry of Agriculture and Co-operatives are teaching farmers to perforate and bury used containers, however there is no way of checking how successful that is. There is a need to develop a code of practice for the use and management of pesticides.

According to information gathered in discussions with officials of farm chemicals the stockpiled pesticides included arsenical dips, DDT, dieldrin, organo-phosphates and other agricultural remedies which were being stored by the Department of Agriculture because these cannot be shipped out of Swaziland to South Africa because of the non-compliance to the Basel Convention. Swaziland has signed the Basel Convention. But there is a need to follow up on this. This means to implement the roles and regulations of the Basel Convention into the Swaziland Waste Management Regulations.

The problem of used pesticide containers has a 35 year history in Swaziland. Some of the larger agricultural enterprises need to obtain ISO 14001 Status and must be able to demonstrate that their wastes are dealt with in line with acceptable international standards.

Farm Chemicals has initiated the use of larger pesticide containers with the larger users. These containers have built in meters and pumps. Protocols are needed for the management of pesticide residues and used containers. Probably there will be a need for a high-hazard waste disposal site in Swaziland. Maybe a simple, less costly container perforating and crushing device is needed because equipment that is currently available is very expensive.

In Maloma there is an open pit coal mine, and the asbestos shaft mine at Bulembu (planned to close down) and the open cast diamond mine at Dvokolwako can create both serious environmental problems as well as health problems. Contact, however, with the mining community was initiated with no success.

4.2.5 Industrial Waste Generated – Mbabane City Council

Industrial waste generated in Mbabane is deposited into the Mbabane landfill. The waste coming into the landfill has been recorded since June 1998 at a weighbridge at the entrance to the landfill (please refer to Annex 1). Waste amounts, the sources and the collection vehicles are registered. The following table shows amounts of industrial waste coming to the Mbabane landfill:

	Direct from industry tonnes/1999	**Indirect from industry tonnes/1999**
Annual	1,398	18
Average monthly	400	1.5

Table 4.2 Industrial Waste (tonnes) delivered to Mbabane Sanitary Landfill in 1999

There are 12 formal garages in Mbabane and an unknown number of informal garage/workshops. The Mbabane City Council recently held a workshop on pollution from garage/workshops. The City Council specified all waste oil was to be collected and deposited in a 6,200 l container. The City Council has contact with an oil recycling company in South Africa – Oilkol (Pty) Ltd. Oilkol is a contractor to the ROSE Foundation, which represents the petro-chemical industry in Southern Africa.

An automobile repair workshop in Mbabane, operating since 1968, was recently visited by the inspector of the SEA in order to find solutions to the company's waste problems. The SEA found that a portion of the waste was being tipped at a local dumpsite and it was reported that used oil was stored and sold to an oil recovery merchant in South Africa for recycling. The company is an example of a garage/workshop that would be interested in source separation of waste fractions and sustainable solutions to oil and other hazardous waste problems. The garage is aware of their air emissions; e.g. they are recycling CFC's.

Oilkol has depot facilities and used oil storage tanks in Swaziland, but is no longer allowed to collect used oil in Swaziland for transport to South Africa. The service will only resume when Swaziland has implemented the Basel Convention into its waste regulations. Representatives of Oilkol stated that used engine oil, hydraulic oil and gearbox oil had been recovered at the rate of 390,000 litres per year when the service had been allowed. Oilkol is anxiously awaiting the legitimisation of the service.

The Mbabane Abattoir incinerator is currently out of commission so there is a problem associated with these wastes at this time.

4.2.6 Industrial Waste Generated – Manzini City Council

The Manzini City Council collects industrial waste on a weekly basis. The same collection vehicles are used on both industrial and domestic collection routes. The waste is disposed of at Manzini dumpsite.

4.2.7 Industrial Waste Generated in Rural Areas

The amount of industrial waste produced in the rural areas is considered to be very small. But it should be noted that formal and informal garage workshops occur. These garages and workshops each produce small amounts of hazardous waste (used oils, chemicals and batteries). However, there are many small workshops and the awareness of the hazards to human beings and the environment from poor hazardous waste management practices is very limited.

4.2.8 Industrial Waste Prevention

Many companies especially in the Matsapha Industrial Estate were found to operate a policy of good housekeeping /4/. Internal reuse was found to be widespread and some recycling at source of paper was taking place. Industries seem motivated to introduce waste preventive measures but there are no local incentives to do so.

A few of the very large organisations are seeking ISO 14001 status to ensure they can continue to trade internationally. These organisations need to be able to demonstrate that the hazardous wastes, and indeed all of the wastes, that their organisations produce can be handled in an environmentally safe way within Swaziland.

4.2.9 Industrial Waste Collection

In general, collection of industrial waste is transported by the individual industries themselves, e.g. in the Matsapha Industrial Estate for example, Matsapha Town Board collects domestic waste, but industrial waste is transported to the Matsapha landfill by the individual industries themselves.

In Mbabane industrial waste is collected every day in waste bins and black waste bags. Any industry producing wastes that require special care or large quantities provides its own transport to the Mbabane landfill and they are not charged tipping fees.

Manzini City Council collects waste from industry and tips this material in the Manzini landfill. In the Company Towns the companies act as the local waste contractor.

4.2.10 Industrial Waste Recycling

Recycling of industrial waste takes place as a natural cost-cutting exercise on the production lines and where there is easy access to a dealer. In the survey on waste management in the Matsapha Industrial Estate /3/ a list of recycled materials and waste dealers has been compiled in the survey. The lists include plastics factory in Matsapha, Swazi Paper Mills, SABIL Foundation and Ngwenya Glass. In some cases materials are recovered by waste sorters directly on the landfill site.

4.2.11 Industrial Waste Treatment and Disposal

4.2.11.1 Matsapha Industrial Landfill

The Matsapha Industrial Landfill is a dumpsite where the waste from households and industries is tipped. It is a very poorly managed site. Comprehensive comments have already been noted under domestic waste management. The extensive and widespread waste sorting by scavengers is of serious concern, especially with respect to the recovery of discarded food products. Whilst on site, a covered truck arrived with condemned chickens and meat on board. Some of the youngest scavengers searched for food. Food is being prepared, sold and eaten on the site.

Two of these steep batter slopes were burning at the time of the visit. This is extremely dangerous with respect to toxic smoke inhalation for the waste sorters and any staff on the site. Apart from other potentially hazardous substances of industrial origin, both polyurethane and polystyrene wastes were noted on site and these materials will produce dangerous emissions in smouldering refuse fires. Such conditions can result in serious injury and death through the immolation of people and the destruction of trucks and plant by fire, because sinkholes will develop when the waste fill collapses as it becomes undermined by the slow combustion process. The site was not being covered although there was a small stockpile of cover. It will be a difficult, dangerous and expensive exercise to extinguish the fires. If the fires spread the smoke will also be a potential hazard for the airport. The steep batter slopes will require engineered corrective measures to improve the stability of the site.

Manzini City Council and Matsapha Town Board have decided to plan a common waste disposal facility, which could also include some of the neighbouring towns. The City has prepared a new planning scheme with a demographic profile of Manzini and Matsapha

Industrial Estate has plans for the establishment of a new solid waste landfill and the closure of the existing dumpsites.

Furniture was being made of scrap and should be encouraged if source separated.

Mbabane Sanitary Landfill

A sanitary landfill, established in 1998, with a projected operational life of 25 years but it has been forecasted that its design life will be shorter. Comprehensive comments have been made relative to the disposal of domestic waste. The site is relatively well engineered but the leachate storage dam appears to be inadequate during periods of high rainfall. Two fenced areas have been set aside off-site – one for the composting of garden refuse and agricultural waste (a new initiative), and the other for the stockpiling of large elements of scrap metal, e.g. automobile bodies and old white goods (stoves, refrigerators, washing machines etc.

The site receives an average daily waste input of 19 tonnes. The waste entering the site is weighed and classified. The information is recorded and the site office can provide detailed data from its last two years of operation on daily, monthly or annual basis. At the working area of the landfill the waste is spread and visible scrap metal is recovered. Ten waste sorters recover materials from the waste delivered to the landfill. There is no market for plastics in Swaziland. Flint glass bottles are sold to Ngwenya Glass, paper and cardboard to the Recycling Mill at Matsapha, aluminium and tin-plate steel cans are sold to the SABIL Foundation. The stockpiles of recycled materials are segregated from the landfill by some large rocks adjacent to the weighbridge and office buildings and the recovered materials are neatly stored in large woven polypropylene bags.

Pigg's Peak Sanitary Landfill

Pigg's Peak Town Council has established a new sanitary landfill in 2000. This development was established by a loan under the Maguga Dam Project to Ministry Housing and Urban Development through the Pigg's Peak Town Council.

The landfill site has a projected operational life of 3 years. The site receives an average daily waste input of 30 m^3 (no weighbridge). Incoming trucks register at the gate, where the waste is recorded as domestic or commercial.

The landfill has a liner and leachate is collected. The leachate is stored in a septic tank for transport to the wastewater treatment plant in Piggs Peak.

Six staff members are employed at the landfill for entry control, spreading, compacting and covering of waste, and for collection of litter in the surroundings. There is no disposal fee yet.

Manzini Disposal Site

This city runs a 21 year-old dumpsite. The dumpsite appears to be dominated by plastic waste from industry. About twenty informal waste sorters were active at the site. The waste sorting does not appear to be organised or controlled. Cans, bottles, glasses, plastics, paper and cardboard are recovered at the site.

4.2.11.2 Company Town Waste Disposal

Usutu – Pulp

The landfill site is a hazardous waste disposal facility, where co-disposal of hazardous waste and general waste takes place. The new section of the landfill (lower section) is lined with bentonite (material with low permeability) to keep the leachate from polluting the water supply. Leachate is sprinkled onto the landfill. The heavy rainfall early this year and erosion are increasingly becoming a major problem. The landfill was redesigned in 1995 and the company plans to operate the landfill for the next 20 years.

4.2.11.3 Waste Incineration – Carcasses etc.

Manzini City Council has an incinerator located at the abattoir. This is used for the destruction of medical waste, condemned foodstuff and carcasses. The City Council collects medical waste and dead animals every day for incineration free of charge. The incinerator, which occasionally breaks down, operates for a maximum period of two hours at a time. An operation manual is not available. No flue gas-cleaning equipment is present.

The Mbabane Abattoir incinerator is currently out of commission so there is a problem associated with disposal of this waste.

4.2.12 Current Industrial Waste Management Costs

Industries do not pay fees at the landfill sites. Economic incentives such as waste taxes or tax relief are not possible at this time because the basic taxation system is being overhauled by the Ministry of Finance.

The infrastructure in Matsapha is financed by the Government of Swaziland through the Ministry of Housing and Urban Development and the Ministry of Enterprise and Employment and E8 million per year has been set aside for the establishment of infrastructure and the operation of services. Waste management is included in this service, but only residential waste is collected and disposed of at the Matsapha Landfill by the Matsapha Town Board. The operation of all services in Matsapha industrial estate is paid for and provided by the Ministry of Enterprise and Employment.

4.2.13 Identification of Problems – Current Industrial Waste (IW) Management

The sections below present the problems that has been identified by the stakeholders as the major problems regarding waste management planning, waste prevention, waste collection, recycling, treatment and disposal and waste management costs for industrial waste (Section 4.2.13.1 - 4.2.13.6).

4.2.13.1 Generation of Industrial Waste and Waste Management Planning

Reliable Data

- The **main problem** associated with estimation of the generation of all kinds of waste is lack of reliable data. The Mbabane landfill is, currently, the only site where weighing of waste is taking place. All local authorities are required to report the wastes arising

within their areas of jurisdiction to the SEA. The only reliable data that will be obtained is that which must be recorded at the larger sites thorough the operation of weighbridges and accurate volume estimates at the smaller sites.

Industrial Waste Management Planning

- The Waste Regulations state that each urban local authority and the company town must prepare Waste Management Plans for the approval of the SEA, but no guidelines exist for this waste management planning by local authorities at this time. Without these guidelines the SEA will not develop a uniform overview of waste generation and management in Swaziland.

4.2.13.2 Industrial Waste Prevention

The **main problems** related to prevention of waste from industrial sources are the following;

Incentives

- There are no incentives to promote waste prevention.
- Need for distribution of know-how.
- Information is available but is commonly not used by the industries.

4.2.13.3 Industrial Waste Collection

Collection Service

- The lack of a formal industrial waste collection service is a serious constraint on the development of an environmentally acceptable industrial waste management system. Without such a service the hazardous waste situation is clearly unmanageable. It is important that this problem is addressed soon. Swaziland has signed the Basel Convention but has not legislated the appropriate and required controls.
- Source separation and controlled transport should be encouraged.

