



Integrated Solid Waste Management Plan (ISWMP) for the City of Maseru/Lesotho



UNIVERSITY OF CAPE TOWN
IYUNIVESITHI YASEKAPA • UNIVERSITEIT VAN KAAPSTAD



Table of Contents

Introduction.....	3
Principles, Vision & Mission.....	4
The Maseru Waste Management Principles.....	4
Vision & Mission of City Government	4
Waste Generation and Management Model.....	5
The Waste Management Hierarchy	8
Waste Management Action Plan.....	9
Framework for waste management actions.....	9
Waste Management Actions – grouped according to the hierarchy.....	10
Themes to guide an institutional arrangement – Actors and Actions.....	16
Waste Management Matrix.....	19
Operationalisation of the ISWMP Plan	20
Policy Tools and Framework	20
Time Plan and Funding.....	21
Proposal of Pilot Activities	22
Conclusion	23
Detailed Description of Actions.....	24
Detailed Description Action 1.1: Integration of Waste Prevention Measures.....	24
Detailed Description Action 1.2: Introduction of Cleaner Production Measures	26
Detailed Description Action 1.3: Implementation of a Source Separation System	27
Detailed Description Action 1.4: At Source Value-Addition	30
Detailed Description Action 2.1: Establishment of Ward-Specific and Material-Specific Collection Systems	32
Detailed Description Action 2.2: Systematic Infrastructure and Route Planning.....	38
Detailed Description Action 2.3: Optimisation of Collection Services Offered by MCC and Private Recyclers and the PPPUE	41
Detailed Description Action 3.1: Creation of a Supportive Framework for Private Recycling Enterprises.....	43
Detailed Description Action 3.2: Support for the Development of a Local Recycling Economy	45
Detailed Description Action 3.3: Regulatory Framework to Support Local Recycling Markets	46
Detailed Description Action 3.4: Coordination of Local Recycling Activities	47
Detailed Description Action 3.5: Develop Capacity to Work with Take-Back Levies.....	48
Detailed Description Action 4.1: Adjustment and Integration of Planning Activities for Sanitary Landfill Site.....	50
Detailed Description Action 4.2: Amendment of EIA	53
Detailed Description Action 4.3: Capacity to Thermally Use Non-Recyclable Paper.....	55
Detailed Description Action 5.1: Use of School Infrastructure as Awareness Creation Medium	56
Detailed Description Action 5.2: Establishment of Waste Minimisation Clubs.....	58
Detailed Description Action 5.3: Establishment of a Waste Information System (WIS)	60
Detailed Description Action 5.4: Awareness Creation through Common Media.....	62
Detailed Description Action 5.5: Review of the ISWMP on a regular basis.....	64
Definitions of Waste Types	65

Introduction

This document presents the 2nd draft of the Integrated Solid Waste Management Plan (ISWMP) developed for the City of Maseru, capital of the Kingdom of Lesotho. The document is in line with the deliverable for **Activity 3: Draft ISWM Plan & Workshop – Produce a second draft of the ISWM plan, based on feedback from the workshop and consultation with stakeholder on the first draft**, as stated in the Memorandum of Understanding concluded between the United Nations Environment Programme (UNEP) and the University of Cape Town (UCT) Environmental & Process Systems Engineering Research Group.

The draft plan was developed on the basis of past experience, independent observation, interrogation of available information (including the baseline study of waste generation in Maseru), and interaction with relevant stakeholders. The result is a concise, easy to read action plan of 15-20 pages with key deliverables and timelines. The action plan is supported by a number of technical support pages which provide details on each proposed action. The ISWMP will be supported by a technical background report on Environmentally Sound Technologies (ESTs) which provides further guidance on achieving the deliverables.

Principles, Vision & Mission

The Maseru Waste Management Principles

This Integrated Solid Waste Management Plan for Maseru is based on the following principles:

1. Upholding the right of every citizen to clean and healthy environment (Immediate need)
2. Protection of the common (public) goods for current and future generations (long-term requirement)
3. The importance of addressing economic and social added-value of waste management in terms of job creation & income generation
4. All citizens contributing to the growing problem and the potential to be part of the solution
5. Primary focus on the promotion and implementation of the three-R principles (Reduction → Reuse → Recycle)
6. Awareness and education with a focus on source reduction & waste-to-resource conversion
7. Building upon existing local capacities and experiences
8. Strengthening public-private partnership including community-based waste management process
9. Putting the necessary policy and institutional framework in place
10. Developing a built-in adaptive mechanism for the continuous monitoring and improvement of the system

Vision & Mission of City Government

The City of Maseru will take ownership of and drive this ISWMP by taking into consideration the following points:

- Public Health & Environment
- Delivery of Basic Services
- Efficiency & Economic Growth (private sector participation)
- Resource exchange (private sector participation)

Waste Generation and Management Model

In 2006, approx. 110,000 t/a of waste were generated in Maseru, with the residential and commercial sector representing the largest waste generation sources with approx. 35,000 t/a each; other, industrial, medical, administrative and educational generation sources make up the remaining 40,000 t/a of waste (see Figure 1). By developing a ‘business-as-usual’ scenario based on growth rates proposed by the Baseline Study for the different generation sources, it is projected that the total waste generated in Maseru would almost double by 2020, amounting to 210,000 t/a.

In order to manage this amount of waste, it is important to understand it. A model has therefore been developed. This could form the basis of a future Waste Information System. It is based on the following assumptions: i) in the next decade Maseru will experience healthy economic growth, ii), industrial development will continue, iii) urbanisation will continue, iv) transport costs will increase, and v) the emergence of a new type of African entrepreneur will see more local enterprise opportunities being harnessed. The ‘interventions’ scenario in the model are based on implementation of the 20 actions discussed in the following sections.

By analysing the generated waste amounts according to generation sources (Figure 2), it can be observed that important waste minimisation interventions are proposed in the residential and industrial sector. The total amount of waste generated in 2020 is estimated at approx. 165,000 t/a, 45,000 t/a of waste less than the 210,000 t/a projected in the business-as-usual scenario.

By analysing the generated waste amounts from the perspective of Maseru’s waste sinks, it can be noted that currently, the majority of waste is being managed in an unsustainable manner, with wild dumping, industrial dumping, formal dumping and home burning representing the major waste management activities. The activities for reduction, reuse and recycling play a minor role in the business-as-usual scenario. It is projected that by 2020, the 210,000 t/a of waste generated in Maseru would still be managed in an unsustainable manner. It is worthwhile mentioning that by then, a total amount of 80,000 t/a of waste would be dumped wildly, approx. $\frac{3}{4}$ of the total waste being generated in Maseru today.

On the other hand, in the interventions scenario, as shown in Figure 4, unsustainable management measures should be terminated one by one over the next few years. Wild dumping and home burning should be completely eradicated. Approx. 100,000 t/a of ‘waste’, or rather secondary resources, will be either reused, composted or fed to animals, recycled or used as substitute fuel in industrial combustion processes. In 2010, a sanitary landfill site should come online in Tšoeneng, deviating the wastes from being formally dumped at Ha Tšosane, amounting to approx. 50,000 t/a in 2020. Furthermore, industrial waste will no longer be dumped informally at Ha Tikoe, but transported to an appropriate treatment facility in South Africa.

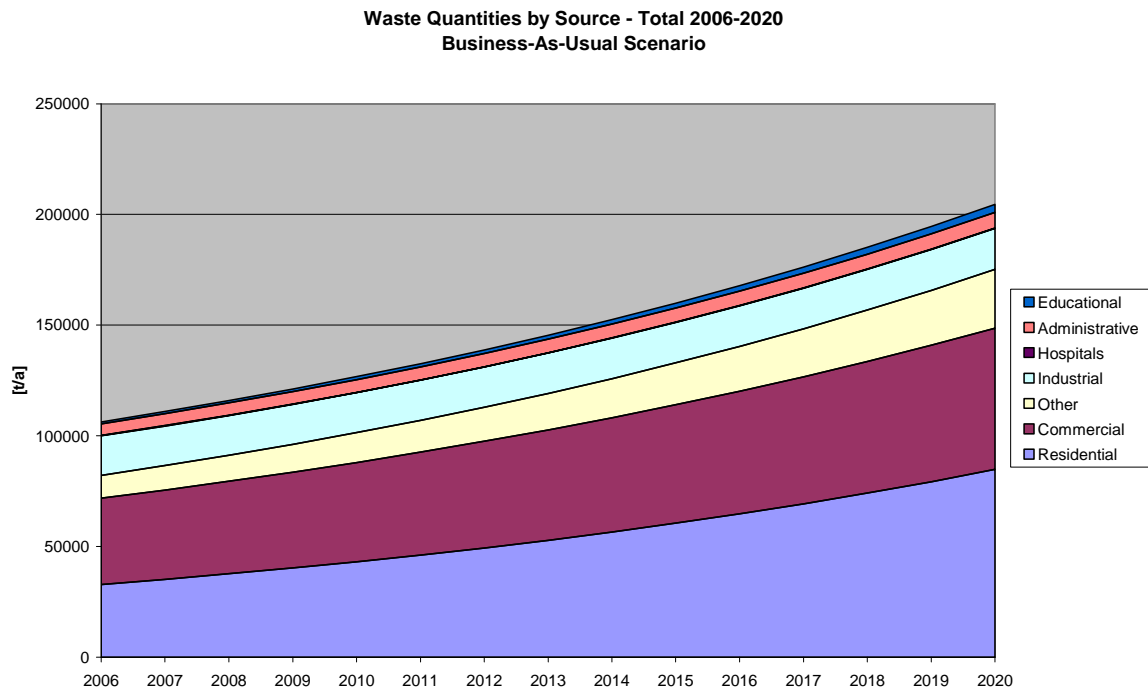


Figure 1: Waste Quantities by Generation Sources, Maseru – Business-as-Usual Scenario

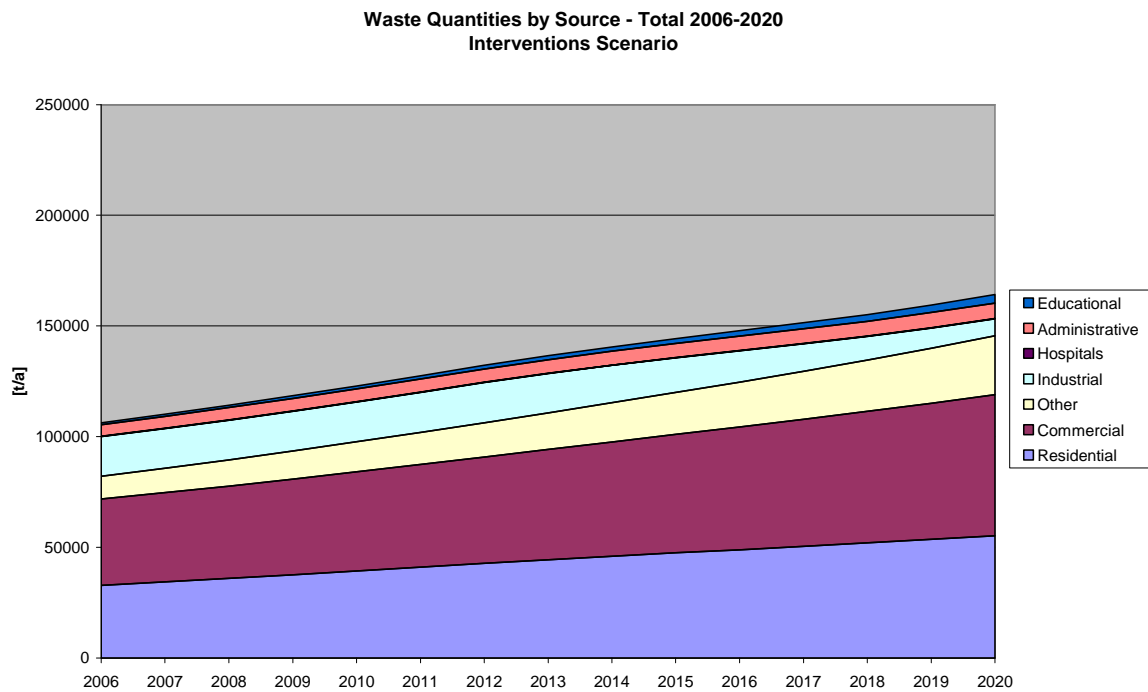


Figure 2: Waste Quantities by Generation Sources, Maseru – Interventions Scenario

