PART II

GUIDELINES FOR FORMULATION OF LOCAL ACTION PLAN ON WASTE MINIMISATION

Guidelines

for

Formulation of Local Action Plan

on

Waste Minimisation

JULY 2006

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APPENDICES

LIST OF ABBREVIATIONS

A/P	Action Plan
BATNEEC	Best Available Technology Not Entailing Excessive Cost
BBC	Buy-back Centre
CBO	Community-based Organisation
C-LAP	Committee for LAP-WM
DOE	Department of Environment
JICA	Japan International Cooperation Agency
KPIs	Key Performance Indicators
LA	Local Authority
LA 21	Local Agenda 21
LAP-WM	Local Action Plan for Waste Minimisation
LGD	Local Government Department
MBM	Majlis Bandaraya Miri
MDKS	Majlis Daerah Kinta Selatan
MHLG	Ministry of Housing & Local Government
MOE	Ministry of Education
MPPP	Majlis Perbandaran Pulau Pinang
MPSJ	Majlis Perbandaran Subang Jaya
MSW	Municipal solid waste
NGO	Non-governmental Organisation
NREB	Natural Resources & Environment Board, Sarawak
ONP	Old newspapers
PET	Polyethylene Terephtalate
RA	Residents Association
RT	Rukun Tetangga
TF	Task Force
UNDP	United Nations development Programme
WACS	Waste Amount and Composition Survey
WMU	Waste Minimisation Unit
WM-M/P	Waste Minimisation Master Plan
WTE	Waste-to-Energy

PREAMBLE

This set of "**Guidelines for Formulation of Local Action Plan on Waste Minimisation (LAP-WM)**" has been prepared as a guidance document for Local Authorities (LAs). The guidelines are in line with the "***Waste Minimisation Master Plan***" prepared under the "Study on National Waste Minimisation in Malaysia" carried out with the cooperation of the Japan International Cooperation Agency (JICA): 2004-2006. The Master Plan aims at the creation of a *Material Cycle Society*. The guidelines are also in tandem with the "***National Strategic Plan for Solid Waste Management***" approved by the Government of Malaysia in July 2005, and will contribute to efforts to achieve a national Recycling Rate of 22 per cent in 2020.

The guidelines complement the "***Waste Minimisation Action Plan***" for the Federal Government, for the Ministry of Housing and Local Government (MHLG), which is the lead implementing agency for waste minimisation.

The guidelines are intended to assist LAs to initiate, prepare and implement an Action Plan for Waste Minimisation. The guidelines are applicable to all authorities (City, Municipal and District), regardless of location and size. They may be applied in the case where solid waste management has been taken over by a solid waste concessionaire, and where solid waste is still being managed by the LAs and their contractors. The target user group is the staff of the Waste Minimisation Unit (WMU) or any group of personnel responsible for waste minimisation at the LA.

The guidelines contain tips and provide examples of options that may be considered by LAs, depending on the conditions prevailing within the LAs. Such conditions include commitment, level of awareness, willingness and preparedness of solid waste generators, availability of organisations for handling recyclables, and the capacity of LAs. The guidelines draw upon the experience and lessons learnt from the Pilot Projects on LAP-WM preparation carried out under the same above-mentioned study involving four model LAs i.e. Majlis Perbandaran Pulau Pinang (MPPP), Majlis Perbandaran Subang Jaya (MPSJ), Majlis Daerah Kinta Selatan (MDKS) and Majlis Bandaraya Miri (MBM).

The guidelines may be applied in LAs that have already established some form of waste minimisation programme, and in those, which do not have one but are planning to embark on a waste minimisation programme. In both cases, the guidelines will ensure that the LAs have taken into consideration all the vital components and factors in preparing the LAP-WM.

The guidelines are flexible and allow the LAs to tailor and modify respective LAPs-WM according to the local conditions, needs and priorities. They allow for LAs to begin on a small scale, based on limited data and then to build up their database and networking during the action plan period, thereupon expanding the waste minimisation programme as more up-to-date and relevant information become available. It allows for components e.g. objectives and targets to be reviewed and revised when necessary.