4.2.13.4 Industrial Waste Recycling

Two **main problems** arise from the current recycling:

Separation at Source

- Recycling through waste sorters that takes place at landfills or dumpsites is an unhealthy practice. Initiatives to strengthen source separation should be encouraged.

Incentives

- The potential for recycling of some of the waste streams is high, but there are no incentives to encourage environmental friendly recycling.

4.2.13.5 Industrial Waste Treatment and Disposal

The **main problems** related to industrial waste treatment and disposal is the following:

Dumping of Industrial Waste

- The existing dumping and landfilling of industrial waste is a threat to the Swaziland environment. The problems with uncontrolled dumping of hazardous as well as non-hazardous waste are very severe and must be attended to as soon as possible. New landfill sites are urgently needed to replace the existing dumpsites that have been formal facilities for urban area waste. Location of new landfill sites should be sought where advantage can be taken of local favourable geology with in-situ low permeability clays. Furthermore the future generation of leachate should be carefully evaluated and new landfill sites should preferably be located in those areas with the lowest rainfall. Until new controlled landfills have been established for all urban areas, appropriate upgrading (e.g. covering of waste with soil) and eventually closure of the existing dumpsites should be performed.
- On-the-job training of landfill staff in handling of waste and proper disposal technique.
- Development and implementation of minimum requirements/establishment of proper standards for licensing of controlled waste disposal sites. Such requirements are essential components together with the proposed introduction of new landfill sites. A properly managed landfill site should offer appropriate levels of operational control, coupled with necessary environmental controls to ensure protection of all environmental media, but especially ground water and surface waters. In due course, SEA will need to undertake their own independent monitoring to ensure compliance with approved requirements.
- 4- 5 disposal sites will be sufficient for Swaziland economically speaking. But politically it might be difficult to share disposal facility. On the other hand, it is considered quite impracticable, without unlimited resources, to provide a safe and controlled disposal facility for each town in the country.
  In the rural areas there is a need for proper facilities to dispose of all types of waste generated. The facilities should be properly managed (trained staff) and awareness amongst the users of the treatment plants and the monitors of the plants should be raised gradually.
- Development of guidelines for local waste disposal sites in waste control areas (or in all populated settlements).
- Awareness campaigns on proper waste handling in rural areas outside waste control areas by e.g. pinpointing potential environmental and health problems.

There is a need for a system for waste management in more densely populated rural settlements/peri-urban or urbanised areas – e.g. by giving guidance to safe ways of disposing of waste. Guidelines or by-laws for waste management could be developed for rural areas and demonstrated.

In the growing market and shopping areas in highway junctions there is a need to establish proper waste disposal sites, or to ensure collection of the primarily commercial waste at local transfer stations for transport to well-managed landfill sites.

In the rural areas where housing is spread out, awareness raising, motivation, education and if necessary penalties are needed. The community health motivators and other groups reach all the people in chiefdoms and would with guidance and education be able to motivate people. There may be a need for each Regional Office to establish a Waste Management responsible person with the responsibilities and duties of ensuring safe waste collection and disposal in dense settlements and larger shopping/market places in rural areas, and ensuring safe waste management practices in other rural areas through the traditional system.

Abbatoir

- There is a need to upgrade the current abattoir waste disposal system, involving incineration.

General Awaremess

- Awareness of the serious nature of these problems is limited.

Training in General

- Training possibilities for managerial as well as operating staff must be upgraded.

4.2.13.6 Cost Recovery of Industrial Waste Management

The **main problems** related to cost recovery of industrial waste management is:

- Methods are needed to introduce and enforce full cost recovery for industrial waste management, as the service cannot be free. Environmentally sound industrial waste management is relatively expensive and the cost must be accounted for as part of the production cost for the goods and services that are traded by industry and commerce.

4.2.14 Institutional Set Up and Capacity related to Operation of the Industrial Waste Management Systems

In the cities and towns where collection and disposal systems are operating the institutional set up is described under Section 3. The institutional set up and capacity related to operation of industrial waste management systems is equal to the management system for the household waste, commercial waste and litter.

As industrial waste disposal, besides the above mentioned, is carried out by the industries themselves, a description of the individual system is not presented.

5 Status Quo Analysis – Medical Waste Management

5.1 Technical and Financial Issues

5.1.1 Definitions

Definitions of different kinds of waste types and fractions produced on hospitals etc. are given in the newly gazetted Swaziland Waste Regulations 2000, as follows:

Medical waste *means any wastes generated by hospitals, clinics, nursing homes, doctors' consulting rooms, medical laboratories, medical research facilities and veterinarians, which are infectious or potentially infectious. Medical waste may be further defined to include the following categories:*

1. *microbial wastes including cultures and stocks of infectious wastes and associated biologicals that can cause disease in human beings;*
2. *human blood and blood products, including serum, plasma and other blood components;*
3. *pathological wastes of human origin, including tissues, organs and body parts removed during surgery or autopsy;*
4. *contaminated animal wastes including animal carcasses; body parts and bedding which has been exposed to infectious agents during medical research, pharmaceutical testing or the production of biologicals;*
5. *isolation wastes associated with animals or human beings known to be infected with "highly" communicable diseases;*
6. *contaminated and uncontaminated sharps including hypodermic needles, scalpels and broken glassware.*

Note that medical waste, containing radio-active material is not mentioned in the definition of medical waste, and that all sources for medical waste generation is not included in the definition. For example medical waste is produced in domestic homes, and although this might be smaller amounts, this waste should be handled carefully when disposed of.

Special wastes *means wastes which due to their nature, require special or separate handling, including, but not limited to tyres, demolition debris, construction waste, motor oil, bulky metal goods, e.g. discarded white goods – refrigerators, stoves etc., hazardous wastes and* ***medical wastes.***

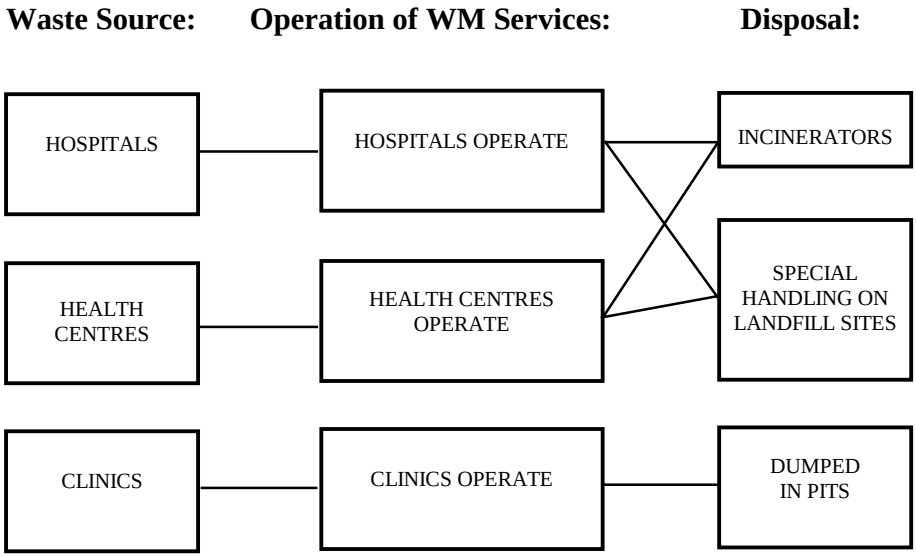
Household waste *means waste from any of the following premises: a home, that is to say, a building or self-contained part of a building which is used wholly for the purpose of living accommodation, or a caravan or a mobile home; premises forming part of a university or school or other educational establishment; and premises forming part of a residential home,* ***hospital or nursing home****.*

5.1.2 Overview of Waste Flow – from Source to Final Disposal

Below is given a brief overview of the main flow of the medical waste. It is seen from the illustration that the operation of the collection and disposal systems of medical waste often are operated by the hospitals themselves, although the waste from some hospitals within the city of Mbabane and Manzini are taken care of by the City Council.
There are no common standards for source separation, collection bins, collection equipment or operation of the disposal facilities.
There is no co-operation between the different operating entities, often the hospitals burn their own medical waste in a small incinerator at the hospitals. Some health centres connected to a specific hospital will, though, transport their medical waste to the hospital.

Collection and disposal of household waste from hospitals etc. is the responsibility of the local authority within the specific area of jurisdiction.

The illustration below indicates that medical waste is either disposed of by the use of incinerators or by special handling on a landfill site if it is not simply dumped together with other waste types. Standards for disposal of waste is included in the Environmental Management Bill and when enacted enforcement is to take place.



5.1.3 Hospitals, Health Centres and Clinics

The handling of pathological and medical waste is solved individually by each hospital, health centre, clinic and/or pharmaceutical shop. The cost of any of the medical waste management systems is born by the operator of that specific institution.

A list of hospitals, health centres, clinics and outreaches is obtainable from the Ministry of Health and Social Welfare. The list is dated February 2000 and contains nearly 400 institutions distributed as follows:

Region	Institutions	Names of Hospitals and Health Centres	Organisation
Manzini	158	**Raleigh Fitkin Memorial Hospital**, Manzini	Mission
		Mankayane Hospital, Mankayane	Government
		National Psychiatric Hospital, Manzini	Government
		Matsapha Tuberculosis Hospital, Manzini	Government
		King Sobhuza II Health Centre, Manzini	Government
		Mankayane Public Health Centre, Mankayane	Government
		Bhunya Health Centre, Bhunya	Company
Hhohho	74	**Mbabane Government Hospital,** Mbabane,	Government
		Pigg's Peak Hospital, Pigg's Peak	Government
		Havelock Mine Health Centre, Bulembu,	Company
		The Clinic, Mbabane	Private
		Mbabane Public Health Centre, Mbabane	Government
		Pigg's Peak Health Centre, Pigg's Peak	Government
		Dvokolwako Health Centre, Mliba	Government
Lubombo	94	**Good Shepherd Hospital** ,Siteki	Mission
		Good Shepherd Health Centre, Siteki	Mission
		Siteki Public Health Centre, Siteki	Government
		Sitobela Rural Health Centre, Kubuta	Government
		Ubombo Ranches Clinic, Big Bend	Company
		Simunye Clinic, Maphiveni	Company
Shiselweni	72	**Hlatikulu Hospital,** Hlatikulu	Government
		Hlatikulu Public Health Centre, Hlatikulu	Government
		Nhlangano Health Centre, Nhlangano	Government

Table 5.1 Hospitals, Health Centres, Clinics and Outreaches

5.1.4 Waste Generation from Hospitals, Health Centres, Clinics etc.

No data on the production of medical waste is available either at the waste sources or at the responsible governmental offices. The number of bed nights/year in hospitals and health centres and the number of visits to the clinics are also not known. However, estimates on the amount of medical waste produced can be calculated on an annual basis.

There are 13 health centres distributed around the country in both the urban and rural areas. The health centres can be operated by the public as well as privately (missions) or operated by a company.

The health centres are small hospitals with less than 42 beds. They manage their medical waste individually and dispose of their medical waste mostly by burying or dumping. The awareness of the health risks from non-structured medical waste management seems to be lacking.

A large number of clinics (approximately 375 clinics), similar to health centres without beds, are distributed throughout the country. These clinics are mostly private but some, around one third are public clinics. Some clinics are using traditional practices and some of

the clinics are solely using established medicine practices. Mainly part-time staff operates the clinics and the medical waste from these clinics are generally buried or dumped.

Rural Health Motivators inform the population in the rural areas about safe waste handling. Every clinic has a team of Rural Health Motivators who are paid by the Ministry of Health and Social Welfare and drawn from the local communities.

The visited Raleigh Fitkin Memorial Hospital has responsibility for some of this work as it operates as a parastatal hospital within the National Health Delivery System (NHDS). There are clinics located roughly within a radius of 8 km in the rural areas as part of the National Health Delivery System. As source separation is not very widespread in hospitals, health centres and clinics it is obvious that some medical waste ends up in the landfills for domestic waste. This creates severe health risks for landfill staff and scavengers.

5.1.4.1 Estimation of Generation of Medical Waste

A resent survey elaborated by the Consultant in Namibia indicated that approximately 0.7 kg of the fraction "infectious waste" was produced every day. The term "infectious waste" is recognised to have a broader definition than that of information collected in Kwazulu-Natal.

The information from Kwazulu-Natal is based on weighbridge data and suggests that the production rate might be as high as 0.4 kg per bed-night. It is in this case found reasonable to use the production rate of 0.4 kg/bed-night in the estimations of the amount of medical waste produced.

From the long list of hospitals/health centres and clinics provided by the Ministry of Health and Social Welfare it has been possible to establish an overview of the number of bed-nights and occupancy on the hospitals and health centres.
Using 0.4 kg medical waste medical waste generated/bed-night, the amount of medical waste generated is estimated in the below table.

It has been extremely difficult to obtain information on medical wastes from the rural clinics or health outreaches. From previous studies in similar countries (Namibia and others) it is estimated that the production of medical waste from similar clinics will be around 0.05 kg/visit and that the clinics have approximately 5-10,000 visits/year.