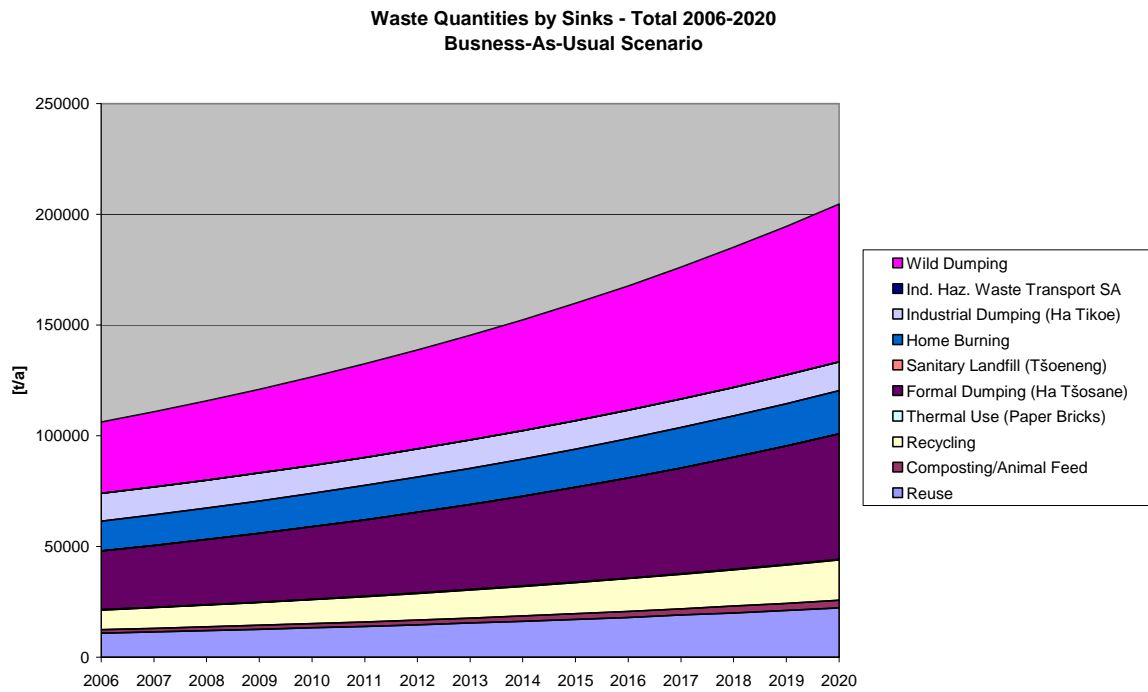


Figure 3: Waste Quantities by Sinks, Maseru – Business as Usual Scenario

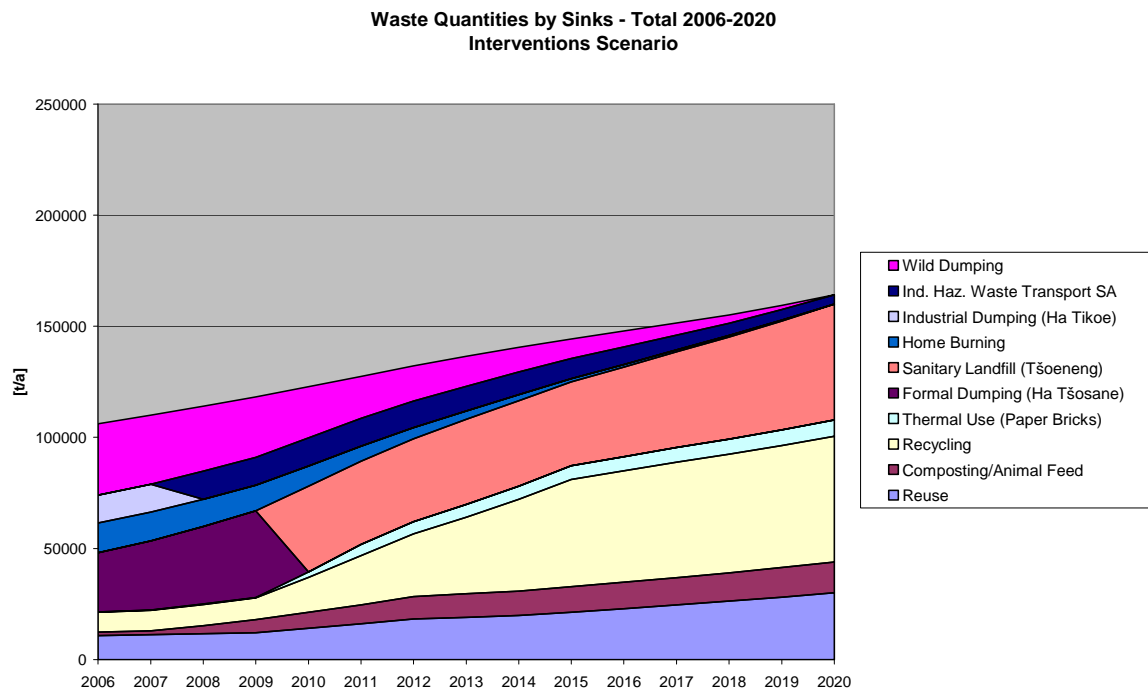


Figure 4: Waste Quantities by Sinks, Maseru – Interventions Scenario

The Waste Management Hierarchy

All actions and activities proposed within this plan will be initiated and developed along a waste management hierarchy, describing the order of preference of the different waste management options, starting with prevention and ending with disposal.

Prevention

Refers to all activities which aim to optimise product design and manufacturing processes so that wastes are not generated in the first place.

Reduction

Also known as waste minimisation, refers to the reduction of waste at source, by understanding and changing production processes to reduce waste. This is also known as process or resource efficiency. Waste reduction can include the substitution of less environmentally harmful materials in the production process.

Reuse

Reuse refers to using an item more than once. A product may either be reused for its original purpose, such as the repeated use of a plastic bag to carry groceries home from the market, or for some other purpose, such as when glass jars are reused in a workshop to hold screws and nails.

Recycling

Recycling is the act of recovering materials from the waste stream and reprocessing them so they become raw materials for new applications. For example, aluminium cans may be melted (processed) and then either reformed as aluminium cans or made into other aluminium products.

Composting

Composting is the term used to describe the aerobic degradation of organic materials under controlled conditions, yielding a usable soil fertiliser or mulch.

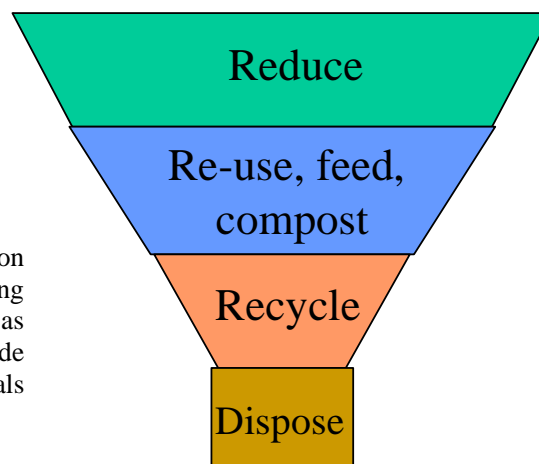
Energy Recovery

Energy recovery refers to any waste treatment that creates energy in the form of electricity or heat from a waste source that would have been disposed of in landfill. Energy recovery is also called Waste-to-energy (WtE) or energy-from-waste (EfW). More advanced Waste-to-energy processes result in a usable fuel commodity, such as hydrogen or ethanol. Energy recovery processes include combustion, pyrolysis and gasification.

Disposal

Landfilling describes the disposal of solid waste at engineered facilities in a series of compacted layers on land. Landfills are lined with impermeable materials to prevent leachates from polluting groundwater, and covered with soil.

Incineration is a waste disposal method that involves the combustion of waste at high temperatures. Incineration and other high temperature waste treatment systems are described as "thermal treatment". Other types of thermal treatment include pyrolysis and gasification. The incineration process, in contrast with energy recovery technologies (see above), does *not* primarily aim at recovering energy or materials.



Waste Management Action Plan

Framework for waste management actions

In order to achieve the vision embodied in the principles, the following framework is proposed. Four fundamental pillars are supported by a sound educational platform. The pillars, educational platform and their underpinning actions and timelines are discussed below.

Pillar 1: Capacity to prevent wasteful resource use at source

This theme addresses:

- i) what is consumed (sustainable consumption),
- ii) how it is produced (cleaner production),
- iii) where resources are routed once used (source separation), and
- iv) at-source value addition (re-use, composting ...)

Pillar 2: Strong, diversified and appropriate collection systems

Recycling, energy recovery and disposal all require materials (resources or waste) to be collected. Different collection systems will work best in different settings (e.g. weekly curbside collection in serviced suburbs; coupon-based fuel for recyclables take-back schemes in informal settlements; removal on call at commercial establishments). It must be the core job description of a skilled professional to ensure that each ward, each commercial establishment and each industrial site are appropriately serviced. The operation of the collection services does not need to be performed by council.

Pillar 3: A healthy recycling industry

The more materials are recycled, the lower the amount to be transported to disposal (and hence the lower the cost to the public). With money to be made from the sale of recovered resources, and from re-manufactured products, the private sector is best equipped to harness potentials. Like all other industrial sectors, there must be business development support, a competitive spirit, and an industry association that subscribes to a code of conduct and can speak for joint concerns.

Pillar 4: An environmentally safe disposal site for real waste

When resources have really and finally become waste, they must be disposed of in a properly engineered sanitary landfill that protects the surrounding environment. The full cost of proper disposal must be borne by the user to avoid over-use. This must not be the easy way out for those wanting to waste. On the other hand, this route must be accessible when needed so that there is no resorting to wild dumping. This is a careful balancing act, requiring further thought on the most appropriate pricing structure.

The Platform: Education, built upon real and up-to-date information

The generators of waste (in households, commerce, hospitals, schools, offices industry), as well as professionals, officials and labourers working within each of the above four pillars need to be educated and trained, and that includes regular updating of skills. Education must be based on an up-to-date knowledge of the real issues in Maseru, so a regularly updated waste information system is also required.

Waste Management Actions – grouped according to the hierarchy

Pillar 1: Capacity to Prevent Wasteful Resource Use at Source

Action 1.1: Integration of Waste Prevention Measures

If certain goods or packaging were not produced (and consumed) in the first place, they would not have to be managed as wastes. The demand for certain goods and their production can be reduced through a change in consumer behaviour (see Theme 5 - Education). In addition, Maseru/Lesotho should regulate by means of taxes and levies the types of goods/packaging which are preferably imported or produced in the country, so that they remain manageable by a local recycling and waste management economy.

Action: Director of NES together with LRA, Trade and LNDC.

Time Scale: Ongoing with 3 years to completion

Action 1.2: Introduction of Cleaner Production Measures

Maseru's industrial sector can reduce waste production via a number of measures, with the specific interventions being determined by the types of industries considered. Waste minimisation measures include process optimisation and the appropriate choice of input materials amongst others. Knowledge about minimisation options can be shared through waste minimisation clubs (see also Theme 5 – Education). Systems such as integrated waste exchanges should be considered to help in matching resource cycling opportunities.

Action: Director of NES together with LNDC and MTICM to pursue establishment of NCPC (National Cleaner Production Council); in interim to establish a WM club.

Time Scale: 5 years to NCPC, 6 months to WMC

Action 1.3: Implementation of a Source Separation System

The proposed source separation system consists of the separation of the following three waste types: biodegradables (wet waste), dry recyclables (paper, glass, tins, and plastics), and real waste. Appropriate systems should be established in households, commerce, schools, hospitals and the administration for separation at source.

Action: MCC Director Health and Environment via a new employee, in partnerships with relevant waste generators

Time scale: Some activity in pilot phase, significant advances within 1 year, activity fully functional within 3 years

Action 1.4: At Source Value-Addition

Through activities such as composting and re-use, waste materials can be managed at source, and do not become a burden for down-stream collection and recycling/disposal activities. Furthermore, they can be used for activities such as gardening or feeding of livestock, they decrease the need for new products, and can possibly generate an income. Activities related to that action will be specific to the considered wards, and may include skills transfer, financial support of projects, and the generation of new ideas. Education plays an important role here.

Action: NES to raise awareness and educate, MCC Director Health and Environment to implement via tendered-in private sector support, possibly with new staff member.

Time scale: Some in pilot phase, 3 year roll-out

Pillar 2: Strong, Diversified and Appropriate Collection Systems

Pillar 2 is predicated on a mutual understanding between waste generators and the MCC/government. In terms of this understanding, if the waste generator

- i) sorts their waste stream into the three fractions,
- ii) takes care of at-source value addition for bio-degradables, and
- iii) delivers the segregated waste to an appropriate location (either kerbside or to a central collection location depending on the area being considered as discussed in Action 2.1 below)

then the MCC will see to it that residual waste is removed and recyclables are collected.

In order to support Pillar 2, it is essential to carry out the following actions.

Action 2.1: Establishment of Ward-Specific and Material-Specific Collection Systems

As the wards within the city of Maseru are very different with regards to income structures, road access and waste management infrastructure in place, it is not possible to design a one-size-fits-all waste collection service. It is therefore proposed that waste collection systems be designed according to the specific requirements of each ward, with the collection systems aiming to achieve the following overall aims:

- maximise the amount of waste being diverted from informal disposal activities,
- minimise the contamination of the three separately collected fractions (see Action 1.3), and
- maximise the integration of existing infrastructures and resources.

In order to do so, the MCC must ensure that there is sufficient planning capacity in place for designing and allocating appropriate options to different wards.

Such systems may include one or more of the following elements:

- Decentralised waste collection depots (bucket shops)
- Integration of informal collectors/waste pickers
- 'Bring' systems with commodity exchange (e.g. food or fuel tokens)
- Waste collection services by truck

Action: MCC Director Health and Environment via a suitably trained employee, harnessing the PPPUE in implementation

Time Scale: Some in pilot phase, many within 1 year, completed within 3 years

Action 2.2: Systematic Infrastructure and Route Planning

The Department Health and Environment within MCC, in close collaboration with the MCC Department of Urban Planning (and with LSPP), should elaborate a waste collection infrastructure plan. Currently, certain wards are not serviced by the MCC as no appropriate access infrastructure exists. Furthermore, the location of waste collection centres as well as the regularity and timing of waste collection services by the MCC should systematically be addressed by both departments. Key staff needs to go on training and/or a consultant should be appointed to carry out this action.

Action: Town Clerk and Commissioner of Lands (MCC & LSPP), with a consultant if required

Time scale: Plan complete within 2 years, rollout within 5 years

Action 2.3: Optimisation of Collection Services Offered by MCC and Private Recyclers and the PPPUE

This action comprises a number of sub-actions which need to be achieved through regular exchange of information between the waste collection services of the MCC and the recycling industry forum (see Action 3.4):

- Implementing free removal of real waste where the compact is observed, starting from the poorest wards
- Facilitating healthy competition for source-separated recyclables (an analogy of this competition is in playing and watching soccer; the game has rules, an impartial referee, and yellow and red cards if someone transgresses). *Needs to be explained further.*
- Provision of waste bins, skips and bags. *Has this service to be provided for free, at a fee, or with subsidies?*
- Optimised allocation of resources and personnel
- Provision of adequate operational health and safety measures/gear to waste workers

Action: MCC Director Health and Environment, harnessing the PPPUE in implementation, and private recyclers forum

Time Scale: Some in pilot phase, many within 1 year, completed within 3 years

Pillar 3: A Healthy Recycling Industry

Action 3.1: Creation of a Supportive Platform for Private Recycling Enterprises

The public sector should provide supportive measures in order to establish a healthy recycling industry in Maseru (and Lesotho?). These measures include a simplified licensing system for recycling activities, business development services, and the development of suitable infrastructure. An important part of the latter is the establishment of an industrial site to be known as the Recycling Centre. Here, a multitude of recycling firms must be able to rent suitable space.

Action: MoLG&C and LNDC with support of MTICM and Ministry of Finance.

Time scale: 2 years for licensing and business support, 4 years for infrastructure

Action 3.2: Support for the Development of a Local Recycling Economy

Currently, recycling activities within Maseru are mainly restrained to the collection, pre-sorting and bailing of recyclables, whereas the major value-adding processing steps are undertaken by companies in South Africa. A healthy local recycling economy would focus on taking over some or all of the downstream, value-adding processing steps, supporting economic growth and job creation by selling value-added (intermediate) recycled products. The recycling centre identified in Action 3.1 would also serve to provide infrastructure for this type of activity. A replicable model for harnessing bilateral donor support for SME development with environmental benefits is proposed in the detail to this action.

Action: LNDC, BEDCO.

Time scale: 2 years to 1st activity, roll-out after 4 years.

Action 3.3: Regulatory Framework to Support Local Recycling Markets

It has been identified within Maseru and Lesotho as a whole that local collection activities of recyclables are disturbed by illegal activities from South African companies. This situation should be altered by the introduction of stricter regulation measures, as it negatively affects the local economy in a twofold manner:

- Tax losses due to illegal commercial activities
- Decrease of quantities of recyclables for local recycling activities

Action: NES and MTICM

Time scale: immediate

Action 3.4: Coordination of Local Recycling Activities

Currently, the activities of local recyclers are not coordinated and systematic. In the mid- to long-term, the coordination of activities led by a forum representing local recyclers (see Action 2.3) would help to support the systematic diversification of recycling activities along the value chain, strengthen the local market place against foreign market influences, and develop a code of conduct.

Action: NES, MTICM with support of local chapter of IWMSA

Timeline: less than 1 year to establishment

Action 3.5: Develop Capacity to Work with Take-Back Levies

This action mirrors 1.1: the recycling industry must be able to pay out take back levies, and be able to fully account for payouts and materials taken back.

Action: MoLG&C to develop policy, MTEC and MITCM (Trade) to implement

Time scale: 2 years to 1st implementation

Pillar 4: An Environmentally Safe Disposal Site for Real Waste

The need for a sanitary landfill site for the proper disposal of waste materials has been recognised by the MCC. A first EIA has been conducted by Genesis Environment Solution which has been rejected by NES.

Action 4.1: Adjustment and Integration of Planning Activities for Sanitary Landfill Site

The development of a sanitary landfill site for Maseru is of crucial importance for the city, and represents one key element of an ISWMP. Planning activities for the new landfill site are underway, and need to be adjusted according to and integrated into the ISWMP.