The guidelines are also posted on the MHLG website. They may be read in conjunction with the "**Guidelines for Source Separation of Municipal Solid Wastes**", 2006.

HOW TO USE THE GUIDELINES

This set of guidelines comprises eight (8) chapters. You may refer chapter by chapter to guide you to establish a new Waste Minimisation Plan or to improve upon an existing one. There are **APPENDICES** with sample formats for surveys and recording/ reporting.

In the guidelines, **Examples** are provided for your consideration, and where relevant there are TIPs so that mistakes may be avoided. Also attached are the LAP Leaflets prepared for the four model LAs; MPPP, MPSJ, MDKS and MBM.

There is also a **LIST OF CONTACTS (Appendix 13)**, which lists out the names of key personnel at the four model LAs for you to direct your queries to. Contact numbers, names of personnel (where available), websites and e-mail addresses are provided.

You may modify the level of details in your LAP-WM according to your LA's capacity, needs and expectations.

Your feedback is **IMPORTANT** to MHLG. When you use the guidelines, please complete the **Questionnaire** at the end of the Guidelines (**Appendix 12**) and return it to:

Solid Waste Management Unit
Environmental Health & Engineering Division
Local Government Department
Ministry of Housing & Local Government
Level 4, Block K
Pusat Bandar Damansara
KUALA LUMPUR

KEY DEFINITIONS

Some key definitions that are used within the scope of this Action Plan are:

A) Solid Wastes

Solid wastes refer to all the wastes from human activities that are in solid form and are discarded as useless or unwanted. Municipal solid wastes refer to solid wastes that are discarded regularly from households, commercial or business premises, institutions and industries (excluding the processed industrial wastes, sludge, household hazardous wastes, construction and demolition wastes).

This includes: food and garden wastes from households, waste papers from offices, aluminium cans from restaurants, cardboards from supermarkets, PET bottles from factory canteen, hotels etc.

This excludes: Used tyres from workshops, scrap metals and packaging wastes from industries, bulky and e-wastes from households, clinical wastes from hospitals etc.

B) Recycling

Recycling refers to the activities of (1) separation and collection of waste materials, (2) preparations of waste materials for reuse, reprocessing and remanufacturing, (3) reuse, reprocessing and remanufacturing of these waste materials. This includes activities of:

a) Separating, retaining of waste materials at generation source to be reused, collected or sold to collectors.
b) Delivering the waste materials to recycling centres or any collection points.
c) Trading or any business dealing with selling and buying of waste materials from one party to another party.

Reprocessing or remanufacturing the waste materials into other products (including composting process).

C) Recycling Rate

$$\text{Recycling rate (\%)} = \frac{\text{Total Recyclables Collected (TRC)} \times 100\ \%}{\text{Waste Amount Generated (WAG)}}$$

Hear,

WAG = TRC + Total Waste Disposed (TWD) + Others
or
= Unit Generation Rate (kg/capita/day) x population

"Others" include open burnt, illegal dump, waste treated or other waste losses.

CHAPTER 1 INTRODUCTION

1.1 Toward a Material Cycle Society

The Malaysian Government is committed to realising a "***Material Cycle Society***" in Malaysia with a target recycling rate[1] of 22 % by the year 2020 as summarised in Figure 1-1.