As there are 375 small clinics it can roughly be estimated that between 100 - 200 tonnes of medical waste is produced from these clinics per year.

Names of Hospitals and Health Centres	Beds	Occupancy %	tonnes/year
Raleigh Fitkin Memorial Hospital, Manzini	330	110	53,0
Mankayane Hospital, Mankayane	65	100	9,5
National Psychiatric Hospital, Manzini	235	110	37,7
Matsapha Tuberculosis Hospital, Manzini			
Mpilo Clinic	33	40	1,9
King Sobhuza II Health Centre, Manzini			
Mankayane Public Health Centre, Mankayane			
Bhunya Health Centre, Bhunya			
Mbabane Government Hospital, Mbabane,	500	120	87,6
Pigg's Peak Hospital, Pigg's Peak	120	120	21,0
Havelock Mine Health Centre, Bulembu,			
The Clinic, Mbabane	32	60	0,3
Mbabane Public Health Centre, Mbabane			
Pigg's Peak Health Centre, Pigg's Peak			
Dvokolwako Health Centre, Mliba			
Good Shepherd Hospital, Siteki	125	152	27,7
Good Shepherd Health Centre, Siteki			
Siteki Public Health Centre, Siteki			
Sitobela Rural Health Centre, Kubuta			
Ubombo Ranches Clinic, Big Bend			
Simunye Clinic, Maphiveni			
Hlatikulu Hospital, Hlatikulu			
Hlatikulu Public Health Centre, Hlatikulu			
Nhlangano Health Centre, Nhlangano			
Estimation of medical waste from all clinics		around	**100-200**
Estimated Total (note that data are missing)			**438,7 - 338,7**

Table 5.2: Hospitals and Health Centres and Clinics - Waste Generation

5.1.5 Medical Waste Collection

Medical Waste Management in Cities

In the cities, for e.g. Mbabane there are 13 private clinics/surgeries from which medical waste is collected by the city on a twice-weekly service interval. The waste collection system in Manzini is considered to be the same as in Mbabane /16/. A concern about the disposal of expired pharmaceuticals was also expressed /16/.

5.1.6 Waste Treatment and Disposal

Swaziland has eight general hospitals and two specialised hospitals. Some hospitals have outreach clinics in rural areas. All the hospitals have small poorly managed furnaces, but

most of these do not operate satisfactorily and the medical waste is therefore often half burnt. Some places the medical waste is co-disposed with domestic waste.
In some of the rural clinics the medical waste is disposed of into pit latrines.

5.1.7 Examples – Medical Waste Handling, Treatment and Disposal

Some hospitals were visited and below is given examples of waste handling at a hospital:

Raleigh Fitkin Memorial Hospital
The administrator of the hospital defined the medical waste streams as:
Medical waste included sharps, surgical waste, tissue and placentae are stored separately and delivered to the hospital incinerator daily.
Clinical waste includes dressings, bandages, syringes are also stored
Domestic waste includes paper, food, dust and general waste from the wards and offices of the hospital. This waste type is stored in dustbins and delivered to the central waste temporary storage area, where it is combined with the Clinical Waste before being transported to the hospital waste disposal site.

All the above mentioned waste fractions are transported to the central waste temporary storage area. Waste that accumulates here is loaded and hauled to the hospital's private disposal site where it is tipped and burned on daily basis.

A tractor trailer unit is used to collect the waste from the central temporary storage area and haul it to the hospital disposal site. The waste being transported is covered by a tarpaulin to reduce the risk of spillage along the way. Hospital waste collection staff has received safety boots, overalls and gloves to reduce the risk of injury from the materials being handled.

The disposal site smoulders and smells bad. This has led to complaints from nearby residents – a Teachers' Training College, a Nurses College, a School and other residents. The hospital has 330 beds with an estimated bed occupancy rate of 110%. The administrator expressed the view that this is the common situation in Swaziland.

The incinerator was inspected it is a relatively small simple "oven-type" unit and was probably adequate at the time that it was originally installed. The unit is manually fed and operated by a hospital staff member, who seemed to have little training in operation and maintenance of the incinerator. The staff member did not at the time of the visit use health protection equipment during operation of the plant. It was not clear what happened to the ash but evidence was seen at the hospital disposal site of the incinerator ash.

During the time that the incinerator was being visited a series of loud reports were heard which corresponded to the explosion of expired pharmaceuticals and medicines being burned in pit near to the incinerator building.

Hlatikulu Government Hospital

Hospital staff use cardboard boxes for the collection of medical waste - needles and sharps. The boxes are sealed before taken to the hospital furnace. Incineration takes place every day.
The ashes from the incinerator is collected by Hlatikulu Town Board for dumping.

Dressings and body waste is put into black plastic bags together with domestic waste. The Hlatikulu Town Board collects the plastic bags for dumping.

Expired medicines are taken back to the medical stores.

The hospital has 210 beds but usually have 250 patients per night. 13 workers are responsible for cleaning and collecting waste from the wards. The staff is provided with protective clothing. Basic training in waste management is needed. The waste are taken to the incinerator or collected by the Town Board and taken to the local dumpsite. Members from the community tend to scavenge the dumpsite!

Dvokolwako Health Centre
The health centre has 240 beds (and still registered as a health centre). The occupancy rate is extremely high, around 120%.

The waste generated in the health centre is divided into: 1) clinical waste i.e. bandages, dressings etc; 2) domestic waste i.e. food stuff etc. and 3) sharps and body waste i.e. syringes, amputed body parts etc.

The waste is taken to a central place and on a daily basis taken to the dumpsite, located in the premises of the hospital. The waste is burnt on a daily basis.
The sharps etc (3) is daily taken to the hospital's incinerator. A pit has been dug near this incinerator in order to burn expired drugs and other pharmaceuticals and the waste is burnt.

The hospital staff employed with waste management is provided with protective clothing. There have been complaints about smoke emitted by the dumpsite and the 3 workers employed with waste management; a tractor driver; an assistant and a incinerator operator.

Sigangeni Clinic
Solid waste is disposed of from the clinic through burning in pits outside the clinic. All waste including food waste, papers, plastics together with clinical waste. The medical waste is not burnt before final disposal.

Mbuluzi Clinic
Solid waste is disposed through burning in pits. All waste is, similar to Sigangeni Clinic thrown into the pit.

5.1.8 Medical Waste Management Costs

The costs of medical waste management are borne by the individual hospitals and institutions that produce the waste.

5.2 Institutional Set Up and Capacity within the Institutions

The hospitals, health centres and clinics etc. manage their waste individually. The monitoring capacity within the Ministry of Health and Social Welfare is small.

5.3 Legal Mandates and Responsibilities

The Environmental Management Bill (1999) mandates the Minister responsible for the Environment to make regulations to regulate medical waste management and disposal. Amongst others he can impose responsibility for any stage of medical waste management upon generators and receivers.

The Swaziland Environment Authority Act 1992 allocate hospitals (medium scale) into Category 2 projects stating that these are likely to cause environmental impacts some of which maybe significant unless mitigation are taken, whilst small scale social structures, as rural health clinics, according to the Act (1992), are unlikely to cause any significant impact.

5.4 Identified Problems - Medical Waste Management

The following problems have been identified with the current medical waste management.

The existing management has severe impact on the health of the people of Swaziland and to the environment as it is handled to day and is as such the most urgent issue within waste management system to be dealt with.

There is a lack in the implementing instruments such as:

- Legislation (including clarification of responsibilities and duties) - guidelines and health and environmental standards etc. There is a need for re-visiting the legislation to get clarity for responsibilities and duties for all stakeholders within medical waste management.
- Institutional and capacity development. For example there is a lack of supervision, accountability, auditing and control of hospitals, health centres, clinics, medical facilities and suppliers.
- Financial support.
- Continued training at all levels. Staff is inadequately trained to handle and manage medical waste. Training programmes must be developed to ensure proper medical waste management practices. Provision must be made for adequate security within the medical waste management system during generation, storage, collection, transport and disposal.
- Awareness amongst all parties involved, and

- Creation of partnerships between institutions and organisations, regulators, and implementers is a necessity in order to sustain a sound medical waste management system in Swaziland.

The following technical and environmental problems have been identified:

- Lack of separation of medical waste at source.
- Lack of standardised reception equipment.
- Lack of the "no touch from source to final disposal" principle which is a must to avoid infection.
- Lack of adequate operation and treatment of medical waste in Swaziland as a whole. The operation of and maintenance of existing equipment is inadequate. Secondary waste fractions must be catered for in the waste management system devised for medical waste; and
- Lack of sufficient enforcement, monitoring and control routines.
- Appoint sufficient educated and trained staff to carry out duties and responsibilities at all levels.
- Public awareness campaign on health risks.
- Guidelines for management of medical waste.
- Improvement of co-ordination between cities and Ministry of Heath and Social Welfare. Mbabane is e.g. not reporting to the Ministry of Health and Social Welfare because no one asks for information.
- Clarification of rolls and responsibilities is needed between local authorities and the Ministry of Health and Social Welfare.
- Guidelines for collection and (pre) treatment of medical waste.
- Guidelines for management of waste in rural areas.
- SEA must be able to enforce regulations and monitor the activities carried out by the Ministry of Health and Social Welfare.

6 The Way Forward

A first draft of this document was discussed by a wide range of stakeholders (40-50 attended) on a one-day workshop 8 August 2000.

Verification of the information gathered in the document took place and amendments to the problems identified were obtained.

In a meeting 24 August 2000, the Project Steering Committee (PS 03), discussed this rectified document - Final Status Quo Analysis (August 2000).

A Needs Analysis will take place, based on the identified problems. The Needs Analysis Report will be drafted and sent out to the stakeholders 11 September and the Identified Preferred Solutions Report will be drafted 26 October. A stakeholder workshop will be executed the 10 November in order to discuss the documents before the draft final editions is presented to the Project Steering Committee (30 November 2000).

Simultaneously, preparation of Pilot Project Documents takes place (conducted by SEA staff), in order to secure financing of these pilot projects, before implementation starts in February 2001.

The Pilot Project Implementation is the second phase of the project and the activities in this phase will be carried out by and lead by civil servants at different levels within the Swaziland Government.
The Consultant's will during this period carry out capacity development activities and monitor the progress of the Pilot Projects.

7 Source Literature Reference Documents

1. Mbabane Landfill Statistics. Waste amounts in kg/month June 1998- February 2000. Excel sheet established by Landfill personnel and RAMBØLL on the basis of hand-written information
2. List of enterprises from the Ministry of Commerce
3. "Report on Phase I of the Matsapha Solid Waste Project, January 1995" (Swaziland Government, Ministry of Commerce and Industry)
4. Survey executed by SEA/DFID in December1999-January 2000, Management of Industrial Pollution Survey.
5. Standard Bank publication on amongst others population, growth rate etc.
6. The Waste Stream Analysis Report – November 1998 prepared for the Durban Metro Water Services, Durban Solid Waste by SKC Engineers, Lombard & Associates, Bosch & Associates and Haultec.

7. 1996 Census modified for 1997.

8 List of Meetings, Names and Addresses

1. Meeting with Ministry Health and Social Welfare, P.S. Mr. S.S. Mdziniso and Ms. Dudu Dube, Mr. Richard Mamba, tel: 404 2431/3; fax: 4042092 or 424296.
2. Ministry with Ministry Housing and Urban Development; 3rd floor Tax Income Building; Mr. Steven Komali
3. Meeting with Joe Traill Thomson, SEA, Economist (DFID).
4. Meeting at SAPPI Usutu Pulp Mill including site visit: Mr. Charles Gonin, Mr. Caiphus Dlamini, and Mr. Dave Flanagan. tel: 4526010 ex. 2240 and cell: Dave Flanagan 604 6323
5. Meeting with City Council of Mbabane including site visits; Director Mr. A. S.Mabuza and Mr. William Ndlela, Mr. Mambo tel: 602 21147.
6. Meeting with City Council of Manzini and site visits. P.S. Mr. Terry Parker and Mr. Penson Dlamini, Mr. Madoda. tel: 502 2481
7. Meetings with the people in and around Siphofaneni
8. Visit to Town of Siteki and site visit
9. Meeting in Motshane and site visit. Mr. Mboni Dlamini
10. Meeting of M Joubert/B Nxumalo/R Lombard: 08:00 20/06/2000 discussion of tasks
11. Meeting of M Joubert/M Mabuza/R Lombard: 10:00 20/06/2000 discussion of collected waste information
12. Meeting of M Joubert/M Dlamini/ R Lombard: 10:30 20/06/2000 discussion of industrial waste generation
13. Agriculture – Pesticide Residues, empty containers and expired materials
    Mr Morrison Mbuli : Plant Protection Officer, P O Box 501, Manzini Tel. 5052051
14. Mr Lionel Dlamini – the Raleigh Fitkin Memorial Hospital
15. Farm Chemicals – Mr Diccon Robinson and Japhta Fakhudze - Farm Chemicals Limited, P O Box 1554, Swaziland Tel. 505 2927
16. Manzini City Council Abattoir by Mr M Dlamini
17. Meeting with Dr A M Vilakati
18. Several visits to Mbabane Landfill and other waste disposal sites.