Ultimately the establishment of the sanitary landfill site should be coordinated with activities regarding infrastructure planning undertaken by the MCC Department of Urban Planning (see Action 2.2).

Action: MCC Dept. of Health and Environment, MCC Dept. of Urban Planning (and with LSPP)

Time scale: immediate

Action 4.2: Amendment of EIA

An EIA has been conducted by Genesis Environment Solutions for the establishment of a new landfill site. This EIA has been found inadequate by NES in its submitted form, and is currently being reviewed by Johannesburg based company Jones & Wagener. A special emphasis should be put on the amounts of wastes for which the landfill site is going to be designed, its location, and the necessity of a transfer station and an additional incineration plant, which would significantly increase the financial burden on the end-costumer.

Action: MCC

Time scale: immediate

Action 4.3: Capacity to Thermally Use Non-Recyclable Paper

From an environmental perspective, paper waste should never be disposed to landfill; this is the least preferred option after recycling and thermal use. It is therefore proposed to create capacity in Maseru to energetically use the remaining stream of paper after its full recycling potential has been exploited. Paper waste could be used in the form of paper bricks to supplement fossil energy carriers such as coal in the industrial sector. By doing so, the combustion of paper waste in uncontrolled situations such as home burning is further reduced.

Action: Director of NES together with LNDC.

Time scale: 1 year to pilot activity, 3 years to full implementation

The Platform: Education, built upon real and up-to-date information

Action 5.1: Use of School Infrastructure as Awareness Creation Medium

Awareness regarding the proper management of wastes at home can be conveyed via the teaching in schools. By teaching the pupils, knowledge can be transferred into the homes, where pupils will in turn teach their parents. There should be a strong emphasis on learning by doing, and generating additional revenue for the schools through sale of collected recyclables.

Action: NES, Ministry of Education

Time scale: 1 year to pilot implementation in some schools, 3 years to implementation in curriculum

Action 5.2: Establishment of Waste Minimisation Clubs

A common practice for sharing experiences regarding waste management, i.e. minimisation, activities in the commercial and industrial sector is the establishment of so-called waste minimisation clubs. Often, a waste minimisation club comprises related industries. Support should be given for the establishment of such clubs (see also Action 1.2).

Action: NES with support of industrial sector

Time scale: 6 months to 1st meeting, followed by meetings on regular basis

Action 5.3: Establishment of a Waste Information System (WIS)

Crucial to effective waste management is up to date and accurate knowledge on waste quantities generated, as well as their final fate. A WIS is a tool that enables the gathering, storing and interrogation of waste data. Besides the technical realisation of such a system, the legal perspective is of paramount importance; data will often not be obtained if the reporting of such data is not compulsory by law. Development of an appropriate system should be supported.

Action: MoLG&C to develop policy, NES and MCC (Dept. Health and Environment, Dept. of Urban Planning) to design and implement

Time scale: 1 year to implementation

Action 5.4: Awareness Creation through Common Media

In order to create awareness on waste management issues, roles and responsibilities amongst the general public, local media such as newspaper, radio and TV can be utilised. The distribution of pamphlets is also an alternative. Furthermore, the early and accurate education of the local population regarding specific upcoming activities such as the construction of a landfill site can help to gain support and buy-in, and contributes towards an accelerated approval process.

Action: NES and MCC (Dept. Of Health and Environment, Dept. of Communications)

Time scale: immediate and in parallel to all activities in ISWMP

Action 5.5: Review of this ISWMP on a Regular Basis

In order to assure that the actions proposed in the ISWMP are rolled out in an effective way, and that the targets set within this ISWMP are met, it is essential to review this plan on a regular basis. The plan proposed should be understood as a dynamic and iterative strategy, needing the readjustment and fine-tuning of proposed actions and targets according to practical developments in order to achieve the best possible outcome. The WIS as proposed under Action 5.3 would be a useful tool for the review.

Action: MoLG&C and Director H&E MCC

Time scale: Every 2 years

Themes to guide an institutional arrangement – Actors and Actions

The 20 proposed waste management actions within the proposed 5 themes cut across a number of government institutions. In order to identify clear lines of responsibility, the actions can be regrouped as follows, with clear responsibilities to four government agencies.

Table 1: Themes, Lead Institutions and Actions

Theme	Lead Institution	Actions
Awareness, Education & information	NES	1.1, 1.2, 1.4, 3.3, 3.4, 4.3, 5.1, 5.4
Collection, segregation & disposal	MCC	1.3, 2.1, 2.2, 2.3, 4.1, 4.2, 5.5
Industrial development (Recycling & CP)	LNDC	3.2, 4.3 + parts of 1.2, 3.1
Policy & institutional mechanisms	MoLG&C	3.1, 3.5, 5.3, 5.5

The summary table below gives the responsible lead institutions for the different actions.

Table 2: Lead Institutions by Actions

Action	Organisation
1.1	NES
1.2	NES
1.3	MCC DHE
1.4	NES
2.1	MCC DHE
2.2	MCC and LSPP (executives)
2.3	MCC DHE, PPPUE and private recyclers
3.1	MoLG&C (support), LNDC (promotion of private enterprise)
3.2	LNDC with BEDCO (Basotho Enterprises Corporation)
3.3	NES with MTICM
3.4	NES, MTICM and IWMSA
3.5	MoLG&C
4.1	MCC
4.2	MCC
4.3	NES and LNDC
5.1	NES and Education
5.2	NES and Industry
5.3	MoLG&C, NES and MCC
5.4	NES and MCC
5.5	MoLG&C and MCC

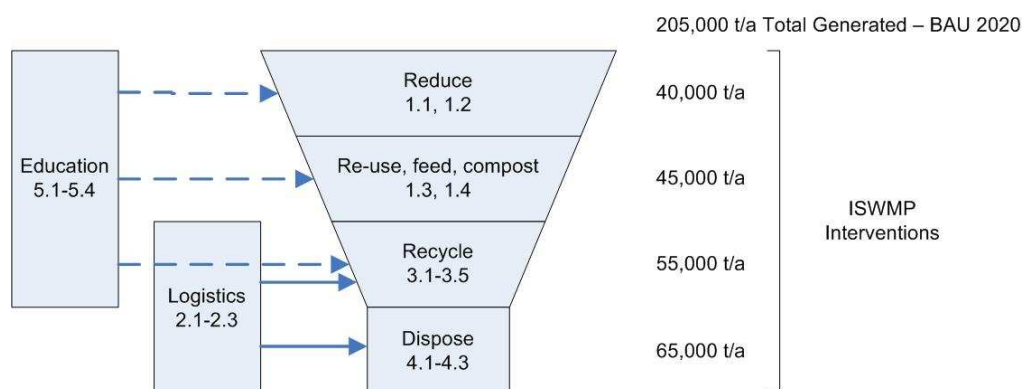


Figure 5: Maseru ISWMP Vision 2020 – Actions and Waste Management Hierarchy

As depicted in Figure 5, the actions defined in the ISWMP fit within the different levels of the waste management hierarchy, extended by logistics and education. The actions of pillar 1 fit within the upper two levels of the waste management hierarchy, namely reduce and reuse, feed, compost. The actions of pillar 2 are mainly concerned with waste management logistics. The five actions of pillar three fall within recycling activities, whereas the actions of pillar 4 are connected to energy recovery/disposal activities. Lastly, actions 5.1-5.4 are aimed at educational purposes. In a business-as-usual scenario, at total amount of 210,000 t/a of waste will be generated in Maseru in 2020. By taking into account the actions defined in the ISWMP, 40,000 t/a of waste will be prevented from generation by waste reduction measures. Furthermore, 45,000 t/a will be reused, fed and composted, and 55,000 t/a will be recycled. Finally, only 65,000 t/a will be disposed of by landfilling/energy recovery.

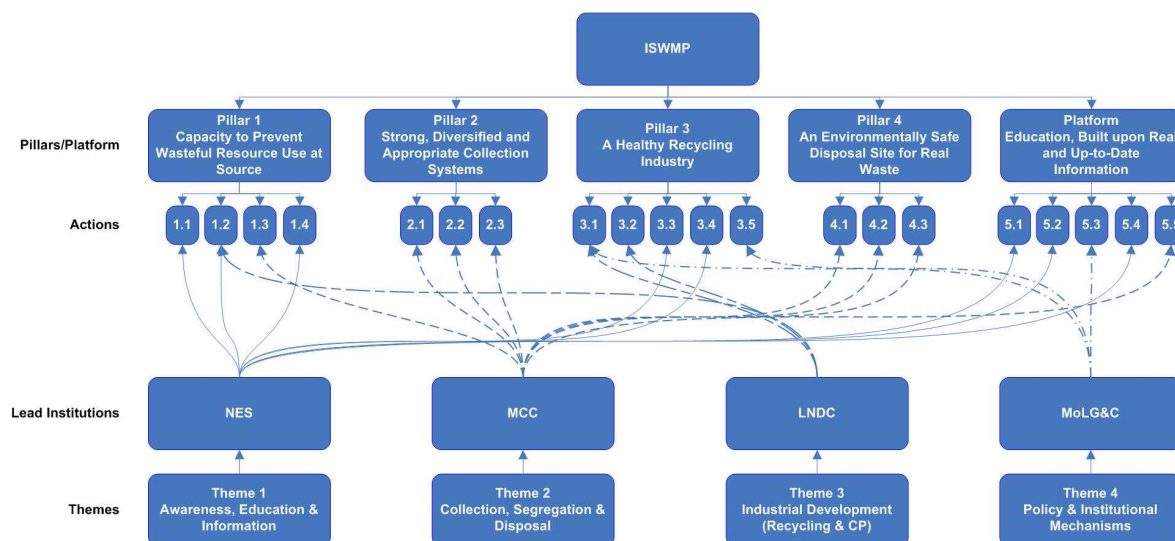


Figure 6: ISWMP – Relationships Pillars/Platform, Actions, Lead Institutions and Themes

Four lead institutions will be responsible for the implementation of the different actions proposed in the ISWMP. In Figure 6, a flow-chart is proposed depicting the relationship between the pillars and platform of the ISWMP and their related activities. Seen from the bottom-up, lead institutions are driven by themes for action in order to implement the actions

proposed in the plan. The aim of this flow-chart is to concisely highlight the relationships between the different elements developed within this plan.

Waste Management Matrix

The table below presents a waste management matrix, listing the different waste types by sector, matched to the actions as described in the previous sections. The purpose of this representation is to allow stakeholder in Maseru's waste management sector to get a concise overview of actions related to a specific waste type.

Table 3: Waste Management Matrix

Sector	Waste types	Actions	1.1	1.2	1.3	1.4	2.1	2.2	2.3	3.1	3.2	3.3	3.4	3.5	4.1	4.2	5.1	5.2	5.3	5.4
Household	a.1	Biodegradables	x		x	x	x	x	x	x	x	x	x		x	x	x		x	x
	a.2	Paper	x		x	x	x	x	x	x	x	x	x	x	x	x	x		x	x
	a.3	Glass	x		x	x	x	x	x	x	x	x	x	x	x	x	x		x	x
	a.4	Plastics	x		x	x	x	x	x	x	x	x	x	x	x	x	x		x	x
	a.5	Tins	x		x	x	x	x	x	x	x	x	x	x	x	x	x		x	x
	a.6	Residual Household Waste	x		x			x	x	x					x	x	x		x	x
	a.6	Hazardous household waste (Hz)	x		x			x	x	x					x	x	x		x	x
	a.6	Hazardous household waste (Hz)	x		x			x	x	x					x	x	x		x	x
Commercial incl. Administrative	b.1	Biodegradables	x		x	x		x	x	x	x	x	x		x	x		x	x	x
	b.2	Paper & Cardboard	x		x	x		x	x	x	x	x	x	x	x	x		x	x	x
	b.3	Plastics	x		x	x		x	x	x	x	x	x	x	x	x		x	x	x
	b.4	Scrap metal	x		x	x		x	x	x	x	x	x	x	x	x		x	x	x
	b.5	Residual Commercial Waste	x		x			x	x						x	x		x	x	x
Other	c.1	e-waste	x		x	x		x	x	x	x	x	x	x	x	x		x	x	x
	c.2	Used tyres	x		x	x		x	x	x	x	x	x	x	x	x		x	x	x
	c.3	Builder's rubble	x		x	x		x	x	x	x	x	x		x	x		x	x	x
	c.4	Sewage sludge	x		x	x		x	x	x	x	x	x		x	x		x	x	x
	c.5	Car batteries (Hz)	x		x			x	x	x	x	x	x	x	x	x		x	x	x
Industrial	d.1	Woven Textile Industry (Hz)	x	x	x	x		x	x	x	x	x	x		x	x		x	x	x
	d.2	Knitted Textile Industry	x	x	x	x		x	x	x	x	x	x		x	x		x	x	x
	d.3	Brewery & Flour Mill	x	x	x	x		x	x	x	x	x	x	x	x	x		x	x	x
Hospitals	e.1	Health Care Waste (Hz)	x		x			x	x						x	x		x	x	x

Operationalisation of the ISWMP Plan

Policy Tools and Framework

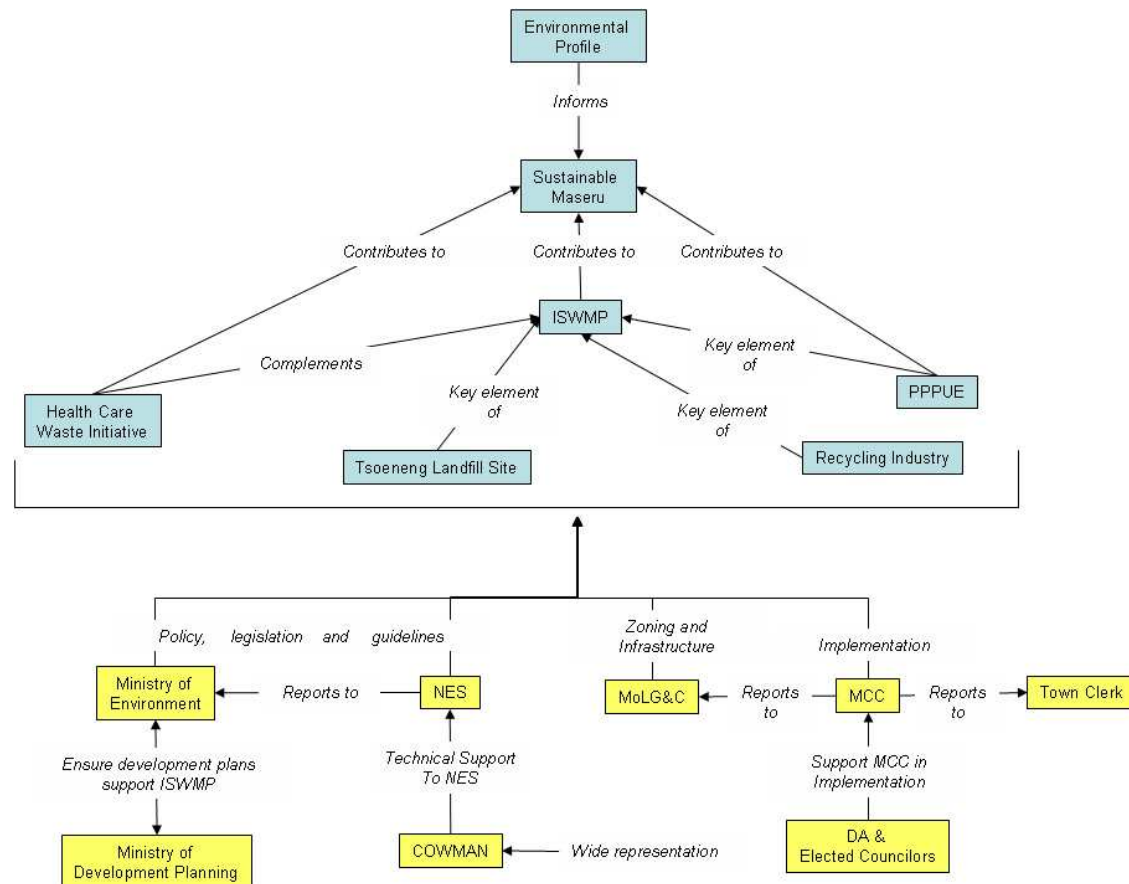


Figure 7: Governmental Structures and Activities, Projects & Plans Related to Waste Management

Time Plan and Funding

Action	2007		2008		2009		2010		2011	2012	2013	2014	
1.1	█	█	█	█	█	█	█	█					...
1.2 WMC			█	█									...
1.2 NCPC													...
1.3													...
1.4													...
2.1													...
2.2 Plan													...
2.2 Implementation													...
2.3													...
3.1 Licensing													...
3.1 Infrastructure													...
3.2 1st Activity													...
3.2 Roll Out													...
3.3													...
3.4													...
3.5													...
4.1													...
4.2													...
4.3 Pilot													...
4.3 Full implementation													...
5.1 Pilot													...
5.1 Curriculum													...
5.2													...
5.3													...
5.4													...
5.5													...