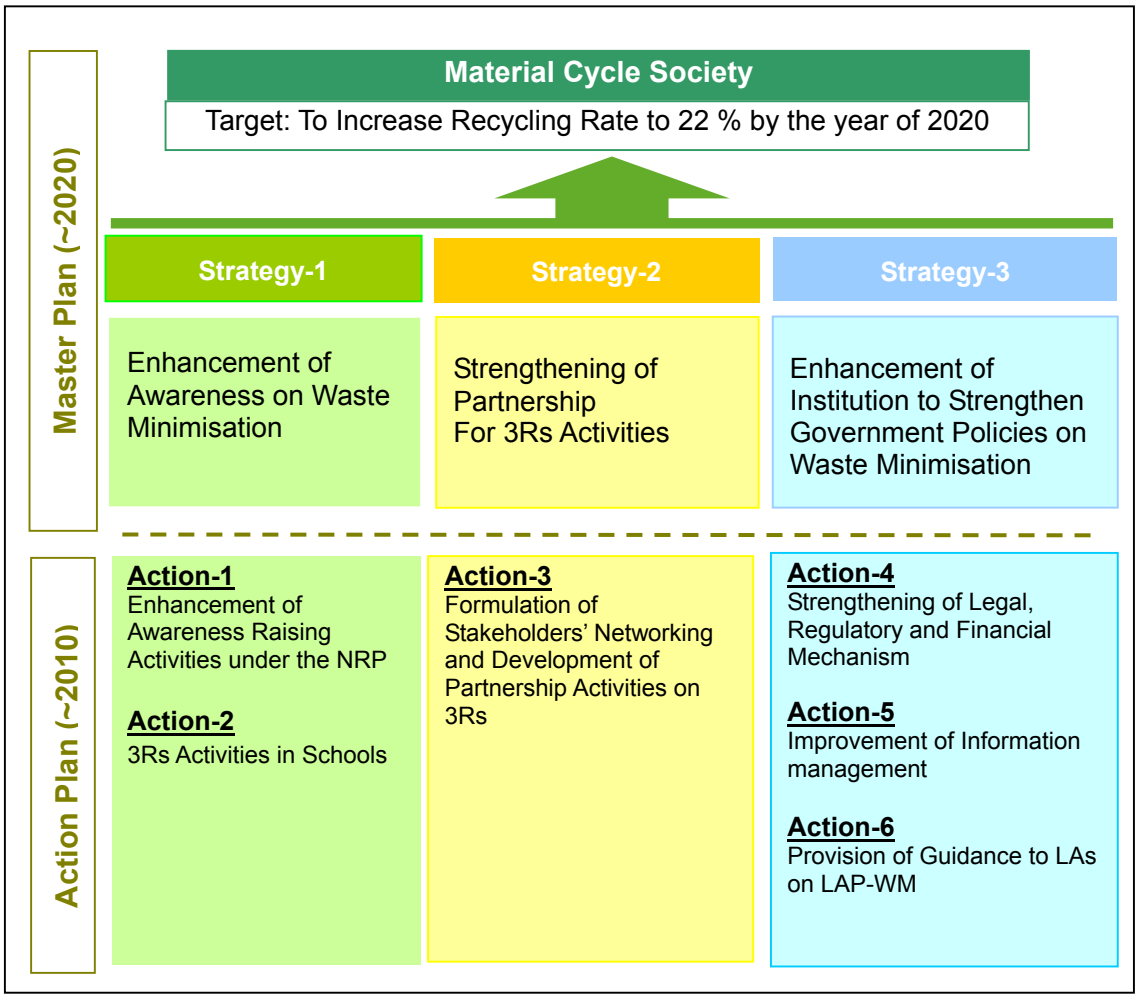


Figure 1-1 Concept of Master Plan and Action Plan for Federal Government

To complement the Master Plan and the Federal Action Plan for Waste Minimisation, it is essential that Local Authorities (LAs) formulate individual Local Action Plan on Waste Minimisation (LAP-WM) so that actions can be carried out in a more organised manner and adequate resources are allocated for implementation. The LAP-WMs will contribute towards efforts to achieve 22 % recycling rate in 2020.

During the Study on National Waste Minimisation (2004-2006), four (4) sample LAP-WMs were produced. These are for Majlis Perbandaran Pulau Pinang (MPPP), Majlis Perbandaran Subang Jaya (MPSJ), Majlis Daerah Kinta Selatan (MDKS) and Majlis Bandaraya Miri (MBM).

[1] Recycling Rate= $\frac{\text{Total Quantity of Recyclables Collected (TRC)} \times 100\%}{\text{TRC + Total Waste Disposed (TWD) + Others}}$

1.2 Process of Developing a LAP-WM

The process of developing and implementing a LAP-WM may be considered in several steps. Each step consists of a number of actions, which in ideal situation would benefit the LA if all are carried out. However, recognising the constraints at many LAs, some actions may not be able to carry out. This is alright, and may be planned to be carried out at a later date.