ANNEX I

MINISTERIAL ACTORS

ANNEX I -1

AN INSTITUTIONAL PROFILE - SWAZILAND ENVIRONMENT AUTHORITY (SEA)

1. History

SEA was conceptualised in 1988 following a seminar held at Pigg's Peak, which recommended the establishment of a national body to co-ordinate environmental activities throughout the country. However subsequently this proposal was scaled down.

The Authority was established[4] as a statutory ***board*** to the Ministry of Natural Resources and Energy in 1992, at which time "Environment" was added to the Ministry's designation. It began its operations in mid-1993. The Ministry's Department of Environment would function as the ***secretariat*** for board.

In 1997 a ***new*** ministry was created for the portfolios of tourism, environment and communications. After which the Environment Authority was attached to, and served by, the ***Ministry of Tourism, Environment and Communications (MTEC)***.

Currently preparations are underway to transform the Authority (board and secretariat) into a "parastatal" or corporate body, which i.a. would make it autonomous in relation to any line-ministry. These preparations are assisted by the Department for International Development of the U.K.

2. Strategy

The overall objective, or mission, of the Swaziland Environment Authority is to:

"Ensure that Swaziland's development is environmentally, economically, and socially sustainable, ***by means of promoting*** *sound environmental policies, practices and development, which meet appropriate national and international environmental standards"*[5].

SEA was conceived primarily as a promotional[6] agency, but it was also vested with regulatory powers. The potential scope of its promotion responsibilities is quite wide, as indicated in the following section, but may essentially be summed up as being a *facilitator* and *catalyst* of good environmental practices throughout Swaziland.

The SEA is funded out of Government recurrent budgets to the tune of about a million Emalangeni. In addition the agency receives international donor funding for specific projects or short-term inputs

[4] Through the enactment of the Environmental Authority Act no. 15, currently under revision.

[5] This mission statement was developed in 1996.

[6] In the sense of having policy making and co-ordinating functions.

3. Systems

The “systems” used by an organisation to achieve its objectives may be described in terms of its equipment and infrastructure (hardware) as well as its procedures and activities (software).

Given the conceptual nature of SEA's functions the equipment situation is most easily summarised: The secretariats about 200 m2 office space comprises 9 separate offices plus a library, and use of a conference room shared with the rest of the ministry. The offices are equipped with a total of about 10 computers with printers and 1 photo-copy machine. Communication-wise every office has a telephone, and there are a total of 3 international lines. One connected to a fax-machine and another to the inter-net. Transport-wise it commands 2 vehicles. Most of these movable assets have been financed by donor funds.

The Authority’s main areas of responsibilities may be summed up as:

- Co-ordination of pertinent issues relating to the environment
- Monitoring of environmental quality
- Setting of environmental standards
- Development of environmental policies
- Designing and institutionalisation of mechanisms that ensure that environmental considerations are taken into account in the decision making and management of development by other actors.

However, due to the newness of the Authority and its thin staffing, SEA has basically only made headway in the *designing* of procedures, but not in their *institutionalisation.* Thus it has come far in the articulation of regulations and manuals for EIA, monitoring schedules, control mechanisms for air, water and waste pollution, but these have yet to be brought in to operation. Only the EIA regulations have been

So far SEA's most substantial contribution to the country’s ***solid waste issues*** has been the drafting of a ***new Waste Management Regulations, enacted in January 2000 and in force April 2000.***

Other activities in the field of solid waste has been training in upgrading of open dump-sites and advises to private enterprises within the sugar and paper & pulp industries. In addition it has been involved directly in the design and establishment of a particular landfill site through administering development control regulations.

An important initial step in institutionalising solid waste management and the harmonisation of the necessary interactions between the various actors, is SEA’s current facilitation of the formulation of a national strategy for solid waste management.

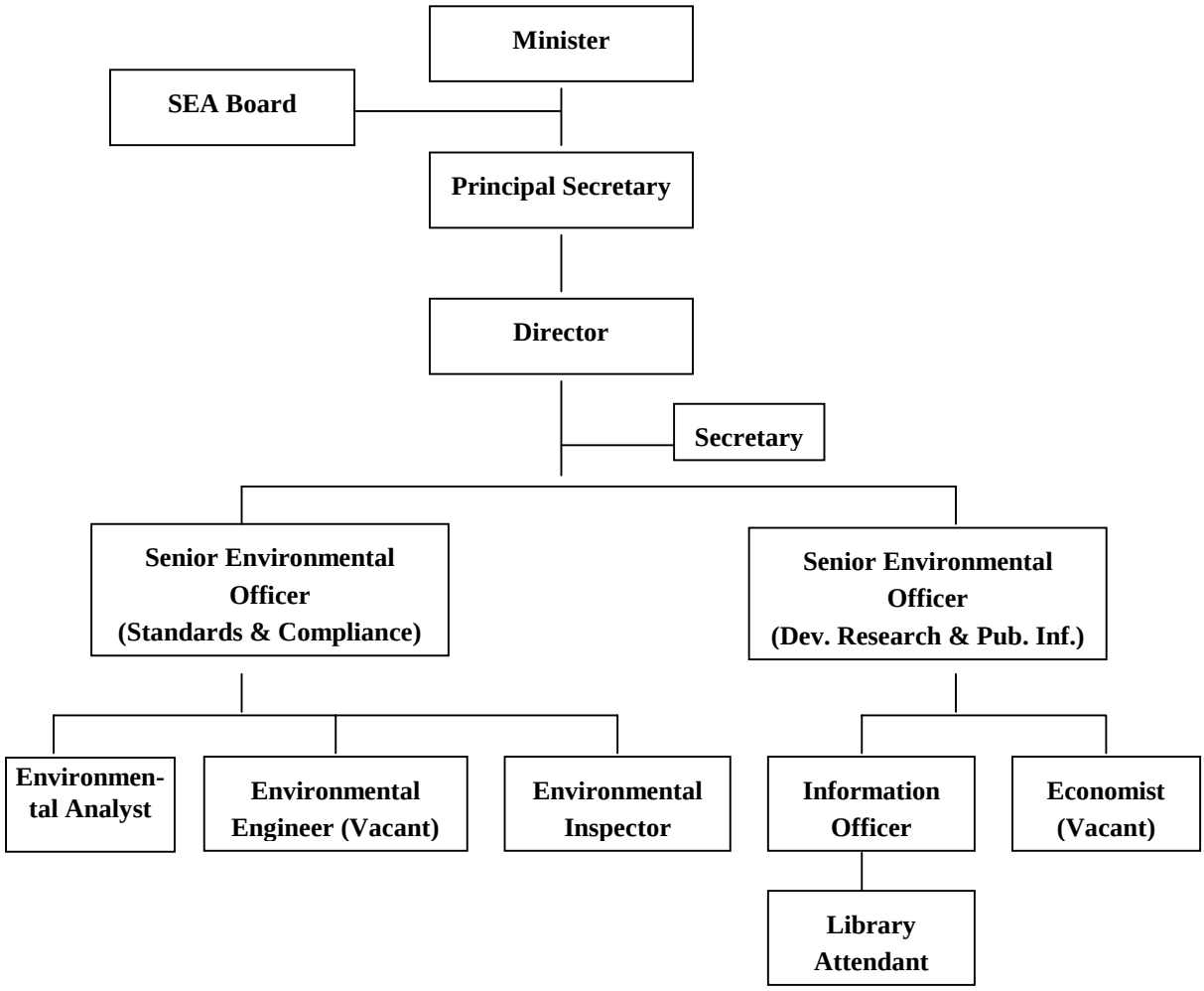
4. Structure

SEA's board itself comprises the following members:

- a Chairman
- a non-voting Executive Director/Secretary
- 8 principal Secretaries (Agriculture & Co-operatives; Works & Construction; Commerce and Industry; Tourism, Environment and Communication; Housing & Urban Development; Education; and Health)
- 4 NGO's (the NGO membership changes every third year. Currently they are: Swaziland Association of Engineers, Architects & Surveyors, Yonge Nawe, Natural History Society, Chamber of Commerce)
- 4 private citizens appointed by the Minister of Tourism, Environment and Communications

The Board meets mandatory four times a year, but otherwise as needed, which in practice has been a lot more frequent during the initial years of establishment. The agenda tends to be set by the secretariat, which also provides the strongest element of continuity, since the participant ministries tend to send changing alternates to their principal secretaries. Hence the Authority seems to function more as an advisory board to the Minister, than as a lead-agency in itself.

The secretariat, or department of environment comprises 8 professional positions of which only 6 are filled. Support staff such as accountants and secretaries are employed directly with the parent ministry. The designation of positions, division of labour and lines of authority are indicated in the organogram below.



5. Institutional Relations

The intended functioning of SEA is very much about establishing relations to both regulating and implementing actors.

In the field of Solid Waste the most obvious institutional stakeholders seem to be:

- The Ministry of Housing & Urban Development (especially the Departments of Housing & Human Settlements, Physical Planning, and Urban Government.), which regulates the City Councils of Mbabane and Manzini, and the various Town Councils & Boards in these matters.

- The Ministry of Health and Social Welfare (especially the Environmental Health Inspectorate) with regards to medical wastes.

- The Ministry of Enterprises and Employment, in relation to the solid wastes of Industrial Townships, also known as “Company towns”.

- The Deputy Prime Ministers Office with regards to all waste types within rural areas, except medical waste.

- Private agents (like hotels) with their own dump-sites which don’t fall under the auspices of the above authorities, and therefore, by default, come under the direct purview of the SEA.

- International bodies or conventions (global and regional) concerned with solid waste.

SEA’s relations with the national stakeholders may generally be described as close and good, but informal and based on ad-hoc requirements. There is no institutionalised and scheduled co-ordination amongst the principal regulators of solid waste. With regards to international stakeholders it should be noted that the country has not yet ratified the Basel Convention. This situation curtails Swazilands options of solving part of its solid waste problems in corporation with neighbouring countries.

6. Skills

The formal training of the Secretariats current staff is as follows:

- Director, holds a M.Sc. in Range Ecology and a B.Sc. in Agriculture
- Senior Environmental Officer, holds a M.Sc. in Land and Water management and B.Sc. in Agriculture
- Senior Environmental Officer , holds a B.Sc. in Agricultural Engineering and a Post graduate Diploma in Soil Conservation
- Environmental Inspector, holds a B sc. Biology and Post graduate diploma in Wildlife Management.
- Environmental Analyst, holds a B.Sc. in Environmental Sciences and Biology
- Information Officer, holds a B.Sc. in Environmental Sciences and Biology

Conspicuous by their absence are formal degrees in jurisprudence and economics.

SEA has been able to utilise ample external funding for external courses and training programmes. Apart from the most recent employed, every officer has attended at least one of the environment related training courses funded by the UK Department for International Development and the German Government. Most have participated in several. The length of the courses have varied from a few weeks to half a year.

7. Incentives

The staff of the secretariat are on the regular pay and benefit schedules of the government. A major incentive in *recruitment* of ministerial staff is the access to further training. Once such a level has been achieved, the incentives of public employment are less effective in *retaining* such staff.

While the incentives for joining the secretariat are transparent, the incentives for individual performance are not. The current civil services terms do not enable a linkage between performance criteria and pecuniary numeration.

ANNEX I - 2

AN INSTITUTIONAL ANALYSIS - THE MINISTRY OF HEALTH AND SOCIAL WELFARE

Environmental Health Inspector - MR EDMUND DLAMINI

1. HISTORY

The environmental health programme comprises a number of interventions designed to prevent and control diseases before they occur. The overall objective of the programme is to reduce and possibly eliminate morbidity and mortality due to improper environment related conditions and diseases transferable to man.

The programme has eight (8) main areas, namely communicable diseases control, sanitation, water supply, meat and other foods, Inspection of trade premises, control of pest and vermin, scrutinisation of building plans and staffing. In sewage disposal the department improved in its task of dislodging the numerous septic tanks being used all over the country (except Manzini and Mbabane urban areas) as the Ministry of Health was able to buy two new vacuum tankers. Hhohho region shares one with Manzini region; Lubombo shares the other with Shiselweni region.

Refuse disposal in all the towns urban areas is the responsibility of the township department which is under the Ministry of Housing and Urban Development. Although there appears to be an improvement in refuse collection in towns, there is still a lot to be done before it can be said that this service is satisfactory. Areas outside the urban area continue to have problems of refuse collection and disposal. This is made worse by the fact that there is no proper legislation against littering. Communities and homesteads are motivated to dig individual refuse pits.