Proposal of Pilot Activities

The pilot activity forms a key part of the three-phase project to develop and implement an ISWM plan in Maseru, bridging phases 2 and 3, and testing some of the key elements of this plan.

Key features to be tested:

- Separation of waste in households into three fractions (bio-wastes; dry, clean, mixed recyclables; residual waste) [Action 1.3]¹
- Adding value at source, esp. to the bio-waste fraction, either by using as feed to livestock or by composting. [Action 1.4]
- Appropriate means of collecting the recyclables (and the residual waste, if not already done), [actions 2.1 and 2.3]; also documenting savings and income.
- Strengthening, diversifying and educating the recycling industry. [Action 3.1]
- Educating school-going children by involving them in this pilot programme. [Action 5.1]

Key dimensions of the pilot activity:

- Duration: 1 year, starting in September of 2007
- Budget: \$ 40 000, of which 80% to be spent on the ground
- Number of participating households: 1000, possibly in two separate areas
- Number of participating schools: 1 or 2 (1 per area)

Characteristics of participating areas:

- Lower than average income (for at least one of the two areas)
- Poor road access to at least one third of the households
- Proximity of a primary school to which children of this area preferentially go
- Presence of an NGO that is willing and able to facilitate

Key activities and responsibilities:

- Design of the pilot activity (UCT and EnviroTech Services)
- Area selection (MCC, esp. PPPUE and DoHE Directors)
- Training of trainers (UCT)
- Design of educational material (UCT and EnviroTech Services)
- Facilitation on the ground (EnviroTech Services)
- Administration and institutional arrangements (MoLG&C)
- Operational support, e.g. in collection, or in provision or acquisition of bins, bags, skips, igloos or mobile platforms (MCC DoHE and PPPUE)
- Evaluation of programme (EnviroTech Services)
- Feedback to ISWMP steering committee (MoLG&C and MCC)

¹ Numbers in square brackets refer to actions in the first draft of the ISWMP.

Conclusion

Waste management in Maseru has not kept pace with the population and industrial growth of the city. Current waste management practices are unsustainable, resulting in damage to the city's natural resource base (including its water supply) and to the health of its residents. Resources that are potentially reusable are being wasted.

In the previous 20 pages, a concise but integrated plan for action has been developed. Clear lines of responsibility have been drawn. Leadership will be needed to ensure that the plan can be implemented. Oversight of implementation is proposed to be in the hands of a committee with representation at Director level of 7 key institutions:

- Ministry of Local Government and Chieftainship (which also acts as chair to the committee)
- Maseru Metropolitan Council
- National Environment Secretariat
- Lesotho National Development Corporation
- Ministry of Trade and Industry
- Ministry of Finance
- Lesotho National Council of Non-governmental Organisations

Some might view the range of activities proposed in this plan as rather large. There will be a temptation to pin all hopes on the completion of the new landfill disposal site, and to neglect some of the activities proposed in this ISWMP. This would be short-sighted, and not in the public interest. It is very important to realise the following economic implications:

- Collection and disposal of waste only costs money and creates only a few jobs.
- The recovery of resources, their separation and further processing may cost money, but it also makes money. And every ton that does not go to landfill disposal, saves the City, and its ratepayers, money.
- Over the next decade, resources will become more expensive globally. A small country far away from resource supplies, will become increasingly vulnerable unless it manages its resources well.

It is for these reasons that each of the 20 action items, described in more detail in the appendices, needs to be implemented.

Detailed Description of Actions

Detailed Description Action 1.1: Integration of Waste Prevention Measures

Background

The first aim of the ISWMP is to reduce the generation of municipal solid waste which needs to be handled by a waste management system. One way of reducing the amount of waste to be managed is to prevent certain goods and packaging from being produced (and consumed) in the first place.

Four means are identified of preventing materials from entering the waste stream which requires management.

1. Introducing legislation for preventing the entry of certain materials into the market.
2. Regulating by means of taxes and levies the types of goods/packaging which are preferably imported or produced in the country, so that they remain manageable by a local recycling and waste management economy.
3. Adding a levy onto perceived “free” goods which both reduces consumption and generates revenue for waste management.
4. Changing in consumer behaviour. This is partly covered in Theme 5 – Education, but could also include the introduction of, for example, eco-labels or the creation of an environmental consumer council.
5. Introduction of take back levies which will encourage consumers to return goods (such as bottles, car batteries and tyres) to the point of purchase rather than letting them enter the waste stream. Take back levies are discussed in Action 3.5.

Points 1, 2 and 3 are expanded below. Points four and five are expanded in Theme 5 and Action 3.5 respectively.

1. Legislation to prevent entry of certain materials into the market

Certain problem wastes could be prevented from being imported or manufactured locally. An example of this is the legislation surrounding plastic bags which has been implemented in South Africa and Rwanda. In South Africa, a ban was placed on all plastic bags with a thickness of less than 30 microns. In addition, a levy has been placed on other bags (see below). In Rwanda, all plastic bags have been banned, with the use of paper bags or baskets being encouraged instead.

2. Regulation of import and production of goods through taxes and levies

The imposition of taxes and levies sends a market signal on the types of materials which are preferred to be imported into the country. This approach is not as extreme as the first approach.

3. Implementation of a Point of Sale levy

An example of this element is the plastic bag levy which is charged on all bags issued in South Africa. The levy serves the purpose of encouraging consumers to evaluate the need for a plastic bag with all purchases, and motivates consumers to use reusable plastic bags.

Deliverables

Evaluation and implementation of opportunities for waste prevention.

Action

- *Director of NES together with LRA, Trade and LNDC.*

Time plan

- Ongoing with 3 years to completion

References

Information on the plastic bag legislation in South Africa can be found at <http://www.environment.gov.za/>

Detailed Description Action 1.2: Introduction of Cleaner Production Measures

Background

Maseru's industrial sector can reduce waste production via a number of measures, with the specific interventions being determined by the types of industries considered.

Waste minimisation measures include process optimisation and the appropriate choice of input materials amongst others. Knowledge about minimisation options can be shared through waste minimisation clubs (see also Theme 5 – Education). Systems such as integrated waste exchanges should be considered to help in matching resource cycling opportunities. A waste exchange is a waste management database that links companies with a waste stream with other companies who can use the stream as a raw material (see for example the City of Cape Town's waste exchange at <http://www.capetown.gov.za/iwe/>).

The opening of a local chapter of the Institute for Solid Waste Management (ISWM) from South Africa, similar to that which has been opened in Gabarone, has been suggested and should be encouraged. A National Cleaner Production Centre (NCPC) such as that set up in South Africa could also be considered (see <http://www.ncpc.co.za/>).

Deliverables

- Establishment of waste minimisation clubs for various industry sectors (see Action 5.2)
- Evaluation of the possibility of setting up a formal waste exchange and implementation if viable.
- Establishment of a local chapter of the ISWM (see Action 3.4)
- Establishment of a National Cleaner Production Centre (NCPC)

Action

- *Director of NES together with LNDC and MTICM to pursue establishment of NCPC (National Cleaner Production Council); in interim to establish a WM club.*

Time plan

- 6 months to first meeting of WMC, followed by meetings on regular basis
- 5 years to NCPC

Detailed Description Action 1.3: Implementation of a Source Separation System

Background

Source separation essentially involves separating waste into classes of recyclables, biodegradables (or organics) and residual waste at the point of generation (e.g. at household level) to facilitate re-use, composting and recycling activities.

UNEP identifies separation of the organic fraction as a priority for developing countries as this typically is the largest category of MSW and thus represents the greatest reduction potential in wastes for disposal.

The second priority is to both support waste minimisation (see Actions 1.1 and 1.2) and maximise the recovery of recyclables, the latter preferably without separate collection by the municipal authority (UNEP-IETC, 1996).

The selection of an appropriate source separation system is of crucial importance, as it will affect any further downstream activity, and must therefore be integrated and adjusted with the design of the waste collection system (Action 2.1), as well as infrastructure and route planning (Action 2.2).

Source separation requires proper bins or bags for each waste fraction. The type and size of bag/bin for each type fraction and each waste generator (e.g. households, commerce and industry) needs to be determined based on the volumes of waste generated (information to be obtained from Action 5.3).

UNEP defines the following principles for the selection of set-out containers (http://www.unep.or.jp/Ietc/ESTdir/Pub/MSW/SP/SP3/SP3_2.asp):

- Choose containers made of local, recycled, or readily available materials.
- Choose containers which are easy to identify, either due to shape, colour, or special markings.
- Choose containers which are sturdy and/or easy to repair or replace.
- Consider identification of containers with generators by address or name or code number.
- Choose containers that are matched to the collection objectives.
- Choose containers that are appropriate to the terrain.

Deliverables

The wards in Maseru are characterised by differences in housing density, accessibility and income levels. As a result, different separation and collection systems may be appropriate for different types of wards. However, for all households, separation into three waste streams is recommended:

1. Biodegradables (wet kitchen and garden waste)
2. Dry recyclables (paper, cardboard, glass, cans and plastics)
3. Residual waste (real waste)

Some industries and commercial outlets may be able to further separate their recyclables; some industries and commercial outlets will not generate significant organic wastes.

The table below outlines the collection or management system options for each ward type (for details on ward types see Action 2.1) and waste type and suggests the most likely container/bag for each separated waste fraction.

For wards where there is good accessibility, kerbside collection of recyclables and residual waste is recommended. Bins should be provided in these areas to assist waste and recyclables collection. Here the recyclables are put in a separate clear/milky plastic bag on top of the bin on collection day. Recyclables may also be taken to local schools that are supporting collection activities of recyclables (see Action 5.1 and pilot activity).

For wards with poor accessibility, an enclosure needs to be provided for residents to put their waste and recyclable bags. These “collection points” can be fenced and partitioned for recyclable and residual waste bags. The collection points should be constructed at points where most of the households do not need to walk for more than 100 meters to put their waste bags.

For wards where residual waste volumes are found to be small, households can use ordinary shopping bags to dispose of this waste fraction. Where residual waste volumes are larger, black bags should be issued to the community by the MCC/PPPUE. For high density, low income wards, black bags and/or bins could be shared by a number of households (e.g. “lines”)

The organic fraction in all cases is assumed to be used by the household either for animal feed or community/home composting. Special containers are not provided at this stage. Composting and other reuse activities are described in Action 1.4.

For commercial areas, similar domestic type bags can be used for small commercial entities and offices. For larger commercial businesses, mini skips or jumbo bins of various sizes should be provided for different waste types. For industrial sites, mini bins/skips or large skips should be provided. Special containers need to be provided for hazardous waste. All these containers should be provided and maintained by the MCC/PPPUE

Collection or management system options for each ward type

Ward Type	Properties	Example	Waste Type	Collection or Management System	Container(s)
A	HD, good accessibility, M&H Income	Maseru West	Recyclable	At schools	Cloth bag
			Organic	Kerbside	Clear bag (in Bin)
			Residual	Home or community composting Kerbside	- Black bag/shopping bag plus bin
B	HD, poor accessibility, L&M Income	Sea-Point / Thibella	Recyclable	Bring System	Clear bag
			Organic	Home or community composting	-
			Residual	Bring system	Black bag/Shopping Bag
C	LD, good accessibility, M&H Income	Makoanyane	Recyclable	Kerbside	Clear bag (in Bin)
			Organic	Animal Feed; Home or community composting	-
			Residual	Kerbside	Black bag/shopping bag in bin
D	LD, poor accessibility,	Lithoteng	Recyclable	At schools	Cloth bag

	L&M Income		Organic Residual	Bring System Animal feed; Home or community composting Bring System	Clear bag - Black bag/Shopping Bags
E	Commercial Area	Maseru CBD	Recyclable Organic Residual	Kerbside Kerbside Kerbside	Skips/Bins/Bags Skips/Bins/Bags (mixed with residual) Skips/Bins/Bags
F	Industrial Area	Thetsane Industrial	Recyclable Residual Hazardous	Kerbside Kerbside Kerbside	Skips/Bins/Bags Skips/Bins/Bags Special closed containers

Action

MCC Director Health and Environment via a new employee, in partnerships with relevant waste generators.

Duties of this new employee will be to:

- Determine the most appropriate bags/bins/skips etc. for each ward based on waste volumes generated
- Determine scheme for issuing appropriate containers to households and commercial and industrial waste generators
- Oversee purchase of containers and roll-out

Time plan

- Some activity in pilot phase
- Significant advances within 1 year
- Activity fully functional within 3 years

References

UNEP-IETC (1996): International Source Book on Environmentally Sound Technologies for Municipal Solid Waste Management TPS No. 6. Extracts available from:

<http://www.unep.or.jp/Ietc/ESTdir/Pub/MSW/index.asp> Accessed: 11 September 2007

Detailed Description Action 1.4: At Source Value-Addition

Background

This action covers all activities that fall under the “reuse” category of the waste minimisation hierarchy, where waste materials are reused or converted at source into other useful items. By managing these waste materials at source it not only decreases the need for new products but also lightens the load on down-stream collection and recycling/disposal activities.

Reuse is essentially any activity that lengthens the life of an item and is distinct from recycling where items are reprocessed into secondary raw materials to make new products. Many waste materials can be reused, e.g. plastic shopping bags, bottles and cans. But perhaps the largest potential for at source value-addition in the Maseru context comes from using the organic fraction of household waste as animal feed or for compost. This is because overall household waste is made up of a high percentage of kitchen scraps and other organic wastes that can be easily reused in this way.