There are seven steps for the formulation of LAP-WM: -

1. Establishment of Institutional Framework
2. Identification of Current Solid Waste Management (SWM) and Recycling Scenarios
3. Determination of Scope of LAP-WM
4. Projection of Future Waste Streams
5. Setting Targets of Waste Minimisation.
6. Determination of Actions to Achieve Targets
7. Monitoring and Evaluation

The principal components and steps in the process of developing an LAP-WM are outlined in Figure 1-2 below. Each step is described in the following chapters.

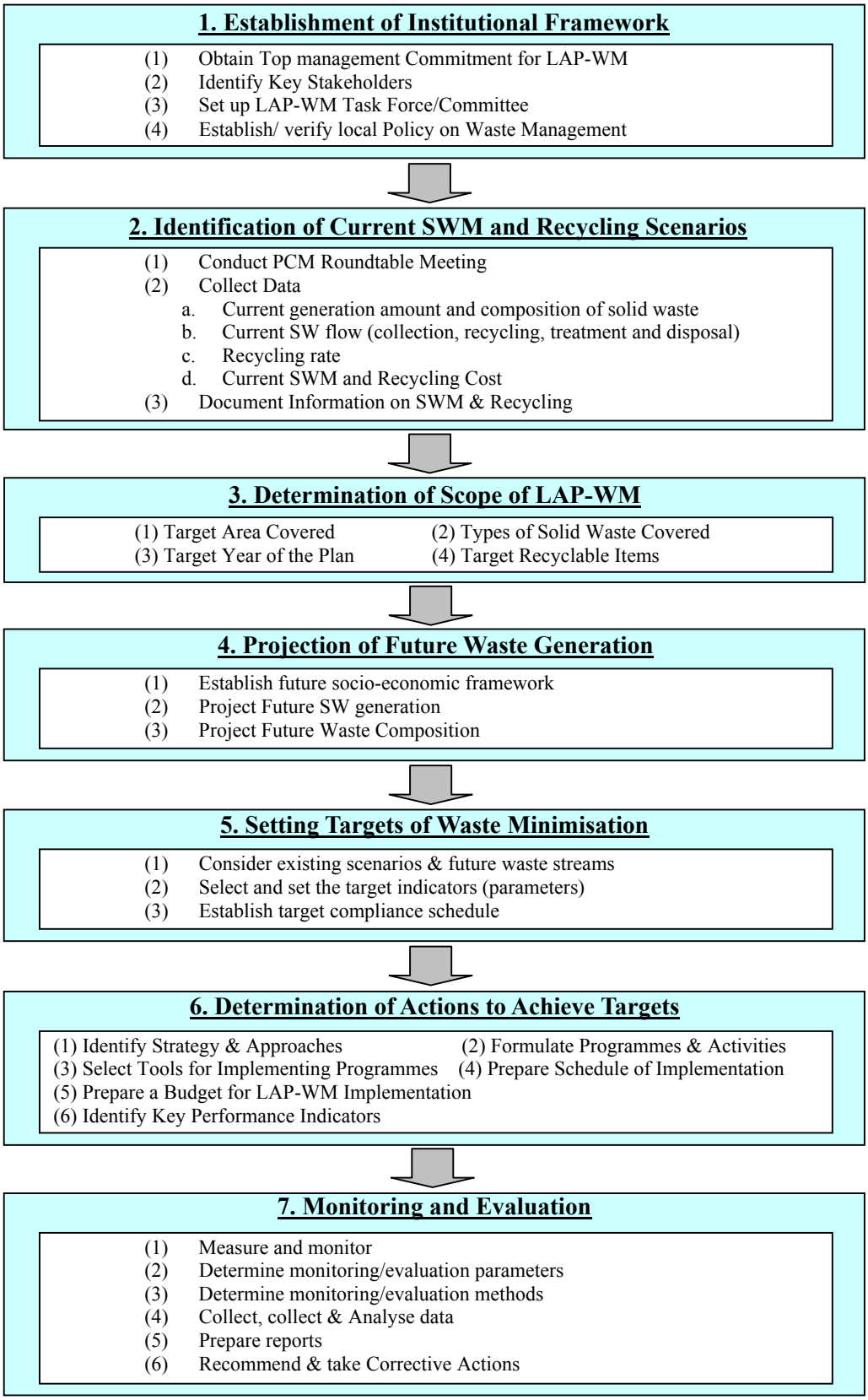


Figure 1-2 Basic Procedure for Formulation of LAP-WM

1.3 Role & Responsibilities of LA in LAP-WM

In the context of the LAP-WM, the LA is to facilitate and coordinate plans, programmes and activities to encourage more widespread adoption of waste minimisation, reducing and recycling initiatives, and contribute to achieving the national target of 22 % recycling Rate in 2020. In particular the LA is expected to assume the following responsibilities:

- To be the lead agency or focal point in the development of a LAP-WM
- To facilitate networking and partnership among the stakeholders in WM
- To monitor performance of WM programmes
- To report performance of WM programmes
- To be the focal point for data & information connected with WM
- To be the link between the Federal Government and the State Government
- To be the model for WM to other organisations ("Leadership by Example")

Figure 1-3 illustrates the overall framework for the actions to be taken in formulating a LAP-WM.

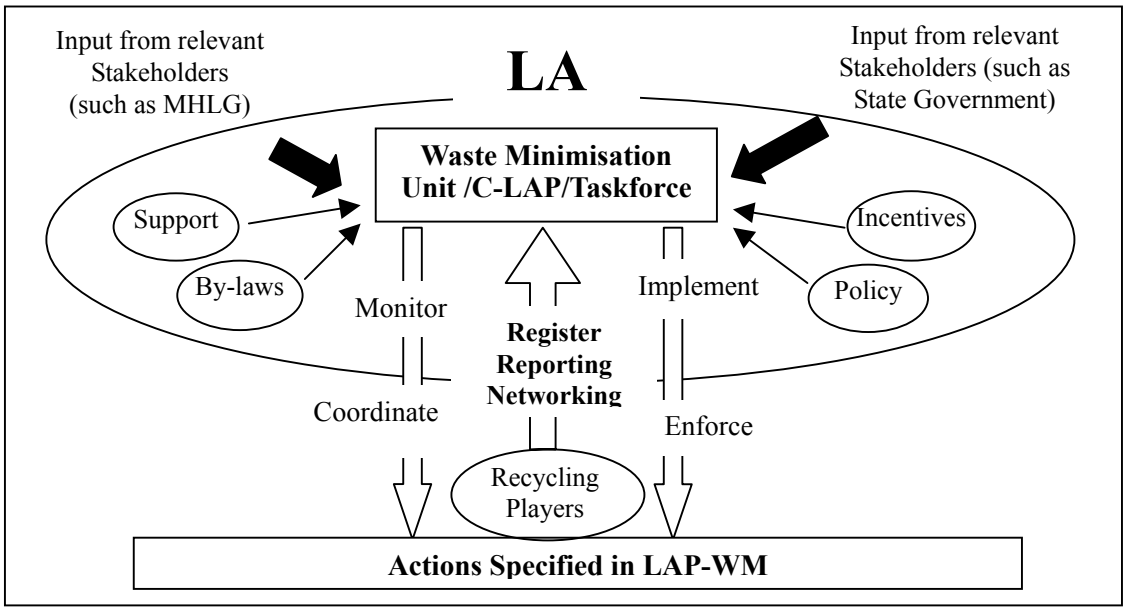


Figure 1-3 Overall Framework for the Actions to be taken in Formulating an LAP-WM

1.4 Table of Contents of LAP-WM

Based on the seven steps outlined above, a LAP-WM document is prepared. A typical *Table of Contents* of the LAP-WM is shown in **Appendix 1**.