This is done during the toilet project follow-up and during inspection of business premises. It is noted that company towns and premises in the country have the leading organised refuse collection and disposal teams as well as the best messages in signs and warnings. This results in a high standard of cleanliness. Some companies and non governmental organisations joined hands and sponsored most clean-up campaigns. Schools were encouraged to collect refuse around the school premises and along the country's main roads.

MINISTRY OF HEALTH - PUBLIC HEATH BILL 1999

Food Supplies and Food Hygiene

- Duties of environmental Health Officers :-

(a) It shall be the duty of every environmental health officer or any health officer authorised by the Minister or law, to take all lawful necessary and reasonable and practical measures to ensure that all food or food supplies intended for human consumption is or are clean, wholesome, sound and free from any disease, infection or contamination and not stale or expired.

(b) Where an environmental health officer or such authorised officer suspects or has reason to suspect that any food in the officer's opinion is spoiled, stale, contaminated or for any reason not fit for human consumption, the officer may take samples of such food for examination or analysis within a reasonable time or to any competent laboratory for examination or analysis.

(c) Any food shop which fails to comply with the applicable provisions of this part or section shall be liable to have the premises closed forthwith by an environmental health officer or such other authorized officer until such time that the applicable provisions as shall be specified by the officer, are complied with to the satisfaction of the environmental health officer or such other authorized officer.

2. STRATEGY

NOTE: There is no proper legislation against littering in the country. The health officer responsible for solid waste management only relies on encouraging cleanliness and proper disposal of waste in rural communities all over the Kingdom.

The Public Health Bill used is too shallow and only covers laws governing Solid Waste Management in Urban Areas.

3. SYSTEMS

The health officer is located at the 5th floor of the immigration building.

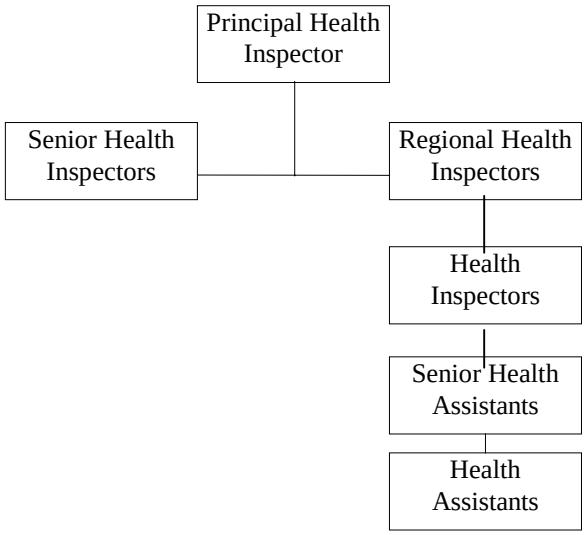
4. ORGANISATIONAL STRUCTURE

The office of the health inspectorate has ninety-five staff members and a further three (3) health inspectors situated at the headquarters, a total of 98 staff members in the department. There is a senior health inspector, 3 health inspectors, 4 regional health inspectors, 23 health inspectors distributed in the four regions, 2 health inspectors in the malaria control unit and 2 health inspectors in the bilharzia control unit. It is also staffed with 5 senior health assistants, 37 health assistants, 6 heavy duty drivers, 3 vacuum tanker attendants and 2 typists.

Designations and Qualifications

Principal Health Inspector - Masters Degree in Public Health
Senior Health Inspector - B. Sc. in Environmental Health
Malaria Programme Manager - Diploma in Public Health

Organisational Chart



5. INSTITUTIONAL RELATIONS

The Environmental Health Inspectorate works on an Advisory Board to the Town Boards and the Town Boards of the different Town Councils and the Cities . They interact with the following:

- Rural Water Supplies
- Swaziland Environmental Authority
- Ministry of Agriculture
- Ministry of Health and Social Welfare
- UNISWA
- NGO's especially those involved in Water Supply and Sanitation.

The Town Boards are advised by the Health Officer. The Nhlangano Town Board is one of those organisations advised by this department on Solid Waste Management.

6. SKILLS

The Health Inspectorate in the Ministry has in all the following professional staff:

Principal Health Inspector - Masters Degree in Public Health
Senior Inspectors - B.Sc. in Environmental Health
Regional Health Inspectors (2) - Diploma in Public Health and the other has a Masters Degree in Public Health.
Health Inspectors - Diploma in Public Health
Senior Health Assistants - Short courses in Public Health

7. INCENTIVES

The Ministry of Health and Social Welfare trains its environmental Health workers locally and abroad to further their knowledge on environmental health. Their staff also occasionally attend workshops and seminars on environmental health. All in all staff is on a monthly payroll scheme with access to pension scheme by the government of Swaziland.

8. CONSTRAINTS

- Shortage of sanitation material
- Shortage of personnel
- Shortage of transport

ANNEX I - 3

AN INSTITUTIONAL PROFILE - THE MINISTRY OF HOUSING AND URBAN DEVELOPMENT

1. HISTORY

Solid Waste Management falls under the Engineering Section of the Department of Urban Government. Within this department waste management issues are dealt with, by one officer.

2. STRATEGY

Currently there is no strategy regarding Solid Waste Management in the MHUD, except that the Urban Government Act provides that the local authorities are to ensure Solid Waste Management Services to urban citizens.

Overview

In the 1999/2000 financial year the department will endeavour to comply with the wishes of the residents of Cities and Towns as expressed in the survey done before the Strategic Plan was formulated. The activities to be done by the department in the coming year will be in line with the strategic directions as contained in the Strategic Plan.

THE REGULATIONS USED ARE:

The Public Health Act 5 of 1969. The Urban Government Act 8 of 1969 . The Waste Regulations 2000. The Food Hygiene Regulations of 1973. The Environmental Audit, Assessment and Review regulations of 1996.

INSTITUTIONAL RELATIONS

Housing regularly interact with the both City Councils and Town Councils , MOHSWF, Yonge Nawe, SEA, WHO, UNDP, UNEP

SKILLS

There are one qualified health inspectors working in waste management. He has no specialised training in waste management.
His role is to advise Local Authorities, especially Town Boards on their refuse collection, management of abattoirs and other waste services.

INCENTIVES

There are no incentives offered staff working on waste management although of course there is a pension scheme.

PERCEIVED INSTITUTIONAL CONSTRAINTS

Inadequate institutional structure for environmental management (hereunder Solid Waste Management)

Inadequate training opportunity for staff in waste management
Inadequate tools and equipment i.e. old computers etc

- Inadequate funds for running the waste management issues
- Poor public awareness in waste management

ANNEX I - 4

INSTITUTIONAL ANALYSIS - COMMUNITY DEVELOPMENT

THE DEPUTY PRIME MINISTER'S OFFICE

(MR MBHELE - PRINCIPAL COMMUNITY DEVELOPMENT OFFICER)

1. HISTORY

The community development started in 1967 when Swazi citizens were preparing for independence. At that time, it was under the then local government i.e. the British colonial Government. It was started solely for the purpose of involving all the citizens in decisions so as to empower themselves and to understand that they were now independent. The organisation comprises of 3 projects namely:

1. Self Help Programme which is the mother body

2. Women in Development - women felt that they were left out of the programme then came in to compliment community development in 1975. The main objective of this programme is to improve the socio-economic status of rural women by expanding opportunities to earn income through training and post training support. In this regard, the programme provides production skills to rural women as a means for them to find gainful employment by generating income through home based production and enterpreneurship e.g. sewing. They run 5 training centres, with the Head office being at Mvutshini.

3. People's participation Programme - which solely came to cater for the least privileged. This programme has a staff complement of 6 who are employed through the project. Their fundamental job is to mobilise, motivate and encourage communities to form income generating activity groups in different regions. These activities are selected by the communities themselves.

NOTE : There is no machinery that co-ordinates community development in the country. Hence the department appears to have no direction. However the United Nations has appointed a person (Mr Asrat) to help build the community development to be a strong unit and develop an operating mandate. He has spent 7 months with the office and his term expires in two years time.

2. STRATEGY

The community development department does not have any regulations supporting their activities. This is mainly because they are involved in making the communities aware of environmental health as well as cleanliness in their homes. Their workers promote awareness on the needs to have pit latrines and to dig holes for the disposal of their household waste. There is not enough focus on schools but provide assistance if the school has a project which has been initiated by the community through school committees.

VISION : “To upgrade the section to a department for the achievement of its effectiveness in developing communities so as to improve their standard of living by utilising available resources to facilitate their self-reliance”.

MISSION : “To serve as a channel between government and the communities and to bring awareness to the beneficiaries through the influence and trained community development workers in identifying and prioritising their needs by involving them in every stage of development and networking with other organisations to achieve their goals and objectives in an efficient manner towards the attainment of self reliance.”

3. SYSTEMS

The community development project or department is only involved in awareness and teaching programmes. They do not necessarily have any systems in place to carry out their duties. However vehicles are available for use by their employees throughout the Kingdom.

4. INSTITUTIONAL RELATIONS

The community development department interacts with all who are involved in development in the rural communities all over Swaziland. They also interact with the Ministry of Agriculture, Health Ministry and non-governmental organisations (NGO’s) who are involved in community development.

5. SKILLS

Community development organisations were involved in the training of staff but staff are now recruited and taken on orientation courses and occasional seminars. Some of their staff join adult education classes at the University of Swaziland but these are mostly development (intfutfuko) workers. There is however a training programme for professional staff.
NOTE : When the community development programme started in 1967 they trained 12 members of its staff. These persons have since left the department. In 1973 12 more recruits were trained at SIMPA of which Mr Mbhele was one of them. In 1974 another 4 members were trained by UN experts on community development. In return, these 4 trained and additional 12 staff members in 1975.
The Training Officer is Mr Msebezi Matsebula.

6. INCENTIVES

Employees of this department are classified as civil servants and are therefore entitled to all such benefits.

7. CONSTRAINTS

- Staff Shortage is a major problem. The department would be more efficient if government would place community development workers in each of the 55 Tinkhundla centres throughout the country.
- Transport is also a problem due to a limited number of vehicles.
- Salaries are low hence an exodus of trained personnel to other departments or government offices.

NOTE : Staff turnover will remain high because of low salaries and other benefits.

ANNEX II
Executing Bodies

ANNEX II - 1

AN INSTITUTIONAL PROFILE - MANZINI CITY COUNCIL

1. HISTORY

Manzini, popularly known as the hub of Swaziland is the administrative Centre for the Manzini region and it is situated about 40km from Mbabane, the Capital City of Swaziland.
His Majesty King Mswati III declared Manzini a City in 1992 after 100 years of existence. Until 1961 Manzini was called Bremersdorp, a Colonial name it assumed in 1890.

Manzini region is the most populous with 30.3 % of the country's population and is also the most urbanised, with 32% of the population living in the urban areas. The population of Manzini City currently stands at 31,382 according to information obtained from the 1999 annual report.

Manzini City Council was established to promote the development of the City and also generally to improve the efficiency and effectiveness of all services rendered to the public thus improving the quality of life of all the residents of the City.

2. STRATEGY

The overall objective or mission of Manzini City Council is to promote the development of the City and also generally to improve the efficiency and effectiveness of all services rendered to the public thus improving the quality of life of all the residents in the City.

Regulation

An elected Council comprising of twelve members and four appointees of the Minister for Housing and Urban Development are responsible for enacting policies and regulations for the Institution. The Council continuously liase with the Ministry of Housing and Urban Development in its activities.

The emphasis of the Town Clerk's office during 1998/1999 has been on organisational development and planning to improve the performance and overall functionality especially with regard to solid waste management.

Revenue

The City Council remains financially constrained by the reliance on rates as the main source of income and anticipates that the Government will move forward on the fiscal decentralisation initiatives that will lead to the development of the revenue/cost sharing formula to ensure fiscal sustainability of local Authorities. The City Council also gets an annual subvention from the Central Government.

The service charges have not been revised for the last 10 years even though it is regulated that the City Council has to charge such fees to sustain their operations.

With regard to solid waste management, the City Council experiences some problems in discharging this responsibility effectively mainly because there is a significant amount of unpaid rates, as a result valuable resources are used to pursue outstanding debts.

Planning

The City Council has developed a participatory planning tool that will help in a lot processes including solid waste management. This planning process also involves the communities so that they can take part in decisions that affect their lives like solid waste management.

The Department of Health and Social Welfare is charged with the responsibility for environmental sanitation, which include among others liquid and solid waste management. This is achieved through planned inspections and the collection of solid waste and refuse disposal from both the Urban and Rural areas.

A new solid waste disposal site initially proposed to be located in Nhlambeni was put on hold as a result of Council's concern regarding imminent relocations of homesteads and the unsuitable geology of the area with relative cost implications. Council is in the process of exploring possible options to get the project going.