Reuse can also be accomplished by:

- Take back levies (discussed in Action 3.5) where customers are offered a financial incentive to return packaging for reuse/recycling
- Purchasing durable goods
- Buying and selling in the used marketplace
- Borrowing or renting
- Donating used goods to charity

Further benefits of reuse include:

- Energy and raw materials savings as reuse reduces the number of new products that need to be manufactured
- Reduced collection and disposal needs and costs
- Create new markets for materials
- Creatively refashioning used materials, maintenance, repair and refurbishment can also generate income and create employment opportunities
- Create opportunities for vocational training
- Cost savings for consumers as reusable products or reconditioned products are often more affordable than new products

Deliverables

Activities related to this action will depend on the projects initiated in various wards, and may include skills transfer, financial support of projects, and the generation of new ideas. Education plays an important role here (see Action 5.4) to encourage a change in behaviour.

As part of Action 1.2, separation at source, households will be encouraged to separate the organic fraction of their waste for reuse as animal feed and/or compost material. As part of the educational material distributed to encourage source separation, information should be provided to households on composting. Technical information on home composting and larger scale community composting can be found in the Environmentally Sound Technologies Review that accompanies this document.

Further reuse opportunities should be identified for the different wards. Examples of projects that have been successful in other developing countries are listed in the EST review document. While these projects can be a source of income, they may require financial or technical support in the start-up phases.

Action

NES to raise awareness and educate, MCC Director Health and Environment to implement via tendered-in private sector support, possibly with new staff member. Responsibilities will be to:

- Identify possible reuse projects in different wards
- Organise technical and or financial support from the private sector or NGOs
- Encourage reuse, particularly of organic fraction, through educational initiatives

Time plan

- Some in pilot phase (education on source separation and use of organic fraction for composting/animal feed)
- 3 year roll-out

Detailed Description Action 2.1: Establishment of Ward-Specific and Material-Specific Collection Systems

Background

The wards within the city of Maseru are very different with regards to income structures (see Figure 8), road access and waste management infrastructure in place. Therefore it is not possible to design a one-size-fits-all waste collection service. Furthermore, wards will differ not only in terms of waste quantities generated (see Figure 9), but also according to waste types. It is therefore proposed that waste collection systems be designed according to the specific requirements of each ward, with the collection systems aiming to achieve the following overall aims:

- Maximise the amount of waste being diverted from informal disposal activities,
- Minimise the contamination of the three separately collected fractions (see Action 1.3), and
- Maximise the integration of existing infrastructures and resources.

In order to do so, the MCC must ensure that there is sufficient planning capacity in place for designing and allocating appropriate options to different wards. Such systems may include one or more of the following elements:

- Decentralised waste collection depots (bucket shops)
- Integration of informal collectors/waste pickers
- ‘Bring’ systems with commodity exchange (e.g. food or fuel tokens)
- Waste collection services by truck

Deliverables

As introduced in Action 1.3, six different types of wards have been identified within Maseru based on housing density, accessibility and income levels and including commercial and industrial areas. It should be noted that some wards may be a hybrid of the types listed here.

- Ward type A: High housing density; good accessibility for collection vehicles; Middle to High Income (Example: Maseru West)
- Ward type B: High housing density; poor accessibility for collection vehicles; Low to Middle Income (Example: Sea-Point/Thibella)
- Ward type C: Low housing density; good accessibility for collection vehicles; Middle to High Income (Example: Makoanyane)
- Ward type D: Low housing density; poor accessibility for collection vehicles; Low to Middle Income (Example: Lithoteng)
- Ward type E: Commercial areas (Example: Maseru CBD)
- Ward type F: Industrial areas (Example: Thetsane Industrial)

The table below extends the table in Action 1.3 by suggesting the appropriate collection vehicles and collection frequency for the various waste and recyclable streams. Transfer stations are identified where appropriate and the final/next destination is also listed.

Here, the collection or management system describes how the particular waste fraction is collected or managed. The options for recyclables include collection points at schools; kerbside collection with residual waste (in separate bags); fetch and bring systems where recyclables are either collected by runners from poorly accessible households to a collection point or vehicle or the

householder brings the recyclables to a collection point. The management options for the household organic fraction include use as animal feed or home or community composting. Organic wastes from commercial areas will be collected at kerbside and sent to a commercial composting facility. The options for residual wastes are kerbside collection or bring/fetch systems.

The collection vehicles proposed in the table depend on the housing density and collection system. Compactor vehicles are used for kerbside collection of residual waste in high density areas with good accessibility. Open vehicles are used for kerbside collection of recyclables and residual waste in other areas. Runners with trolleys or bicycle carts are used in for recyclables and residual waste collection in areas with poor accessibility where a “fetch” system is in place.

Transfer stations include collection points for wastes and recyclables or sorting/value-add points for recyclables in bring/fetch collection systems. A transfer station may also be required for waste collection from low density areas on the outskirts of Maseru. This will be determined in Actions 2.2 and 2.3.

The collection frequency depends on the type and amount of waste, the type of container/bag chosen, and the planning of collection routes (see Actions 1.3 and 2.2). An ‘open’ collection frequency refers to a frequency depending on the party bringing the waste. ‘On demand’ collection is very specific to hazardous waste amounts in industrial areas.

Action

- MCC Director Health and Environment via a suitably trained employee, harnessing the PPPUE in implementation

Time plan

- Some in pilot phase
- Many within 1 year
- Completed within 3 years

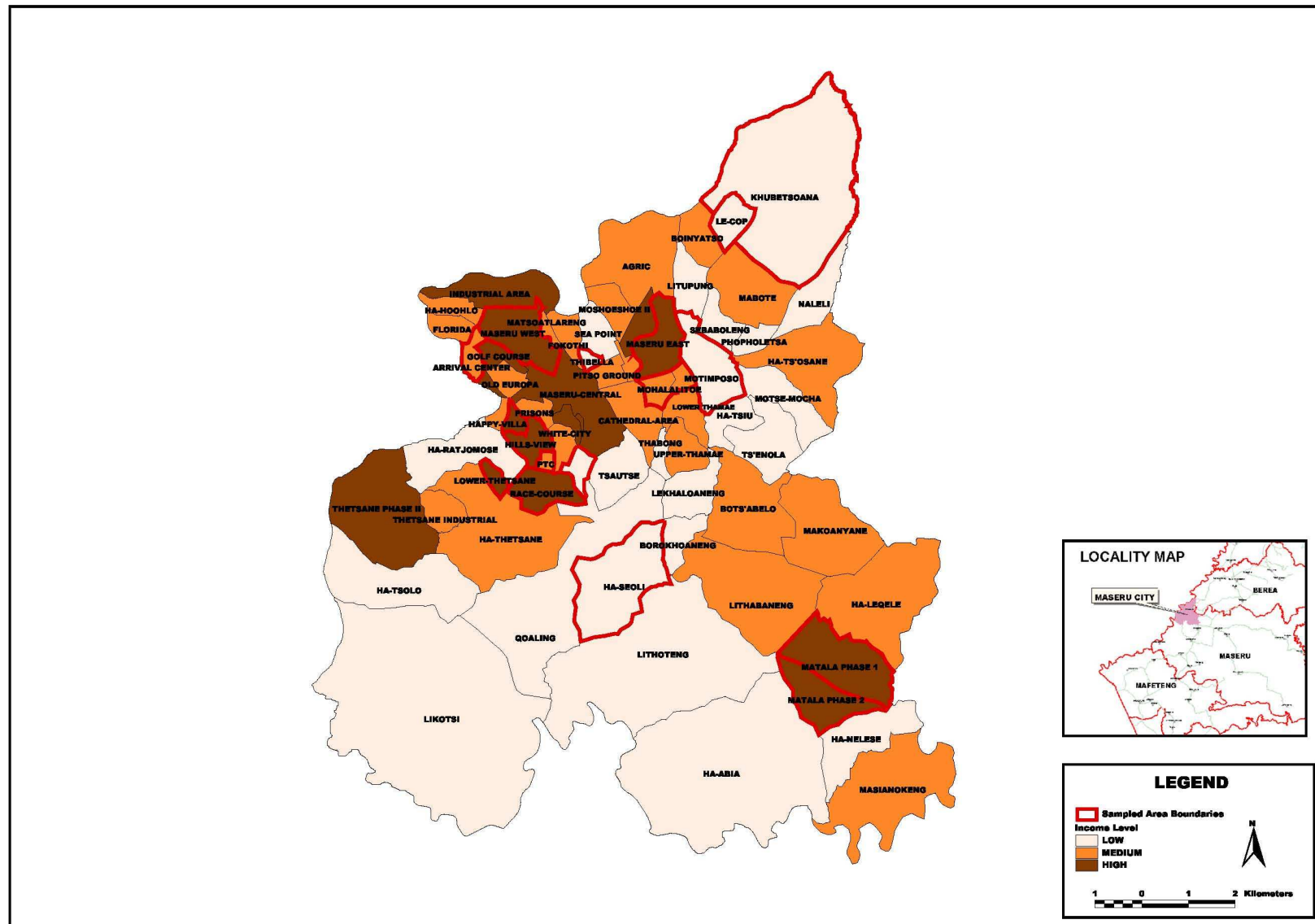


Figure 8: Study Area – MCC Wards by Income Level

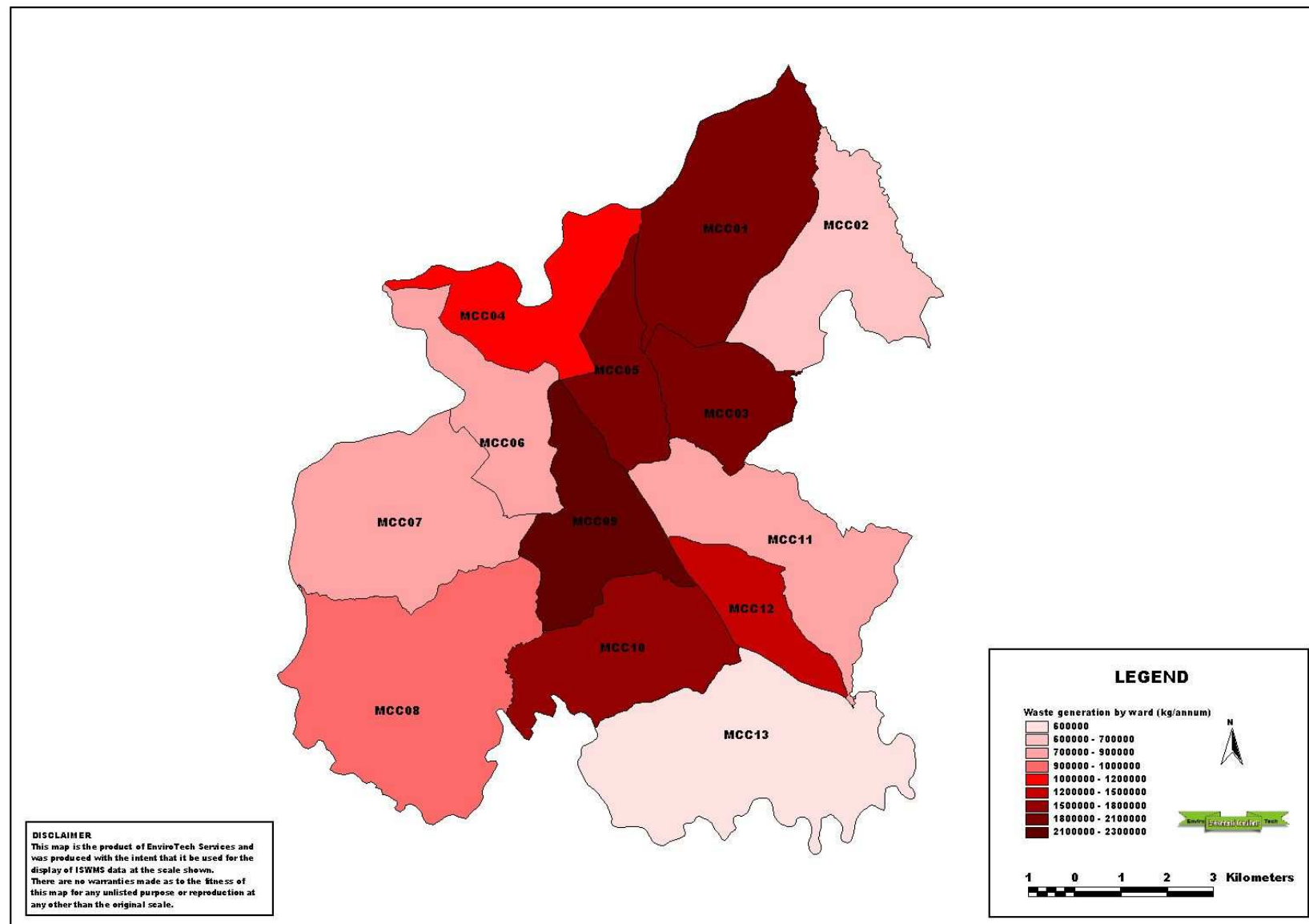


Figure 9: Waste Generation by MCC Ward

Ward Type	Properties	Example	Waste Type	Collection or Management System	Container(s)	Collection Vehicle(s)	Collection frequency	Transfer Station(s)	Next/Final Destination
A	HD, good accessibility, M&H Income	Maseru West	Recyclable	At schools	Cloth bag	School children	Open	Schools	Private Recycler/Recycling Centre
				Kerbside	Clear bag (in Bin)	Open truck	Weekly	-	Private Recycler/Recycling Centre
			Organic	Home or community composting	-	-	-	-	-
			Residual	Kerbside	Black bag/shopping bag in bin	Compactor truck	Weekly	-	Sanitary Landfill Site
B	HD, poor accessibility, L&M Income	Sea-Point / Thibella	Recyclable	Fetch System	Clear bag	Runner with trolley or cart	Weekly	Sorting/value-add station or collection points	Private Recycler/Recycling Centre
				Bring System	Clear bag	Householder	Open	Sorting/value-add station or collection points	Private Recycler/Recycling Centre
			Organic	Home Composting/Animal Feed	-	-	-	-	-
			Residual	Fetch System	Black bag/Shopping Bag	Runner with trolley or cart to open truck	Weekly	-	Sanitary Landfill Site
				Bring System	Black bag/Shopping Bag	Householder	Open	Collection points	Sanitary Landfill Site
C	LD, good accessibility, M&H Income	Makoanyane	Recyclable	Kerbside	Clear bag (in Bin)	Open truck	Weekly	-	Private Recycler/Recycling Centre
			Organic Residual	Home Composting Kerbside	- Black bag/shopping bag in bin	- Open truck	- Weekly	- If required	- Sanitary Landfill Site
D	LD, poor accessibility, L&M Income	Lithoteng	Recyclable	At schools	Cloth bag	School children	Open	Schools	Private Recycler/Recycling Centre
				Bring System	Clear bag	Private + open truck	Weekly/bimonthly	Collection Points	Private Recycler/Recycling Centre
			Organic	Home Composting/Animal Feed	-	-	-	-	-

ISWMP – Maseru/Lesotho

			Residual	Bring System	Black bag/Shopping Bags	Private + open truck	Weekly	Collection Points	Sanitary Landfill Site
E	Commercial Area	Maseru CBD	Recyclable	Kerbside	Skips/Bins/Bags	Open truck	Weekly	-	Private Recycler/Recycling Centre Commercial Recycling Facility Sanitary Landfill Site
			Organic	Kerbside	Skips/Bins/Bags	Open truck	Weekly	-	
			Residual	Kerbside	Skips/Bins/Bags	Open/compactor truck	Weekly	-	
F	Industrial Area	Thetsane Industrial	Recyclable	Kerbside	Skips/Bins/Bags	Open truck	Weekly	-	Other Industries/Private Recycler Sanitary Landfill Site Hazardous Waste Facility SA
			Residual	Kerbside	Skips/Bins/Bags	Compactor Truck	Weekly	-	
			Hazardous	Kerbside	Special Container	Special Vehicle	On demand	-	

Detailed Description Action 2.2: Systematic Infrastructure and Route Planning

Background

Route planning is an integral part of the development of an efficient waste management system. Although a special effort will be done to separate waste at source as proposed under Action 1.3, and to maximise the amounts of waste being either reused or recycled (Action 1.4 and Pillar 3), a specific amount of residual waste will have to be handled and disposed at the sanitary landfill site (Action 4.1). Furthermore, recyclables will have to be transported to specific locations for further handling and processing.