The LAP-WM may contain maps, graphics and photographs to present a clearer view of what the existing conditions are, and what the LA proposes to achieve with waste minimisation within the plan period. The level of details presented may vary from one LA to another. It will vary depending on a number of factors: -

- The Vision and Mission for Waste Minimisation adopted by the LA;
- The capacities of the LA and its partners; and
- The availability of data needed for good decision-making.

However, it must be remembered that the LAP-WM shall be in accordance with the "*Waste Minimisation Master Plan*" and the "*National Strategic Plan for Solid Waste Management*". The draft LAP-WM may undergo amendments during the preparation process as more information is gathered, and as the LA and its partners become more confident with the targets set.

As the LAP-WM may turn out to be quite voluminous, the salient points particularly the targets for waste minimisation may be summarised in a leaflet for circulation to the public. This leaflet should be simple, attractive and easily understood by the general public. Where possible, they may be produced in English, Malay, Chinese and Tamil. Examples of LAP-WM leaflets produced under the Study on National Waste Minimisation in Malaysia are attached in **Appendix 2**.

1.5 Approval and Publicising a LAP-WM

(1) Approval of a LAP-WM

On finalising the LAP-WM, it should be endorsed and approved as a working document by the relevant authorities at both the local and state government levels. This will be carried out according to the administrative processes in place at the LA, and carried out in due course.

(2) Publicising a LAP-WM

When the LAP-WM is approved, all relevant stakeholders should be made aware of its existence. This is important in order to ensure that actions planned and targets set, receive due support. By so doing, all involved will understand better their roles and responsibilities, and contribute to efforts to realise the set targets jointly.

The LAP-WM should be communicated to both internal and external parties. Internal Parties refer to the LA itself; all its departments/sections/ units. External parties refer to the MHLG and all LA's partners and relevant stakeholders.

What is the best way to publicise a LAP-WM?

Some of the ways to publicise the LAP-WM that may be considered are:

- Circulating information materials
- Placing copies of the LAP-WM in strategic locations at LA offices, and at the offices of its partners for reference.
- Holding explanatory sessions with key stakeholders
- Publishing reports and features in local newspapers and news bulletins

Depending on the resources available, the LA may consider other ways of publicising the LAP-WM such as: -

- Choosing appropriate slogans and a Mascot to represent the waste minimisation targets
- Preparing buntings and streamers (using slogans & mascot) and hanging at strategic location within the LA (progressive exercise)
- Participating in exhibitions/conferences/campaigns on related matters e.g. a campaign on Public Health
- Including Waste Minimisation as a permanent agenda of meetings at different levels i.e. State Government, LA Council Meetings, and meetings of residents associations (RAs) and the Rukun Tetangga (RT).

CHAPTER 2 ESTABLISHMENT OF INSTITUTIONAL FRAMEWORK

This first step is critical in ensuring the feasibility of the process of preparing an LAP-WM, and eventually of ensuring the sustainability of its implementation. The lead agency will play a pivotal role and adequate resources must be allocated in order for it to carry out the responsibilities entrusted upon it. It is a matter of ownership and of taking up the responsibility and being accountable for the LAP-WM. The Waste Minimisation Unit (WMU), which is proposed to be established in each LA, will be the lead agency or focal point for LAP-WM. For the purposes of these guidelines, the WMU, LA is referred to as "the Planner". In the interim, while awaiting the establishment of a WMU, the section or unit responsible for waste management and/or minimisation will be the most appropriate as lead agency.