3. SYSTEMS

The systems used by the organisation to achieve its objectives includes equipment and infrastructure as well as its procedures and activities. It is important to note that the City Council 's department of Health and 'welfare works hand in hand with the Engineering department in the disposal of solid waste. The department of Health performs an advisory role in the disposal of solid waste while the operational responsibility is handled by the Engineering Department.

Household waste is collected twice a week and hospital waste is collected everyday Monday to Fridays by three refuse trucks. It is taken to a landfill site next to Manzini Cemetery. Waste bins from densely populated areas is collected once a week and also taken to the dumpsite. Household waste disposal costs the household owner E 7.00 per month, which is charged through the Water bills.

Medical waste is collected once a week and taken to the incinerator. The collection of medical waste is free. Private medical practitioners have special skip containers, which are also collected once a week for disposal.

Industrial waste is dumped in a landfill site by the industries themselves. Chemicals are buried in the dumpsite in containers.

The dumpsite is manned by a staff complement of four - 2 drivers and two payload excavators.

The solid waste management unit co-ordinates 8 Health Attendants, who inform households on how to store waste until collection. The Health Attendants are employed by the Department of Health and Social Welfare.
For the waste collection:

- 5 drivers
- 4 tindunas
- Street sweepers
- 2 Dumpsite Attendants.
- 4 Health Inspectors

The Health Inspectors are responsible for ensuring that all solid waste in the urban area is properly collected and disposed and also control the illegal dumping of such waste. These also do a periodic check around the Urban Area to identify and remove any solid waste, which has been dumped.

The Dumpsite Attendants are responsible for a proper compacting of all solid waste which has been deposited at the dumpsite.

Tindunas are responsible for the supervision of all the Street Sweepers involved in the collection of Solid Waste.

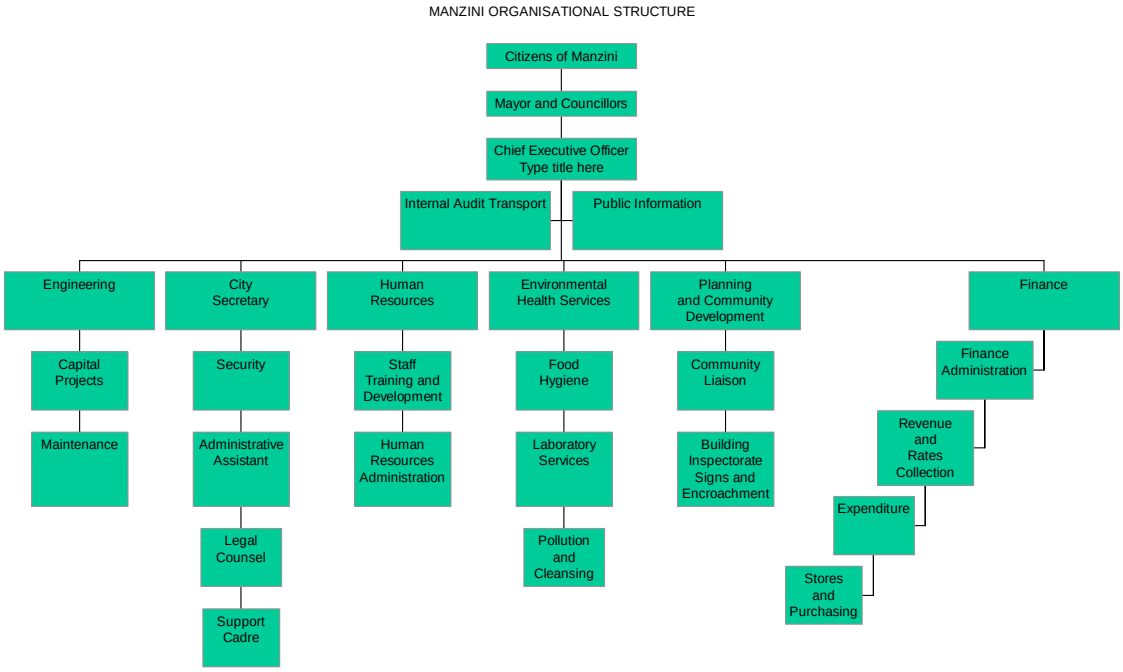
The equipment situation at Manzini City Council can be summarised as follows;

- 3 Refuse Collection Compactor Trucks (acquired in 1996)
- 1 Refuse skip Truck
- 1 Loader
- 1 Refuse Compactor
- 1 Loader

Manzini City Council is still expecting one 10 cubic metre truck.

4. STRUCTURE

Manzini City Council's health comprise of the following members of staff;



5. INSTITUTIONAL RELATIONS

Manzini City Council constantly interacts with the Ministry of Housing, Ministry of Health, Swaziland Environmental Authority with regard to Solid Waste Management. This interaction is mainly on an advisory basis.

6. SKILLS AND QUALIFICATIONS

Solid Waste Management at Manzini City Council is monitored by Health Inspectors whose qualifications are as follows :

Chief Health Inspector Environmental Public Health Inspection
2 x Senior Health Inspectors Environmental Public Health Inspection
3 x Health Inspectors Environmental Public Health Inspection
2 x Supervisors (Assistant health Inspectors)
Laborers

7. INCENTIVES

The Manzini City Council staff are on ordinary monthly pay and benefits being offered very little non-economic benefits. There is a formal technical training and assistance programme which provide significant benefits to the staff. This is offered by Manzini ‘s Sister City which is the City of Winston-Salem, North Carolina USA. Comparatively, the City Council pays better salaries than other institutions who are also parastatals.

8. PERCEIVED INSTITUTIONAL CONSTRAINTS

(a) The City Council of Manzini is experiencing significant amounts of unpaid rates. The general feeling is that they could deliver more services if income was received in time.

ANNEX II - 2

AN INSTITUTIONAL PROFILE - CITY COUNCIL OF MBABANE

1. HISTORY

Mbabane is the capital city of the Kingdom of Swaziland. It was founded in 1902 by the then British Colonial Administration center. However, the city council of Mbabane was established and given its status in 1992 by His Majesty King Mswati III. The city of Mbabane is managed and maintained by the city council.

The city is governed by a council made of members called councillors. The council in chaired by a Mayor elected by the councillors. All government ministries and departments, diplomatic representatives and all media houses are located in the city. The offices are located at 1 Warmer street adjacent to the water fountain on Allister Miller Street. The city has a population of 58063, according to data extracted from the city council's annual report of 1999.

The languages commonly used are siSwati and English. Literacy rate is reasonably high and the way of life generally modern in the affluent city. The national currency is Lilangeni in singular and Emalangeni in plural,-which was issued in 1974 and is on a 1:1 basis with the South African Rand.

All connector roads from other towns into Mbabane are tarred. Mbabane is the main linkage between the major industrial sites in the country and, in South Africa, Johannesburg. In fact, other than the over 50 000 tower dwellers, the city serves a further 103,000 people from the surrounding areas outside the town.

2. STRATEGY

The strategy of the city council of Mbabane includes both the vision statement and their mission statement:

(a) Mission Statement
- To provide quality serves and good governance for all citizens and ensure an attractive,

(b) Vision Statement
- The city of Mbabane will be the preferred destination in Africa.

Central Allocation

City Council to a large extend still relies heavily on Government subvention.

Regulation and Taxes

The city council levy property tax on immovable property. This tax is called rates. It is through these

taxes that local authorities can provide all the necessary service to residents such as solid waste disposal.

The city council charges rates based on the market value of the property i.e value of land with/without any structure built on it. The rating Act states that an independent value be appointed by the city council from a of values approved by the Ministry of Housing and Urban Development to evaluate the property.

The city council also charges street vending fees monthly or annually, using the urban Government Act 1969, refuse collection fees, bio-waste collection fees, and abattoir's operations fees. The city council also charge penalties on person(s) caught committing illegal acts.

The city council also generates income by charging such services as sports and recreation centers, cemeteries and charges for functions held at the coronation Park. The city council has formulated a strategy plan to guide its operations up to 2002. The document astute the city's vision and the city council's mission and maps out the plan's.

3. SYSTEMS

Equipment

The City Council of Mbabane has 2 tractors and forty-two waste containers. They also own 3 waste collection containers. All these were acquired in 1996 and their payoff period is estimated to be around 8 years.

Disposal Sites

Mbabane has a landfill site situated about 14 kms out of town. The waste collection trucks collect household waste twice a week, accept for medical waste which is collected daily. Household waste is collected using plastic bags of different types, card boxes and standard dustbins which have all proved unsuitable during the loading process.

Hardware and Software

- 15 computers
- 3 printers

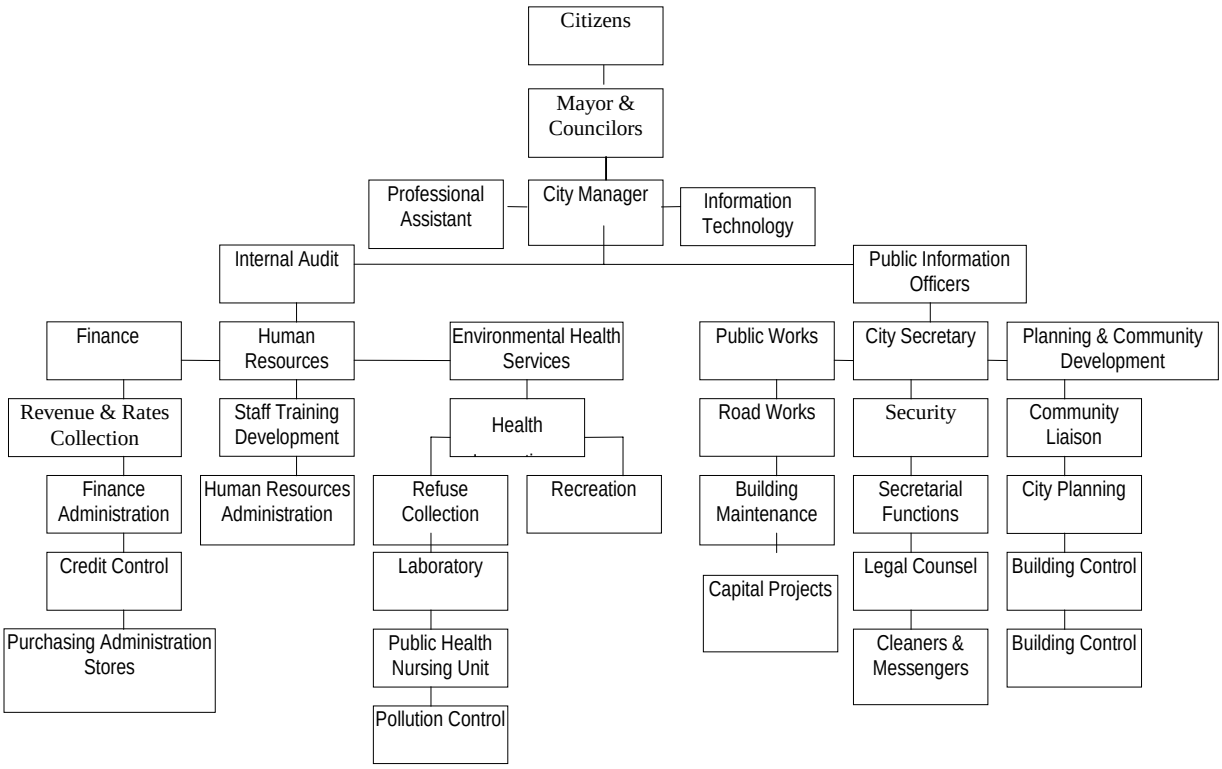
4. ORGANISATIONAL STRUCTURE

The city council of Mbabane has 329 employees. There are seven departments in the council:

1. Chief Executive Officer - G. Mhlongo
2. Finance -Director of Finance - J. Motsa
3. Human Resources- Acting Director -T. Dlamini
4. Environmental Health Services- Director -A.S Mabuza
5. Public Works-Director -M. Mabuza
6. City Secretary- Acting -F. Matsebula
7. Planning and Community development- Director M. Salver

Organogram

The city is governed by 16 members of council called councillors -12 of them are elected by the people of Mbabane, and 4 appointed by the Ministry of Housing and Urban development. The elections are governed by the elections regulations as amended in 1998, which are subsidiary to section 8 of the urban government Act 1969. The council is chaired by a mayor elected by the councillors.



5. INSTITUTIONAL RELATIONS

The city council of Mbabane interacts constantly with the Ministry of Housing, Ministry of Health, Swaziland Environmental Authority and the Rate Payers Associations with regard to issues of waste in the urban area.

6. SKILLS

This encompasses the ability to handle systems, i.e availability of competencies and trainability of staff. The staff particularly involved in waste management have no training in this area

Note: The main focus of the City Council of Mbabane was ensuring the provision of quality services to

both internal and external users, promoting economic development and welfare in the city, and projecting a good image of the organisation.