As can be seen in Figure 10, certain wards are currently not serviced by the MCC as the capacity of the City's waste collection fleet is limited and/or no appropriate access infrastructure exists for waste collection vehicles. Furthermore, waste collection fees are currently not paid by all households as households are either not willing to pay them, or they can not afford them. Therefore, collection routes are designed according to areas where households pay waste collection fees. This situation requires the review of the current collection fee structure (see financial plan).

Once an appropriate waste collection system has been put in place (Action 2.1), the logistics of transporting the wastes and recyclables will have to be optimised. Basically, the aim of systematic infrastructure and route planning should be to:

- Maximise the amount of generated waste being handled by a formal waste management system (in connection with Action 2.1), as this is the mandate of the MCC.
- Minimise transport distances and -costs, as well as related environmental impacts.

Deliverables

In order to achieve the previously stated aims, the following deliverables are proposed:

- In the mid- to long-term, the Dept. of Health & Environment within MCC, in close collaboration with the MCC Department of Urban Planning (and with LSPP), should develop a transport infrastructure which optimises the accessibility for waste collection vehicles to all establishments in Maseru.
- The choice of appropriate collection containers and vehicles under Action 2.1 is of crucial importance to any further handling and transportation steps. Action 2.1 and the systematic infrastructure and route planning should be carried out in tight cooperation.
- Collection routes should be designed in order to collect as much waste in a minimum of time and with as little distance to cover as possible. The different wards of Maseru should be organised into service areas, which would then fall under the authority of the MCC or private collection companies (see Action 2.3).
- The location of waste collection centres, as well as optional transfer station(s), need to be adjusted with the specific needs of the overall collection system in order to optimise its efficiency.
- The frequency and timing (e.g. avoidance of peak traffic hours) of waste collection services by the MCC should systematically be addressed in order to increase the overall efficiency of the system.
- The number of personnel deployed on service trucks and other sections of the collection system should be optimised according to the nature of the technology. Although it might

be considered to maximise job creation potentials within the waste management system, an optimised deployment of personnel in the collection system is of importance for the smooth operation of the overall systems. The benefits from an efficient collection system could be spent on social issues elsewhere.

- A prerequisite for route planning is also the availability of maps of the concerned areas which might be obtained from the LSPP. Software tools could be deployed in order to assist in route planning: A number of products can be obtained which can be coupled to Geographic Information Systems (GIS). It should be investigated if GIS are being used in other MCC departments in order to optimise synergies and minimise costs.
- Tracking of distances travelled and areas serviced by collection vehicles, logging of waste amounts dumped at sanitary landfill site, and feeding of information into central Waste Information System (WIS - Action 5.3).
- Key staff needs to go on training and/or a consultant should be appointed to carry out this action.

Action

- Town Clerk and Commissioner of Lands (MCC & LSPP), with a consultant if required

Time plan and Target

- Plan complete within 2 years
- Rollout within 5 years
- 100% of households serviced by 2010

References

<http://www.unep.or.jp/Ietc/ESTdir/Pub/MSW/index.asp>

http://www.iar.rwth-aachen.de/www/front_content.php?idcat=136

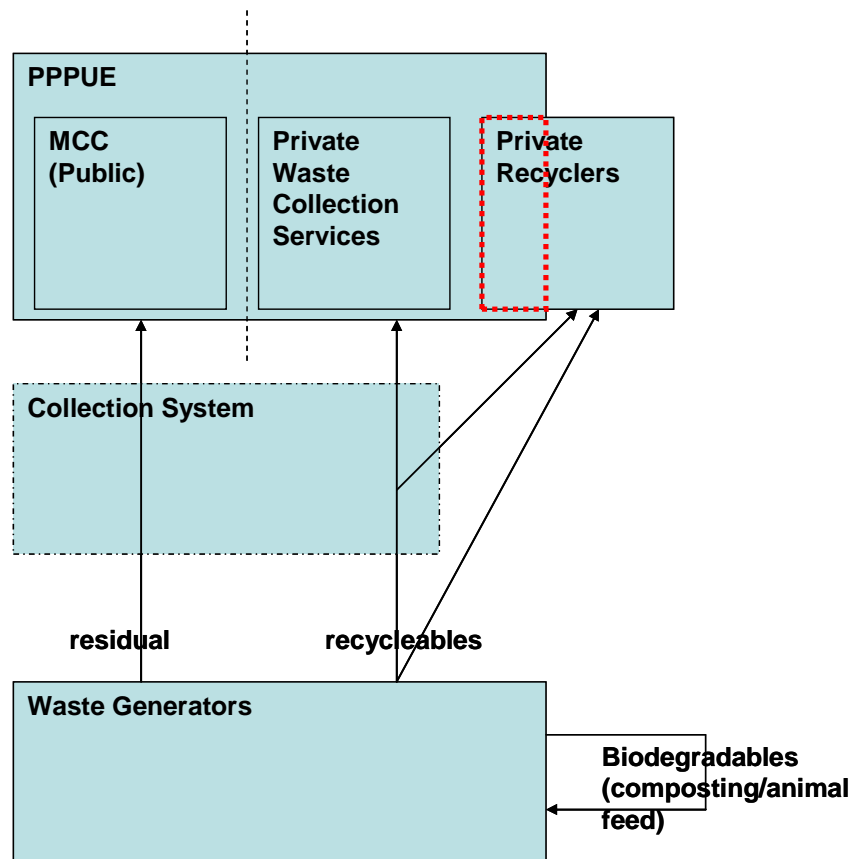


Detailed Description Action 2.3: Optimisation of Collection Services Offered by MCC and Private Recyclers and the PPPUE

Background

The provision and optimisation of collection services comprises the co-ordination of a number of sub-actions, details of which are covered elsewhere in the ISWMP, particularly Actions 2.1 and 2.2. Through these an optimised system will be developed which:

- Ensures waste generators have access to appropriate waste bins, skips and bags which are appropriate for the services being offered in their areas.
- Achieves removal systems for recyclables and residual waste, at a cost to generators which reflects the volumes of waste produced, and the ability of generators to pay for services. Ideally, no one should be excluded on the basis of being unable to pay for services.
- Facilitates healthy competition for source-separated recyclables
- Ensures that all recyclables are collected and recovered, not only the high value materials.
- Makes best use of other resources, including personnel
- Ensures provision of adequate operational health and safety measures/gear to waste workers



Optimisation of the collection services is expected to be a dynamic process, and development must be supported by regular exchange of information between the waste collection services of the MCC and the recycling industry.

Deliverables

An optimised collection system for recyclables and residual waste.

Action

- MCC Director Health and Environment, harnessing the PPPUE in implementation, and private recyclers forum

Time plan

- Some in pilot phase
- Many within 1 year
- Completed within 3 years

Detailed Description Action 3.1: Creation of a Supportive Framework for Private Recycling Enterprises

Background

The successful establishment and ongoing maintenance of a healthy recycling industry in Maseru, and Lesotho as a whole, will largely depend on the right mix of policies and programmes. Experience has shown that the key spheres of action will revolve around governance, education, technology and finance.

Deliverables

The interventions required in supporting this action include:

- A supportive legislative framework and licensing system for recycling activities, including ensuring no barriers to the export of material, whilst at the same time providing incentive for local value add to materials. It is noted that the imposition of export taxes on recyclables could have significant negative impacts on the recycling sector
- Business development services for establishment of new recyclers and support of existing recyclers in accessing new markets and accessing equipment for value add to recycling streams. Such services include education, access to funding and support in accessing donor funding.
- Financial support, including development of innovative financing schemes that promote investment in recycling, easy access to dedicated funds to support recycling and access to funding for new equipment and infrastructure for individual recyclers.
- Education and awareness building issues among all concerned stakeholders, and comprehensive networking among them at the local level. Considerations include the provision of appropriate and timely information to decision makers, targeting stakeholders in the public and private sectors, communities and consumers (see Action 5.4).
- Suitable infrastructure to support access to-, collection of- and processing of- the waste materials. This includes exploration of the potential for a recycling park where recyclers can be co-located to encourage synergistic relationships and increased value add to material either for local use or export (see Actions 2.1 and 2.2).

Action

The following institutions will be involved in supporting these interventions:

- The LNDC to support new business development, including potential access to funding for business start-up and access to equipment,
- Trade and Industry, also to support new business development, and
- Ministry of Finance to ensure a favourable economic environment for the growth of the industry.

Time plan and targets

- 2 years for licensing and business and financial support
- 4 years for infrastructure

References

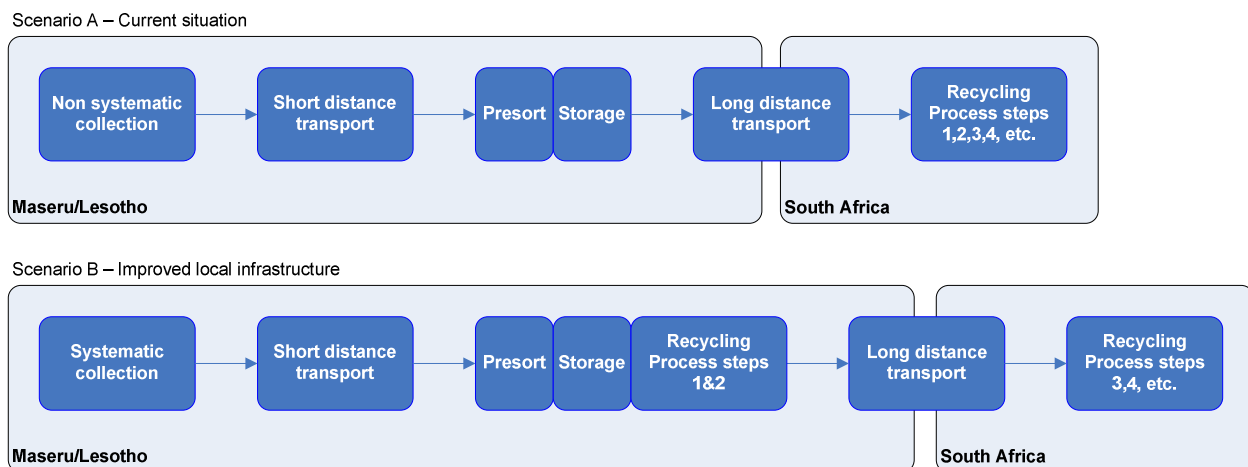
United Nations Environment Programme (UNEP) (undated), Strategic Elements in Implementing the 3R Platform, accessed online at http://www.unep.or.jp/Ietc/SPC/3R_Strategic_Elements.pdf, September 2007

Detailed Description Action 3.2: Support for the Development of a Local Recycling Economy

Background

Recycling activities within Maseru are currently mainly constrained to the collection, pre-sorting and baling of recyclables, with the major value-adding processing steps being undertaken by companies in South Africa.

A healthy local recycling economy would focus on taking over some or all of the downstream, value-adding processing steps, thus supporting economic growth and job creation by selling value-added (intermediate) recycled products. The figure below illustrates the shift in the economy which would need to occur as an outcome of this action.



The recycling centre identified in Action 3.1 would assist in providing infrastructure for the local recycling economy, while Actions 3.3 (recognition and support of local recycling markets) and the proposed recycling forum of Action 3.4 would provide a healthy environment for collaboration surrounding the recycling economy.

Furthermore, a value add component for recyclables could be considered as part of the tender process for removal of wastes under the ISWMP.

Deliverables

Support to existing recyclers or new entrants into the recycling economy with development of business models and access to seed funding/support where possible.

Action

- LNDC and BEDCO

Time plan and targets

- 2 years to first activity
- Roll-out after 4 years

Detailed Description Action 3.3: Regulatory Framework to Support Local Recycling Markets

Background

At the time of writing the ISWMP, it was identified that local collection activities of recyclables are disturbed by illegal activities from South African companies, both within Maseru and Lesotho as a whole.

This situation should be altered by the introduction of stricter regulation measures, as it negatively affects the local economy and recycling sector in particular in a number of ways:

- Tax losses due to illegal commercial activities, as these actors do not pay taxes in Lesotho
- Reduction in the volume of recyclables for local recycling activities,
- Removal of high value materials due to the selectivity of the illegal actors, leaving behind lower value materials
- Reduction in the potential for value add in Maseru (see Action 3.2).

An improved, simplified regulatory environment with simplified licensing, and enforcement of legislation, will help to support local recycling markets. Furthermore, a co-ordinated waste management system as proposed in Action 2.1 will contribute to this action.

It is noted that imposition of export taxes is not a solution to the issue. Export taxes have the potential to completely destroy the recycling market if it makes an already marginal business model less viable.

Deliverables

A revision of the licensing, business application and enforcement regime for recyclers, to be developed in collaboration with the recyclers.

Action

- NES
- MTICM

Time plan

- Immediate

Detailed Description Action 3.4: Coordination of Local Recycling Activities

Background

Currently, the activities of local recyclers are not coordinated and systematic. Not all recyclables are collected and some individuals are selectively targeting high-value recyclables to the detriment of other businesses. In general these businesses lack the necessary expertise and equipment to optimise their activities and their potential revenue.

There is also the issue of poor working conditions and health risks associated with recovery and recycling for the lowest-level workers (i.e. pickers) that needs to be addressed under this action.

The advantages of coordinating local recycling activities are that:

- A cooperative would have greater negotiating leverage with receiving industrial plants (in South Africa) than individual recyclers leading to increased profits
- As part of an organisation, workers would receive better training and have better working conditions (particularly if source separation and recyclables collection is implemented)
- Source separated recyclables are cleaner, further improving profitability and working conditions
- Overall waste recovery for the city can be optimised

Deliverables

In the mid- to long-term, the coordination of activities led by a forum representing local recyclers (see Action 2.3) would help to support the systematic diversification of recycling activities along the value chain, strengthen the local market place against foreign market influences, and develop a code of conduct.

The proposed forum should be aligned with IWMSA interests. (The Institute of Waste Management of Southern Africa (IWMSA) is a professional association not for gain, committed to sound waste management and can assist with education, technology transfer and input into and support of local legislation). A local chapter of the IWMSA could assist with all actions under pillar 3 – A healthy recycling industry.

The concept of a centralised recycling centre, where value-add activities can take place before transportation to South Africa (Action 3.2) should be investigated.

Action

- NES
- The Ministry of Trade and Industry, Cooperatives and Marketing
- With local chapter of IWMSA

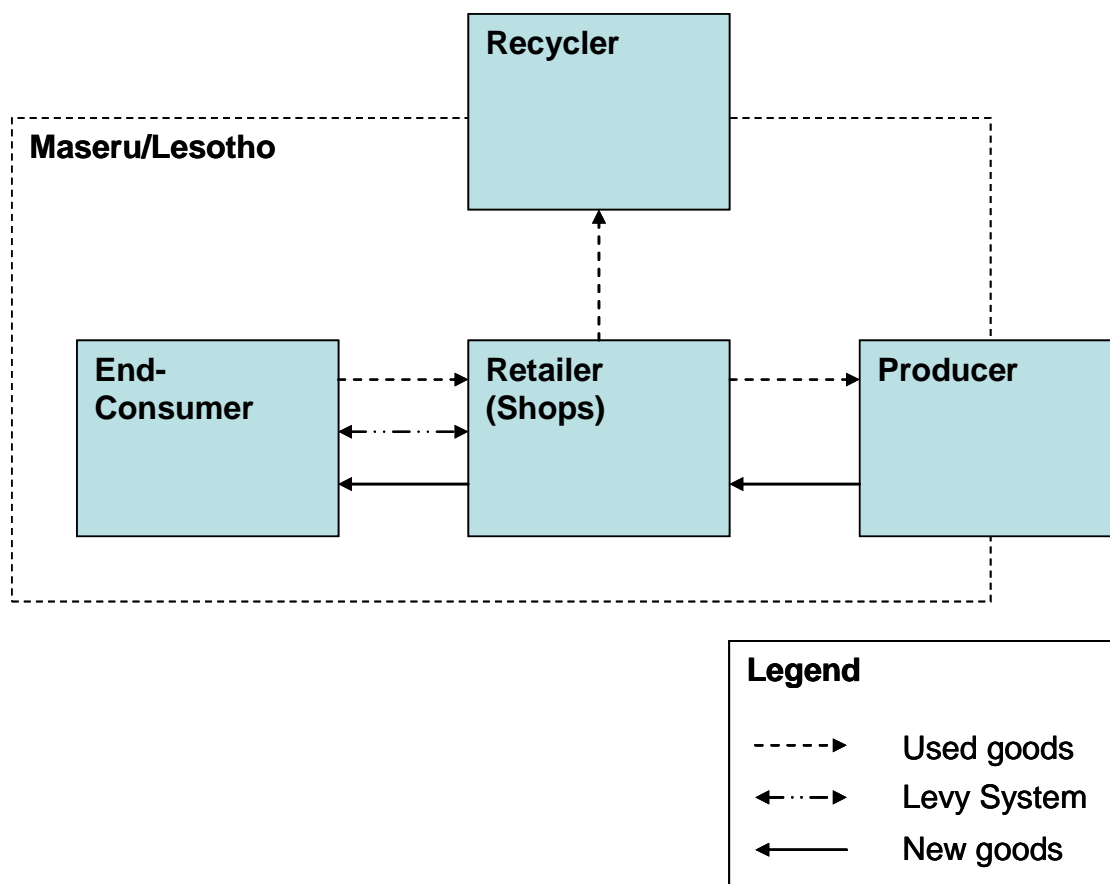
Time plan

- Less than 1 year to establishment

Detailed Description Action 3.5: Develop Capacity to Work with Take-Back Levies

Background

Take back levies or deposits have been widely used around the world to encourage recycling and prevent pollution. Here special taxes, charges, or fees are charged on certain consumer items, and are recovered by the purchaser when he or she returns the item to a collection point which is often the location from which it was purchased. This is illustrated schematically in the figure below.



Returnable beverage containers are the focus of most of such systems around the world. In the United States, several states have implemented the application of deposit-refund systems to soft drinks and beer containers. These states report that of the total number of containers affected by the system, 80% to 95% are returned for recycling. Here the monetary incentive (US\$0.05 to US\$0.10 refund/container) is sufficient to induce the desired compliance. Other countries which have successfully implemented deposit-refund systems for beverage containers include Finland, Sweden, Norway and other parts of Europe.

Other schemes around the world include those for car tyres and batteries. Mandatory deposit systems for automobile batteries have been implemented in some states in the United States (e.g.,

California). In these states, every battery sold or offered for sale must have a deposit paid at the time of sale. The deposit is waived or returned if a used automotive battery is brought to the store.

Experience indicates that deposit-refund systems work well, and apparently are more effective than voluntary return systems. A probable reason is that deposit-refund systems provide a tangible reward for performance. Deposit-refund systems are efficient in terms of administration, in that monitoring or other involvement by authorities is usually not required.

Deliverables

Development and implementation of take back systems for beverage containers, tyres and car batteries based on world best practice.

Action

MoLG&C to develop policy, MTEC and MITCM (Trade) to implement, Note, as the implications of the action are national rather than local, input from the LRA and NES may be required.

Time Plan

- 2 years to 1st implementation of the take back levy system.

References

http://www.unep.or.jp/Ietc/Publications/spc/Solid_Waste_Management/Vol_I/22_23-Part4_Section-Chapter15.pdf

Bottle Bill Resource Guide (2007), Home Page accessed online at <http://www.bottlebill.org>, September 2007.

Detailed Description Action 4.1: Adjustment and Integration of Planning Activities for Sanitary Landfill Site

Background

The development of a sanitary landfill site for Maseru is of crucial importance for the City, and represents one key element of an ISWMP. It is the ultimate repository of Maseru's MSW after all other options - reduce, reuse, recycle - have been exercised.

Landfills range in type from uncontrolled open dumps to secure sanitary landfills. Uncontrolled, open dumps are not a sound practice, but controlled dumps and sanitary landfills can provide effective disposal of a city's MSW in accordance with appropriate local health and environmental standards.

The City is best advised to replace its current formal and informal dumpsites by a sanitary landfill site in order to avoid any environmental & health risks due to uncontrolled emissions. Furthermore, Maseru's main dumpsite is located critically close to the City's main water body.

Deliverables

Planning activities for the new landfill site are underway (see Action 4.2), and need to be adjusted according to and integrated into this ISWMP. In order to address the issues mentioned here above, the following deliverables are proposed:

- The capacity of the new landfill site should be calculated in accordance to the new findings regarding current waste amounts, and future waste disposal projections as proposed by this ISWMP (different from numbers in Baseline Study).
- The location of the new SLS should be considered in connection with the design of infrastructure and route planning and should aim at decreasing transport distances and costs. The location of a sanitary landfill site should therefore be as close as possible to the generation points, generally at the outskirts of a City. As can be seen in Figure 11 however, the proposed location for the new sanitary landfill site is at approx. 30 km from Maseru. As the EIA for the landfill site is currently being reviewed (see Action 4.2), it is suggested that its location is reassessed in connection with suggestions made for waste collection logistics under Actions 1.3, 2.1-2.3. Furthermore, the following points are of special relevance:
 - As Maseru is located in an area prone to geological anomalies (mountainous area), the planning of the new landfill site should take special precautions regarding hydrological and geological factors.
 - Residents in close proximity to the newly planned landfill site might express a number of concerns including health and environmental risks, increased noise and odour emissions associated with the facility, and the inequity of dumping everyone else's waste in their backyard (NIMBY - Not-In-My-Backyard syndrome). The MCC is therefore advised to inform and involve the affected population as early as possible in the planning process in order to avoid misinterpretations and clarify misconceptions, and assist in accelerating the approval process (see Action 5.4).
- The financial plan must take into consideration the costs for the landfill site over its full lifespan, from planning to post closure use. This will be discussed in detail in the EST and financial sections.
- The post-closure use of the landfill site (e.g. recreational uses such as parks) should be

considered in the planning process, as this affects the development of the landfill site.

Action

- MCC Dept. of Health and Environment
- MCC Dept. of Urban Planning (and with LSPP)

Time plan and Target

- Immediate action required.
- No illegal dumping activities by 2020

References

<http://www.unep.or.jp/Ietc/ESTdir/Pub/MSW/index.asp>

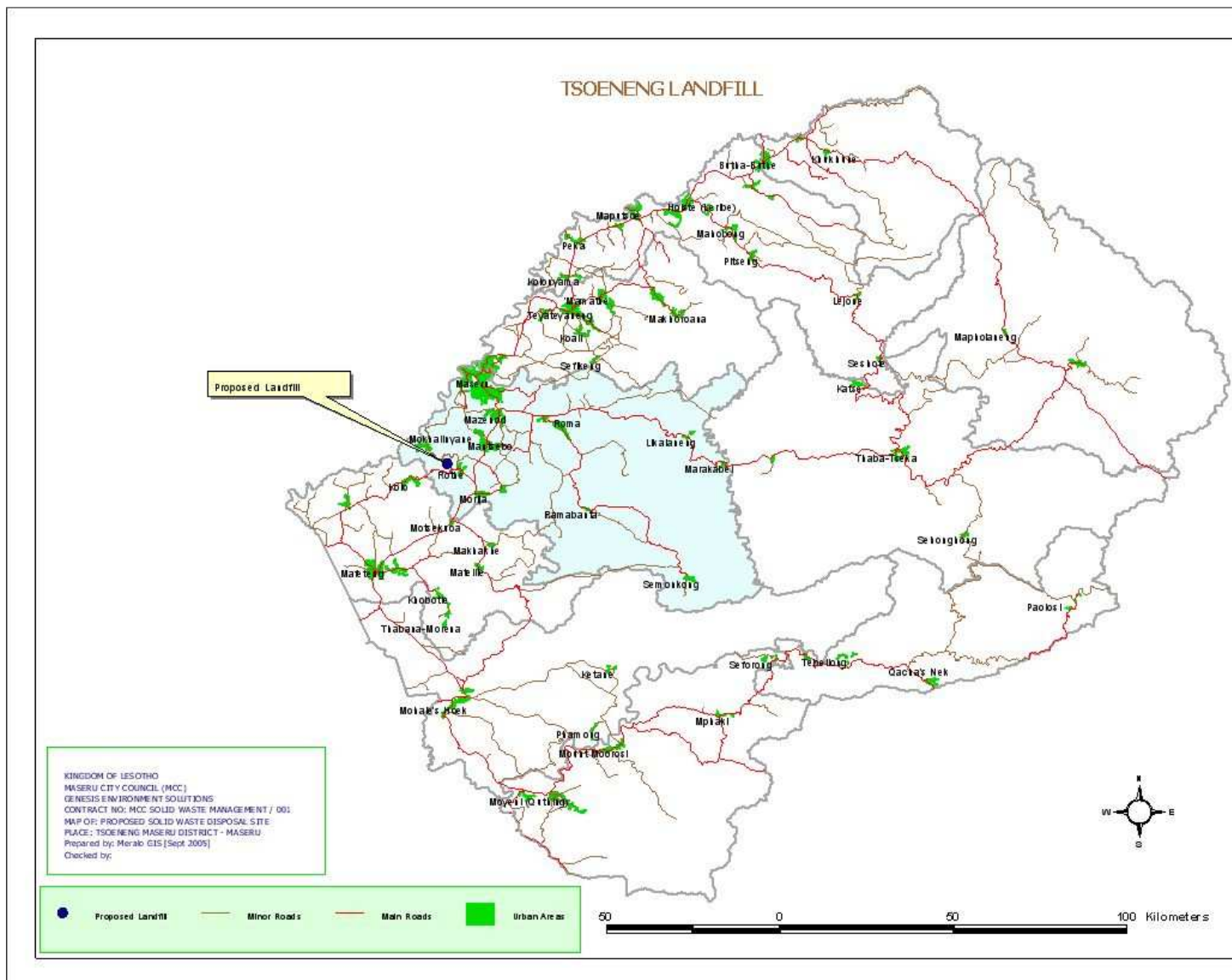


Figure 11: Proposed Location Tsoeneng Landfill (Source: Genesis Environment Solutions, 2002)

Detailed Description Action 4.2: Amendment of EIA

Background

According to IAIA (1999), an Environmental Impact Assessment (EIA) can be defined as the process of identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant effects of development proposals prior to major decisions being taken and commitments made. EIA is used to inform decision-makers about the environmental impacts of potential projects before their implementation.

Based on the European model (<http://ec.europa.eu/environment/eia/eia-legalcontext.htm>), an EIA should generally include the following sections:

1. Description of the project
2. Alternatives that have been considered
3. Description of the environment
4. Description of the significant effects on the environment
5. Mitigation
6. Non-technical summary
7. Lack of know-how/technical difficulties

An EIA has been conducted by Genesis Environment Solutions for the establishment of a new sanitary landfill site in Maseru. This EIA has been found inadequate by NES in its submitted form, and is currently being reviewed by Johannesburg based company Jones & Wagener.

As the planning and EIA of the new sanitary landfill site had started before the drafting of this ISWMP had been commissioned, it is likely that a number of important factors have not yet been considered.

Deliverables

In order to synchronise activities related to the EIA and the ISWMP, the following deliverables are suggested:

- Establishment and support by the MCC of an efficient channel of communication between parties involved in the development of the EIA and the ISWMP. This would lead to the effective integration of the new landfill site into the actions proposed in this ISWMP, and avoid the duplication of work.
- Develop a common understanding on current and projected waste amounts for which the landfill site is being designed. Significantly different numbers on waste generation have been found by an analysis of the baseline study; Planning activities for the landfill site have been based on the baseline study up to this stage. Furthermore, projected waste disposal amounts could be significantly decreased due to waste reduction, reuse and recycling activities proposed by this ISWMP.
- Amendment of EIA according to suggestions made under Action 2.2 regarding the systematic planning of infrastructure and waste collection routes.

Action

- MCC

Time plan

- Immediate

References

IAIA - International Association for Impact Assessment in cooperation with Institute of Environmental Assessment (UK) (1999), Principles of EIA Best Practice; IAIA International Headquarters, ND 58103 USA.

Detailed Description Action 4.3: Capacity to Thermally Use Non-Recyclable Paper

Background

From an environmental perspective, paper waste should never be disposed to landfill; this is the least preferred option after recycling and thermal use. It is therefore proposed to create capacity in Maseru to energetically use the remaining stream of paper after its full reuse and recycling potential has been exploited. Paper waste could be used in the form of paper bricks to supplement fossil energy carriers such as coal in the industrial sector. By doing so, the combustion of paper waste in uncontrolled situations such as home burning is further reduced.

Deliverables

In order to achieve an efficient deviation of the low-grade waste paper stream from landfilling to thermal combustion applications, the following deliverables are proposed:

- Creation of capacity at MCC/NES level in terms of personnel and finance for the facilitation and coordination of projects to substitute fossil fuels by low-grade paper waste in Maseru.
- Identification and analysis of potentials for partly or fully substituting fossil energy carriers by low-grade paper in informal and formal residential, commercial and industrial thermal combustion applications.
- Facilitate and coordinate implementation of fossil fuel substitution projects on residential, commercial and industrial scale.
- Deviation of low-grade waste paper stream from landfilling by organising a collection, transport and storage system for low-grade paper.
- Support local job creation in processing/manufacturing of refuse derived fuels (RDFs) based on low-grade waste paper (e.g. manufacturing of paper bricks - see also UCT 4th year project).
- Awareness creation regarding the benefits of thermally using low-grade paper waste instead of landfilling/dumping in Maseru (see Action 5.4).

Action

- Director of NES together with LNDC.

Time plan

- 1 year to pilot activity, 3 years to full implementation

References

Moberg, A., Finnveden, G., Johansson, J. and Lind, P. (2005) Life cycle assessment of energy from solid waste--part 2: landfilling compared to other treatment methods, *Journal of Cleaner Production*, **13** (3) 231-240.