7. INCENTIVES

These include economic and non-economic incentives. Training and development is one of the fundamental functions of the department of Human Resources in the City Council of Mbabane. Training is considered a non-economic incentive.
Despite being understaffed, the department was able to successfully arrange and organise training for not less than 131 council employees during the year of 1999. In addition about 15 council employees and councilors attended various important international and local conferences during the year.

8. PERCEIVED INSTITUTIONAL CONSTRAINTS

The reorganisation of one of the links in the waste removal chain does not cause, by definition, a solution by the total chain, i.e. the construction of a new landfill site at a distance of 14 kms from the town centre causes an enormous problem in the waste collection sector, especially for the tractor collection system, the communication system and the social/labour circumstances of the personnel.

ANNEX II - 3

AN INSTITUTIONAL ANALYSIS - NHLANGANO TOWN COUNCIL

(Mr E Motsa - Town Clerk)

1. HISTORY

The Nhlangano Town council is a relatively new council having been formed in 1994. Prior to this it was a town board which was under government. The town council was facilitated by the government policy to empower government at grass roots by transforming the town board to a town council. Presently there are about 1280 stands with an average of 6 people per household. The population is therefore estimated at about 7680 people. Nhlangano has an informal population of about 450 families living in slum areas that have no infrastructural services. During working hours of each day the population is estimated to be around 65 000 people. The town council is governed by 8 councilors of which 6 are elected by the electorate and 2 are appointed by the minister.

The council started by acquiring premises for the council offices. They have established one township known as Mathendele township - extension 6. It has also engaged in the exercise of collecting property taxes from the residents of its jurisdictional area. Their existing dumping site is located at MacAlpine location which is about 3 kilometers away from town. The town has not had a town clerk for 2 years.
NOTE : No co-ordinated policy for medical waste management.

2. STRATEGY

The Nhlangano town council generates income through charging property taxes (i.e. rates) using the Rating Act of 1995 as amended. They collect approximately E 324 000.00 from property owners. Refuse collection charges are charged at E 96.00 per annum which is charged and collected through property rates once a year. Presently there are no user fees that the council collects for itself rather it collects market fees and abattoir charges on behalf of the government. In other words, this responsibility has not yet been passed over to the Nhlangano authority.

However a large proportion of its finance comes from the central government in the form of subventions. These subventions account for about 62% of the council's total revenue. The council also charges the central government rates on the properties owned by it. There are no documented future strategies.
NOTE : There is an urgent need to organize a well managed dumpsite but there are budget constraints.

3. SYSTEMS

- 1 truck to collect refuse twice a week
- 6 truck staff including the driver
- 1 dumpsite attendant
- 3 offices
- 2 board rooms
- 1 reception area
- 2 computers
- 2 printers
- 1 fax machine

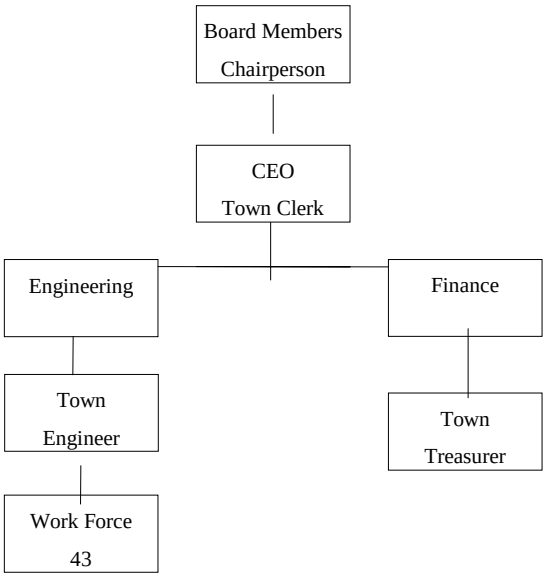
- 1 photocopier which is old and needs replacing

NOTE: The Nhlangano Town Council collects domestic waste from the hospital staff houses

4. ORGANISATIONAL STRUCTURE

The work force of the Nhlangano Town Council is 43 including :

- 3 clerical staff
- 2 electrical staff
- 10 x street cleaners
- 5 roads maintenance
- 2 showground maintenance
- 4 cemetery / graveside maintenance
- 4 market and bus rank maintenance



5. INSTITUTIONAL RELATIONS

There is no co-ordinated policy in place to work with hospitals and clinics in the area around Nhlangano.

6. SKILLS

Staff are not properly trained in waste handling. They are issues with protective clothing and gloves.
NOTE : Professional staff consists of the Chief Executive Officer and his secretary; the Town Engineer and town treasurer.

7. INCENTIVES

Up until April 2000 there were no non-economic incentives. From 1 April 2000 the council adopted conditions which have a training programme, car loan scheme, affiliate pension scheme with Manzini City Council. Most of their staff is daily paid. However 18 of the 43 staff members are civil servants.

8. CONSTRAINTS

- The biggest problem in the council is capacity in terms of personnel and machinery
- Staff are not well trained to handle machinery in case one is bought - resources are limited
- Dumpsite is located next to a residential area and there are a lot of complaints
- Scavengers litter all over the place sine the burning of the waste is usually done after working hours or on Sunday afternoons.
- Most of the land that could be used belongs to the central government. While it is easier to secure the process is long. Therefore it is bought cheaper.

ANNEX II - 4

AN INSTITUTIONAL ANALYSIS - PIGGS PEAK TOWN COUNCIL

TOWN CLERK - MRS MPAPANE

1. HISTORY

The Piggs Peak Town Council is relatively new. The town council started functioning in 1996 and before then it was a town board. The council was facilitated by the government policy to empower the government at grassroots level. The Piggs Peak town has a population of about 8000 people. The town council generates its revenue through charging property taxes known as rates. However the town council does not charge the town dwellers for waste collection or for using the landfill site. The council also receives government subventions from the central government. The waste collected is estimated at 30 cubes per day with 20 cubes and 10 cubes from commercial and residential areas, respectively. The waste is collected 3 times per day for commercial and residential areas. The town council is governed by councilors elected by the electorate and a few others appointed by the Minister. The town council of Piggs Peak has contracted out the department of solid waste management. This includes the collection of refuse around the town and actually the management of its dumpsite. This landfill is next to the prison about 2 ½ km from the town centre, which is well organised and has a guard controlling it. The contractor has 6 employees in this department including the manager. This landfill site is well organised and fenced. They collect the waste on a daily basis and cover it with soil.

2. STRATEGY

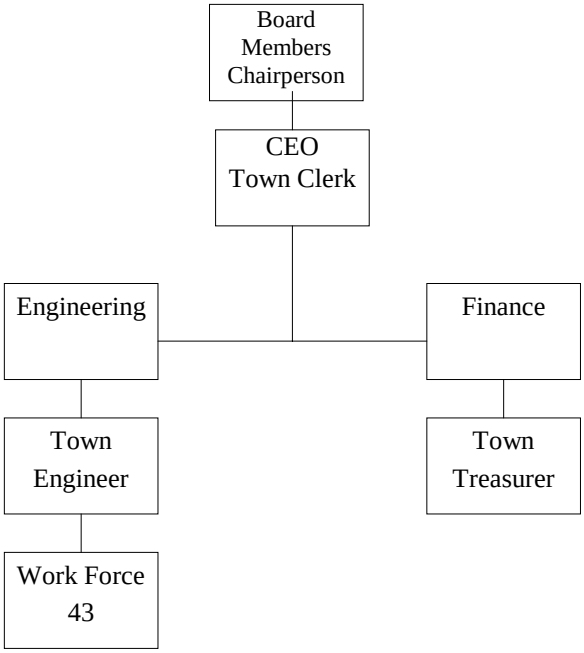
The Pigg's Peak town council generates income through charging rates to the Pigg's Peak community in its small town. At the moment there are no specific tariffs on charges for the use of their landfill site and refuse collection, however these are included in the rates charged. The property rates are charged using the rating Act of the Government Act of 1969. The town council of Pigg's Peak also supplements its revenue through subventions from the Swaziland Government which also pays rates to the council for her properties around the Pigg's Peak town. Hence a large portion of its revenue comes from the government subventions. The Pigg's Peak town council does not have any documented future strategies in place. They also do not have user fees that the council collects for itself.

3. SYSTEMS

Refuse collection is done 3 times a week for commercial areas an 3 times a week for residential areas. The waste is separated at the dumpsite where it is then covered with soil on a daily basis.
NOTE : There is no problem in collecting waste from commercial areas; the problem in the residential areas is that people prefer to dispose of their waste and not put it out for collection. The problem is perceived to arise from the issue of tariffs which though have not been effected are in the pipeline. At the moment the charges for refuse collection are included in the rates.
Hence its solid waste disposal is contracted out to KOBWA, they have the following system:

- 1 tractor and 19 skips (ie large containers used for collecting and transporting the waste)
- 1 TLB (ie back loader)
- 1 Compactor
- 1 computer
- 1 printer

4. ORGANISATIONAL STRUCTURE



5. INSTITUTIONAL RELATIONS

The Piggs Peak town council interacts with the following:

- Contractor (KOBWA)
- stakeholders
- Health Ministry
- Housing Ministry

6. SKILLS

Staff is not properly trained in waste handling, although they do have protective clothing and little awareness on the dangers of the waste.
NOTE: Professional staff in the town council's offices do have higher level education on solid waste management.

7. INCENTIVES

There are no incentives provided to staff members.

8. CONSTRAINTS

One of the major constraints is that residents like to collect and dispose of their own waste because they are not sure what charges are incurred if council collect.

ANNEX II - 5

AN INSTITUTIONAL PROFILE - MATSAPHA TOWN BOARD

(MR EPHREAM MASUKU - CIVIL ENGINEER)

1. HISTORY

Matsapha was declared a town by a gazette in 1970. Matsapha is a 3 in 1 situation:

(a) Matsapha Township includes the University, schools in the area and residential areas such as Mageveni, Mobeni and the Airport
(b) Matsapha urban area

(c) Matsapha Industrial Area

The solid waste in the Matsapha township is collected by the Manzini City Council and is not under the Matsapha Town Board. The Matsapha Town Board is only concerned about the industrial estate where waste is collected 3 times a week. The collection of the waste in the estate is contracted out every year to the tune of E 1 000 000.00. This amount is paid through a trading account which was opened by the Ministry of Enterprise and Employment and is operated by the Ministry of Finance. The dumpsite at Matsapha is managed and maintained by two contractors and now has a three year life span.

2. STRATEGY

The Matsapha Town Board collects rates from property owners around Matsapha and this is deposited into a trading account operated by the Finance Ministry. There is no charge for bin collection. These rates also include grass cutting fees, road maintenance fees, etc.

NOTE : The Swaziland Environmental Authority should monitor petroleum industries - alerted by the Town Board - to abide by the rules and regulations governing the disposal of their waste. However, there is no clear definition on who should monitor this industry.

MISSION STATEMENT - Swaziland Government

The mission of the government of the Kingdom of Swaziland is “To provide a climate and infrastructure that will progressively maximise the quality and life of the people of Swaziland and make the best use of the country’s natural resources.”

The vision of the Matsapha Town Board is to build one dumpsite which will be divided into different waste categories i.e toxic/hazardous waste in one section, domestic waste in one section, etc. This may also help to control the scavengers in the dumpsite either by registration or otherwise and charges levied monthly.

NOTE : Toxic waste has to be catered for by the SEA. A dumpsite for toxic waste and another dumpsite for all other waste material exists in the estate.

3. SYSTEMS

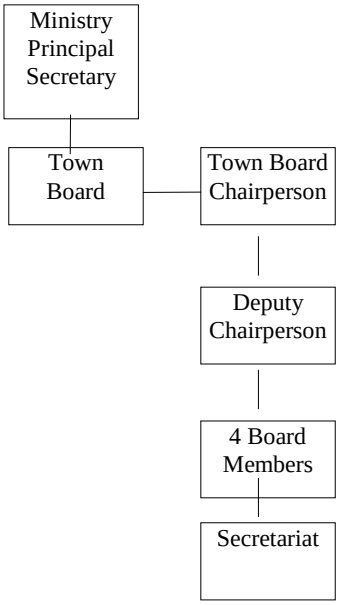
The systems in this area will only include those used in the office of the town board since the contractor has its own equipment.

Town Board equipment consists of:
1 x computer
1 x printer
1 x fax machine
1 x drawing board
1 x conference room
3 x offices, including reception area.

4. STRUCTURE

The structure at Matsapha Town Board can be described as follows:

The Principal Secretary of the MHUD is Chairman of the Town Board, his deputy who is also deputy chairman, 4 board members and the secretariat.



5. INSTITUTIONAL RELATIONS

The Matsapha Town Board interacts with ratepayers, Ministry of Health, Swaziland Environmental Authority, contractors, scavengers and the Royal Swaziland Police.