Detailed Description Action 5.1: Use of School Infrastructure as Awareness Creation Medium

Background

Children have the capacity to actively promote awareness regarding the proper management of wastes both at home and within their communities. Use of school infrastructure can therefore be very effective as a channel for community education and awareness creation. Whereas Action 5.4 takes a broader approach to awareness creation and education, this Action has a very specific emphasis on the major role school infrastructure could play.

There are many innovative approaches designed to target school children, but an effective program is characterised by (Abelitis and Lenehan, 2007):

- Simple and appropriate for the school environment (whether primary school or high school)
- A lesson plan format to ensure ease of use by educators
- A replicable and adaptable format
- An integrated approach to material development and implementation

The Fairest Cape Association has developed a lesson plan for teachers on solid waste management which has the following aims (many of which cover the actions proposed in the ISWMP). These could be adapted to the Maseru context:

- To foster clear awareness of the environment
- Provide every person with opportunities to acquire the knowledge, skills, values, attitudes and commitments to protect and improve a clean and healthy environment
- To create new patterns of behaviour in individual groups and society as a WHOLE towards the environment (e.g. source separation)
- To develop responsible citizenship, take ownership of the environment and issues and problems both locally and globally
- To develop leadership and organisational skills
- To empower school children with entrepreneurial skills, e.g. use waste products to create new products (potential job creation), recycling, etc.

Deliverables

The Ministry of Education (particularly the National Curriculum Development Centre) should look to incorporate solid waste management into the national curriculum.

- A lesson plan format should be adopted to ensure that it can be easily taken up by the schools
- There should be a strong emphasis on learning by doing
- Audit of school waste generation
- Recycling activities at schools
- Making art or useful items from waste materials
- A pilot activity focused on schools will be carried out within the framework of this ISWMP, which could be used as a starting point for further activities

An added advantage here is that recycling activities at schools can generate additional income to further support education.

Action

- NES
- Ministry of Education

Time scale

- 1 year to pilot implementation in some schools
- 3 years to implementation in curriculum

References

WASTECON (2006) Fairest Cape Association – Solid Waste Management Teacher Training Manual

Abelitis, L. and Lenehan, A. (2007) Child-centred course for teachers to promote basic health and hygiene awareness in rural communities. WRC Report No: 1400/1/07, Water Research Commission

Detailed Description Action 5.2: Establishment of Waste Minimisation Clubs

Background

A waste minimisation club (WMC) is a voluntary association to promote the exchange of experiences and information between peer groups of companies/organisations in the implementation of waste minimisation measures. WMCs usually consist of between 7-15 members. The clubs can be either sector-based with firms from the same industry, or area based, across a sector. The collaborative club approach ensures that costs of hiring consultants are shared while experiences, resources and contacts are pooled, making the concept attractive and useful to companies.

Objectives of WMCs include to:

- implement a programme of waste minimisation within member company/organisation
- reduce all sources of waste (liquid, solid, energy, gaseous)
- continual improvement
- establish a monitoring programme
- reduce environmental impact
- share information with other club members
- attend regular club meetings

Meetings are held on a regular basis, generally monthly or bimonthly. At these meetings, Club members exchange information, ideas and experiences in waste minimisation. Training in waste minimisation aspects is also provided.

A comprehensive study on establishment of Waste Minimisation Clubs in South Africa was conducted by Barclay and Buckley (2006). This study includes guidelines on formation of such clubs, funding, and legislative support, as well as a report on past experiences and downfalls of clubs. It is recommended that this document be used to provide guidance on this action.

Deliverables

Suitable sectoral or geographical compatible candidates for establishment of waste minimisation clubs

Action

- Chamber of Commerce and Industry,
- (External) mediator employed by NES

Time plan

- 6 months to first meeting, followed by meetings on regular basis

References

Barclay, S. and C.Buckley (2006), A Guide to Establishing and Managing Waste Minimisation Clubs in South Africa, Water Research Commission Report No TT 283/06, ISBN No: 1-77005-493-6, available online at http://www.wrc.org.za/publications_reports2.htm#industrial.

accessed September 2007.

National Cleaner Production Centre South Africa (NCPC), Waste Minimisation Clubs, accessed online at http://www.ncpc.co.za/wmc/what_are_wmc.htm, September 2007. Zwavel, Z. (2004)

Report on the Waste Minimisation Clubs of the City of Cape Town's 'Wastewise' programme August 2001 - August 2003, City of Cape Town, Cape Town

Detailed Description Action 5.3: Establishment of a Waste Information System (WIS)

Background

Critical to effective waste management is up to date and accurate knowledge on waste quantities generated, as well as their final fate. A WIS is a tool that enables the gathering, storing and interrogation of waste data. Besides the technical realisation of such a system, the legal perspective is of paramount importance; data will often not be obtained if the reporting of such data is not compulsory by law. Development of an appropriate system should be supported.

It is a necessity for Maseru to run a waste inventory, as this will allow the City to design, integrate and adjust the ISWMP efficiently, as each action of the plan is closely linked to specific waste streams.

Deliverables

- Creation of capacity in terms of finance, personnel and technology within the MCC to develop, operate and update a WIS.
- Development of a (software) tool and database for the WIS:
 - The South African Waste Information System is operational (<http://wis.octoplus.co.za/>) and could be used as a template.
 - Furthermore, the UCT team developed an MS Excel application in order to analyse and project waste figures for the development of this plan, which could also be integrated in the design of a WIS.
- The integration of a GIS would be useful in order to map waste information (possible interface to route planning under Action 2.2).
- The reception area of the new sanitary landfill site as addressed under Action 4.1 should be fitted with a weighbridge so that incoming waste amounts can be logged and fed into the WIS.
- A reporting system for waste information should be developed and put in place by the MCC: Standardised (on-line) forms will be necessary in order to enable parties to enter specific waste information.
- The introduction of standardised waste codes will be helpful in the categorisation of reported waste amounts. The European Waste Catalogue (EWC - http://europa.eu.int/eur-lex/en/lif/reg/en_register_15103030.html) could be used as a template.
- The reporting of information by waste generators should be voluntary in the start-up phase of the WIS. MCC should however consider making it compulsory to report waste amounts by commerce and industry in case it does not obtain the required information. Furthermore, a compulsory system would allow the City to track whether waste generators dispose their wastes properly (esp. hazardous wastes). In case of a compulsory system, the MCC must develop appropriate legal instruments.
- The transportation of wastes must be regulated by a local/national authority (see Action 2.2). Information on domestic and cross-border waste transports should be fed into the WIS.
- Unrestricted WIS information should be made publicly available via e.g. hardcopies or the internet, so that individuals, commerce and industry can use information to pro-actively

engage in reduction, reuse and recycling activities independently from MCC (e.g. Integrated Waste Exchanges, see Action 5.2).

- Development of an interface to infrastructure and route planning activities (see Action 2.2), as the location of waste source and amounts affects the design of collection systems and -routes, as well as other logistic infrastructure.
- Waste information should be used by the City to structure and adjust its waste fee system.

Action

- *MoLG&C to develop policy,*
- *NES and MCC (Dept. Health and Environment, Dept. of Urban Planning) to design and implement*

Time plan

- 1 year to implementation

References

http://www.abfall-nrw.de/aida/AIDA_literatur/Waste_2004.pdf
<http://www.environment.gov.za/nwmsi/wis.html>
<http://www.biffa.co.uk/content.php?name=legislation/ewc.html>

Detailed Description Action 5.4: Awareness Creation through Common Media

Background

Awareness creation and education is a powerful tool with regards to the implementation of programs with a strong environmental component as is this ISWMP.

The mandate of the MCC is to provide its citizens with a healthy and clean environment. However, the prevailing perception is that the provision of public services to achieve a better environment come at a certain cost, which will eventually be borne by Maseru's population.

By running an environmental awareness programme, the MCC should aim at achieving cleanliness and health in its communities by educating and empowering its population. An environmental awareness campaign within the framework of this ISWMP should demonstrate that:

- solutions to reduce, re-use and recycle waste are not necessarily bound to additional costs, but rather financial and social benefits to the local population, and that
- if services such as residual waste collection are provided at a certain cost, these are by far outweighed by social and environmental benefits to Maseru's citizens.

Deliverables

In order to successfully implement an awareness creation and education programme related to this ISWMP, it is suggested that the MCC assumes the following responsibilities:

- MCC, assisted by NES, should provide capacity for in-house trainings regarding general environmental awareness of City of Maseru staff.
- MCC, assisted by NES, should provide capacity for in-house trainings regarding specific environmental matters according to responsibilities of MCC staff, especially staff of the Department of Health & Environment.
- MCC should foster the creation of partnerships amongst the different local and national governmental departments dealing with environmental matters.
- The MCC should aim at creating environmental awareness amongst Maseru citizens and developing the ability to collectively take care of the environment. Citizens should be educated about the following aspects: Relevant laws and regulations about their rights, interests, duties and responsibilities.
- Social, environmental and economic consequences of non-compliance with the principles set out in this ISWMP.
- The MCC should promote the actions of this ISWMP through environmental campaigns on local and national media (newspapers, radio, television, etc.) by involving key public players, decision-makers and opinion-builders. The involvement of traditional leaders might be of special importance in Maseru.
- Environmental awareness campaigns should be aimed at and adapted according to the different target groups: communities, non-governmental organizations, the private sector incl. industrial and trade associations.
- Environmental awareness and education programmes should be included in the curricula of schools and other educational establishments (see Action 5.1 as well as pilot activity).
- A key to the successful implementation of the ISWMP is the creation of a legal penalty system for offences against the principles set out in this plan (e.g. illegal dumping). The

MCC should encourage public involvement in the monitoring of compliance with the ISWMP principles.

Action

- NES and MCC (Dept. Of Health and Environment, Dept. of Communications)

Time plan and goal

- Immediate and in parallel to all activities in ISWMP

References

City of Cape Town (2003): “Environmental Education and Training Strategy”

<http://www.unep.org/dec/onlinemanual/Enforcement/InstitutionalFrameworks/PublicAwarenessEducation/tabid/99/Default.aspx>

Detailed Description Action 5.5: Review of the ISWMP on a regular basis

Background

In order to assure that the actions proposed in the ISWMP are rolled out in an effective way, and that the targets set within this ISWMP are met, it is essential to review the ISWMP on a regular basis. The plan proposed should be understood as a dynamic and iterative strategy, needing the readjustment and fine-tuning of proposed actions and targets according to practical developments in order to achieve the best possible outcome.

Whereas the individual actions and deliverables might require more regular review cycles, this action focuses on the overall review of the ISWMP in order to assess its state of progress.

Deliverables

In order to implement this action, the following deliverables have been defined:

- Creation of a task team responsible for the review of the ISWMP, consisting of members of the Department of Health & Environment of the MCC, NES and COWMAN.
- The Waste Information System (WIS) proposed under Action 5.3 should be used for the assessment of past and future waste generation and disposal trends. The assessment results are of paramount importance to the review of the ISWMP, as the different actions, deliverables and targets are closely linked to the (non)occurrence of specific waste streams.
- Quantification of deliverables for each action where appropriate and assessment against set targets.
- If a deliverable is not quantifiable, the state of implementation and development of the deliverable should be assessed, and a qualitative statement should be formulated regarding the progress of the specific deliverable.
- Readjustment and fine-tuning of actions and deliverables according to problems occurred, new insights won i.a. regarding the achievability of specific targets, as well as practical developments in Maseru.
- The review of the ISWMP must include the review of the overall budget. Whereas the budgeting for the different actions and deliverables might be carried out independently on a more regular basis, the review of the ISWMP should be used for the assessment of current spending and income, and project future financial development (see also Financial Plan).
- Drafting of a report on the review of the ISWMP (e.g. ISWMP Progress Report). This publication will have a twofold purpose: a) tracking of the development of the ISWMP over time, b) demonstrate to the public that ISWMP is running and that set targets are being achieved (see also Action 5.4).

Action

- *MoLG&C and Director H&E MCC*

Time plan

- Every 2 years

Definitions of Waste Types

Biodegradables

All organic matter in the solid waste stream, capable of undergoing anaerobic or aerobic decomposition, e.g. kitchen leftovers, yard trimmings.

Paper & Cardboard

Mostly from packaging material, newspapers and institutional waste. It has a great potential for recycling, though a paper can be recycled only a finite number of times (generally 5-10).

Glass

Generated mostly from bottles, broken glassware, light bulbs, and other items. Glass normally comes in a number of colours; the major types are flint glass (clear glass), green glass, brown/amber glass.

Plastics

Plastics are used to manufacture everyday products such as beverage containers, household items, and furniture. The largest category of plastics are found in containers and packaging (e.g., soft drink bottles, lids, shampoo bottles), but they also are found in durable (e.g., appliances, furniture) and nondurable goods (e.g., nappies, trash bags, cups and utensils, medical devices).

Tins or cans

Tins or cans are used for tinned foods, soft drink, beer, etc. They are made of aluminium, steel, or metal alloys. The recyclability of tins is a function of the materials of manufacture.

Hazardous Household Waste

Households generate small quantities of hazardous wastes including oil-based paints, paint thinners, wood preservatives, pesticides, insecticides, household cleaners, used motor oil, antifreeze, and batteries.

Scrap metal

Includes parts of vehicles, building supplies, and large metallic appliances. They can potentially be recycled and formed into new products thereby saving a lot of energy that goes into mining and metallurgical operations for virgin metal production.

E-waste (electronic waste)

Includes computers, entertainment electronics, mobile phones and other items that have been discarded by their original users. E-waste consists of expensive and more or less durable products used for data processing, telecommunications or entertainment in private households and businesses.

Used tyres

Used tyres consist primarily of natural and synthetic rubber, both of which have substantial heating value, and various other materials. The recovery of rubber from used tyres can be very energy-intensive, and such processing may generate hazardous substances and other process residues.

Builder's rubble (Construction & Demolition waste)

Construction and demolition (C&D) debris are generated regularly in urban areas as a result of new construction, demolition of old structures and roadways, and regular maintenance of buildings. These wastes contain cement, bricks, asphalt, wood, metals, and other construction materials that are typically inert.

Sewage sludge

Municipal wastewater treatment (MWWT) sewage sludge (biosolids) is generated as a consequence of processing municipal wastewater for safe discharge to the environment. The sludge is composed of the semi-solid or solid residues.

Waste oil

Used oils are generated primarily in gas stations and in mechanics' shops. These oils often discharged enter the sewage system, causing problems in the treatment plants or in the receiving bodies of water.

Car Batteries

These batteries are also known as lead acid batteries and are found in cars and other vehicles. Used car batteries burned in waste combustion facilities can release mercury or cadmium to the air and water, ultimately entering the food chain and posing health threats to people and the environment.

Industrial waste

Waste generated from industrial sources can have non-hazardous and hazardous components, with non-hazardous waste usually representing the greater part of the volume. The hazardous component of this waste, while generally being relatively small in volume, can pose significant environmental and public health problems.

Hospital waste (Health Care Waste)

Wastes generated within health care facilities have three main components:

- 1) General wastes (for example, administrative office waste, garden waste and kitchen waste);
- 2) Pathogenic or infectious wastes (including sharps and anatomical wastes)
- 3) Hazardous wastes (mainly those originating in the laboratories containing toxic substances).

The quantity of the first type of general wastes tends to be much larger than that of the second and third types.