NOTE: The people scavenging the dumpsite steal things from the premises of the property owners and then claim that they found the items at the dump site. Hence the involvement of the police.

6. SKILLS AND QUALIFICATIONS

There are 5 members of staff including Mr Masuku who is employed by the Ministry and is a Civil Engineer.

7. CONSTRAINTS

- Non compliance by rate payers i.e. standard dustbins should contain household or office waste only and this should be placed outside the gate in their premises.
- Dumpsite is affected by the presence of scavengers who actually attack the truck before it is stationary thus spilling the contents of the waste vehicle all over the area.
- Scavengers collect expired food products and in turn sell them to the community. This poses a health risk to those purchasing such food products.
- A security guard was employed to watch the dumpsite and he was beaten up and never returned to work of collect his salary.
- Hazardous waste is also dumped at the waste site together with ordinary waste.

ANNEX II - 6

AN INSTITUTIONAL PROFILE - EZULWINI TOWN BOARD

TOWN CLERK - MISS QUEENETH MASUKU - MINISTRY OF HOUSING

1. HISTORY

Ezulwini area was declared a town, using the government Act of 1969, in 1995. During that time a town board was then put in place which started its operations in 1996. The board consists of 6 members, 5 of whom were elected by the community of Ezulwini and one appointed by the Ministry of Housing and Urban development. The area is estimated to have a population of over 30936 people. The Ezulwini Town board is not yet fully functional because it is still under the Ministry of Housing. So far the board has acquired premises worth E 400 000.00 where they will have their offices. They have also bought land where they will locate the handicraft market and it is estimated to cost approximately E 4 million for the whole project. The construction of the market site will commence in April 2001. They have also tarred one of the main roads in the area which is about 2.1 km long.

NOTE : The hotels and other businesses around Ezulwini town collect their own waste and dispose of it using their own equipment. The board only assesses them on the efficiency and effectiveness and their compliance to the environmental health standards.

The Ezulwini town board has set short term, medium term and long term objectives :-

(a) To establish a security/police force in the area
(b) To develop sporting facilities
(c) To establish street names
(d) To provide health facilities
(e) To establish a cemetery for the community
(f) To develop tourism - this was done partly by the establishment of a handicraft market to be constructed from April 2001.

NOTE : It is worth noting that the board has still not facilitated the collection and disposal of wastes from the community. However a survey is still underway to determine the strategies and equipment required. Nevertheless, the board is planning to contract out the department of solid waste/refuse collection.

2. STRATEGY

The Ezulwini Town Board depends entirely on the Swaziland government in carrying out its activities. They receive subventions from the Government which contributes to 100% of their income so far. This is because they still do not charge the community for services rendered. Their budget is based on the subvention they receive from Government.

MISSION STATEMENT

To promote an environment that will foster a good quality of life by proper planning of the urbanisation process ensuring all necessary resources and infrastructure are utilised economically in the provision of services to improve the well being and quality of life for the people in the town of Ezulwini ensuring a meaningful participation of the community we serve.

VISION STATEMENT
To be committed to the community we are priviledged to serve with integrity, creativity which will be communicated responsibly at all times.

3. SYSTEMS

The office of the Ezulwini Town Board is situated between Mbabane and Manzini and is about 400m2 with 5 offices; 3 bathrooms, one conference room, one administration area, kitchen, 1 garage and a servants quarter. They do not have a car yet but they use one car from the Ministry of Housing and Urban Development.

4. ORGANISATIONAL STRUCTURE

BOARD MEMBERS: Mr Ray B Sibandze; Mr John Fraser; Mr N Buckham; Mr Peter Armstrong; Mrs Turrie Thatcher

5. INSTITUTIONAL RELATIONS

The Ezulwini Town Board depends entirely on the Swaziland Government especially the Ministry of Housing and Urban Development. Therefore all activities of the board are fully attached to this Ministry.

6. SKILLS

Miss Queeneth Masuku - BA Administration

7. INCENTIVES

The town clerk is employed on a full time basis by the central government and is on their monthly payroll system and their pension scheme. However the town clerk has attended a course on local and regional planning in Kenya and has been to other local seminars.

8. CONSTRAINTS

- The residents urgently need their waste / refuse collected
- They also want a proper water supply not bore-holes
- Roads need to be upgraded
- They also want a cemetery in the area.

ANNEX II - 7

AN INSTITUTIONAL ANALYSIS - COMPANY ORIENTATED TOWNS

BIG BEND

DOMESTIC WASTE

Domestic Waste is collected twice a week in Big Bend. Each household is allocated a standard waste bin which is used to store domestic waste until collection.

REVENUE

The company at Big Bend charges E 60 per month per household for waste disposal especially in the main village and Hlandze.

The disposal of waste is done by company employees since this service has not been outsourced. This monthly charge is automatically deducted from the monthly salary schedule.

Subordinate staff at the lower level is not subjected to this monthly refuse collection charge.

ANNEX III

Hospitals, Health Centres and Clinics

ANNEX III - 1

AN INSTITUTIONAL ANALYSIS - Manzini Raleigh Fitkin Hospital

(Mr Leonard Dlamini - Hospital Administrator)

The waste in the Manzini RFM is 3 fold :-

1. Clinical Waste - i.e. bandages, dressings, etc
2. Domestic Waste - i.e. food stuffs
3. Sharps and body waste - i.e. syringes, amputated body parts, etc.

The clinical waste and domestic waste is taken to a central place where the waste is kept to be taken to their dumpsite which is located in the hospital premises behind the hospital. This waste is then loaded onto a tractor and covered to prevent spillage whilst being transported to the dumpsite. The tractor collects this waste to the dumpsite on a daily basis where it is burnt and destroyed.

The sharps i.e. syringes, needles and other hazardous is taken straight to an incinerator for burning. This is also done on a daily basis. However all other household waste from the staff houses is collected by the Manzini City Council. The staff involved in the waste disposal is generally aware of the waste handling and are provided with the necessary equipment and protective clothing such as boots, gloves, etc.

The Manzini RFM hospital has also dug a pit next to their incinerator where expired drugs and other pharmaceutical waste is burnt. This is done to prevent destroying their incinerators. There is no fully-fledged budget to cater for waste disposal except for fuel and salaries. The hospital has fuel pumps in the premises for petrol and diesel for use in their vehicles, to ignite the incinerator, and to start a fire in the land fill site.

NOTE : The hospital has 330 beds, however the occupancy rate is 110% - overcrowded.

CONSTRAINTS

- Residents close to the hospital complain about the smoke emitted by the dumpsite and there are also school students and college students in the premises who pass the dumping site.

- The staff also complain about inadequate training on the waste management.

NOTE : The Manzini RFM hospital would like to involve the Manzini City Council to involve them in the disposal of their waste.

There are 4 people generally involved in the waste disposal :-

- 1 x tractor driver

- 1 x assistant tractor driver
- 2 x incinerator operators

COMMUNITY CLINICS

The RFM Hospital sends their nurses to teach community members about hygiene and waste disposal. This awareness campaign is done in collaboration with Regional Health Motivators who are employed by the government. The RFM Hospital is a health care hospital as it provides services on behalf of government, hence they receive a subvention from the government. It is therefore a regional referral and training institution.

ANNEX III - 2

INSTITUTIONAL PROFILE - HLATIKULU GOVERNMENT HOSPITAL

(MATRON SHIBA)
The collection of waste in the hospital is carried out by using different kinds of containers for the various waste types. Since there are incinerators available at the hospital, the staff seal empty cardboard boxes and open a hole at the top. This is done so as to avoid needles and any other sharp objects coming into contact with the personnel responsible for waste disposal. These cardboard boxes are then taken to their incinerator on a daily basis by the male orderly and burnt daily.

The ashes from the incinerator is taken out to cool and then collected by the Hlatikulu Town Board for dumping. Dressings and body waste is put in black refuse bags and taken to the incinerator for burning. However due to cultural beliefs, patients prefer to take their own body parts with them for burial hence there is usually few or no body parts to be taken to the incinerator. Domestic waste such as foods is dumped in black refuse bags and taken to a place next to the gate where the Hlatikulu Town Board collects it for dumping.

NOTE: Due to the negligence of nurses in the hospital, used needles, sharp objects and food waste is usually found in the same refuse bags which are sent to the incinerator. This poses a health hazard to those who operate the incinerators. During our visit, the male orderly complained about a needle which had poked his leg whilst we visited the incinerator.

The hospital has 210 beds and is usually overcrowded with about 250 patients at any one time. Those patients who are not accommodated on beds are made to sleep on the floor. There are 13 male orderlies who are responsible for cleaning and collecting waste from the wards. The waste from the wards is taken to the incinerator or the dumpsite by the Hlatikulu Town Board. The hospital does not have its own dumpsite. Expired medicines are taken back to the medical stores through an outlined procedure i.e. they are not disposed. Staff have no formal training on waste management and although they have a slight idea on hygiene awareness, they lack knowledge of the legislation on waste management. Basic protective clothing is provided. Protective footwear consists of safety boots.

NOTE : An empty injection syringe exploded on a consultant’s face whilst inspecting the incinerator.

CONSTRAINTS
Members from the community tend to scavenge the dumpsite and the waste is littered all over. This poses a threat to environmental health.

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NOTE : An empty injection syringe exploded on a consultant’s face whilst inspecting the incinerator.

CONSTRAINTS

Members from the community tend to scavenge the dumpsite and the waste is littered all over. This poses a threat to environmental health.

ANNEX III - 3

AN INSTITUTIONAL PROFILE - DVOKOLWAKO HEALTH CENTRE

The waste in the Dvokolwako Health Centre is 3 fold :-

1. Clinical Waste - i.e. bandages, dressings, etc
2. Domestic Waste - i.e. food stuffs
3. Sharps and body waste - i.e. syringes, amputated body parts, etc.

The clinical waste and domestic waste is taken to a central place where the waste is kept to be taken to their dumpsite which is located in the hospital premises behind the hospital. This waste is then loaded onto a tractor and covered to prevent spillage whilst being transported to the dumpsite. The tractor collects this waste to the dumpsite on a daily basis where it is burnt and destroyed. The sharps i.e. syringes, needles and other hazardous is taken straight to an incinerator for burning. This is also done on a daily basis.

The staff involved in the waste disposal are generally aware of the waste handling and are provided with the necessary equipment and protective clothing such as boots, gloves, etc.

This hospital has also dug a pit next to their incinerator where expired drugs and other pharmaceutical waste is burnt. This is done to prevent destroying their incinerators. There is no fully fledged budget to cater for waste disposal except for fuel and salaries. The hospital has fuel pumps in the premises for petrol and diesel for use in their vehicles, to ignite the incinerator, and to start a fire in the land fill site.

NOTE : The hospital has 240 beds, however the occupancy rate is 120% - overcrowded.

CONSTRAINTS

- Residents close to the hospital complain about the smoke emitted by the dumpsite and there are also school students and college students in the premises who pass the dumping site.

- The staff also complain about inadequate training on the waste management.

There are 3 people generally involved in the waste disposal :-

- 1 x tractor driver
- 1 x assistant tractor driver
- 1 x incinerator operator

COMMUNITY VISITS

The Hospital send their nurses to teach community members about hygiene and waste disposal. This awareness campaign is done in collaboration with Regional Health Motivators who are employed by the government. The Hospital is a health care hospital as it provides services on behalf of government, hence they receive a subvention from the government.

ANNEX III - 4

AN INSTITUTIONAL ANALYSIS OF RURAL CLINICS

SIGANGENI CLINIC

Sigangeni Clinic is located about 30 km west of Ngwenya Boarder gate and it serves health needs of a community covering a radius of 15 km.

Waste Disposal

Solid Waste is disposed through burning in rubbish pits outside the clinic. This includes food, cotton wool, papers, plastics and used dressings.

Clinical waste is thrown in pit toilets and it must be noted that no effort is made to burn it before hand.

Tins are problematic but the clinic encourages community members to collect and recycle them.

Old metals are sold to a company in Matsapa that is involved in recycling. If enough plastic material is collected this is ten used to make mats for resale.

This clinic does not have an incinerator for waste disposal.

MBULUZI CLINIC

Mbuluzi Clinic is located about 15km East of Mbabane along the Pine Valley road and it serves health needs of a community covering a radius of 15 km.

Waste Disposal

Solid Waste is disposed through burning in rubbish pits outside the clinic. This includes food, cotton wool, papers, plastics and used dressings.

Clinical waste is thrown in pit toilets and it must be noted that no effort is made to burn it before hand.

Tins are problematic but the clinic encourages community members to collect and recycle them.

Old metals are sold to a company in Matsapha that is involved in recycling. If enough plastic material is collected this is ten used to make mats for resale.

This clinic does not have an incinerator for waste disposal.