2.1 Obtain Top Management Commitment for LAP-WM

As focal point, the WMU is responsible for initiating the administrative process of obtaining approval to proceed with preparation of the LAP-WM from the LA's top management. This may be done by preparing a paper to propose the LAP's formulation. The main contents of this paper are:

1. Purpose of Paper
2. Introduction/Background to Waste Minimisation
3. Description of proposed LAP-WM
4. Justification or Benefits of LAP-WM
5. Resources Required for LAP-WM
6. Request for Approval to Proceed

2.2 Identify Key Stakeholders

The WMU may prepare a provisional "***List of Waste Minimisation Stakeholders***" currently existing and/or operating in the LA. The list may include the following: -

1. State Government
2. Local Authority
3. Households/Housing Estates/Condominiums/Villages
4. Recyclable Collectors/ Recycling Industries/Recycling Agents
5. Food Outlets (Restaurants/hawkers)
6. Hotels
7. Markets/supermarkets
8. Hospitals
9. Office buildings
10. NGOs/ CBOs
11. Schools
12. Factories
13. Concessionaires and their contractors
14. Others

This list will form the basis of a database on WM partners for the LA, and as a tool for establishing or enhancing networking in particular for recycling purposes. Information that may be included in this list are names of contact persons, addresses, contact numbers (including for mobile telephones), and websites (where available). This list

will also be used in identifying potential members of the committee for LAP-WM, which is described below.

MPPP and MBM have published their list of stakeholders as directories[2], prepared under the "*Study on National Waste Minimisation in Malaysia*", and these are useful references.

2.3 Set up Committee for LAP-WM (C-LAP)

From experience in formulating LAP-WMs at the four LAs; MPPP, MPSJ, MDKS and MBM, the LA benefits from having a committee to organise the LAP-WM process (C-LAP). This committee need not be a new one i.e. the LA may decide to expand the scope of an existing committee to include waste minimisation or it may create a new one comprising key partners that would contribute largely during plan formulation, implementation and not forgetting its promotion.

(1) Objectives of C-LAP

The C-LAP will guide the LA in the process of formulating the LAP-WM. The objectives of C-LAP are to facilitate and promote: -

- The exchange of information and data among key stakeholders on current SWM and waste minimisation activities,
- Mutual understanding among key stakeholders on the current conditions of SWM and waste minimisation in the target areas, as well as the current roles and responsibilities of each stakeholder in these area,
- Common recognition on the potentials, needs and issues of key stakeholders to promote waste minimisation in the target areas,
- Acknowledgment of roles and responsibilities of each stakeholder in LAP-WM; and
- Consensus on the targets and actions for waste minimisation.

(2) Composition of C-LAP

Considering the objectives of C-LAP mentioned above, members of the C-LAP may be selected from the following key stakeholders: -

- Local government, as the organiser of C-LAP and planning body of LAP-WM,
- State government, as the coordinator among local authorities as well as with the national government,
- Concessionaires and SWM contractors, as the organisations responsible for providing SWM services,
- Recyclers, as the principal key players for promoting recycling in the target areas, including collectors, buyers, traders, managing bodies of recycling centres (buy-back centres, drop-off-centres), the industries receiving recyclables as raw materials for their manufacturing (papers, glass bottles, plastics, metal/non-metal scraps, etc.)
- NGOs, CBOs, and any other group or individual (such as community leaders, PTAs, school teachers, etc.), as the grass-root promoters of waste minimisation and/or

[2] Pulau Pinang Island Recycling Directory, MPPP, September2005
EcoPack, Miri City Council, Jan 2006

representatives of general public.

TIP <Example of C-LAP>
In MPPP, a new committee was set up, known as the Action Plan Task Force (TF). The TF is chaired by the Director of Urban Services, MPPP and the members comprise representatives from recyclable agents, solid waste collector, residents association, Environmental Health Unit, MPPP and its consultant.

2.4 Establish/Verify Local Policy on Waste Minimisation

The C-LAP shall be guided by the "***Waste Minimisation Master Plan***" prepared under the same study, and be in accordance with the "***National Strategic Plan for Solid Waste Management***".

Pursuant to this, it is a good idea to have a **POLICY** pertaining to WM specifically for the LA. This policy serves as a statement of the LA's commitment towards reducing, reusing and recycling wastes. Developing the policy is a simple exercise particularly if it is done in consultation and in collaboration with key partners. This may be accomplished via the C-LAP, which would consider among others, the following factors in developing the policy: -

- The LA's capacity & resources
- The LA's aspirations/ Vision & Mission Statements
- Good waste management practices
- Current and future laws

A sample Policy for Waste Minimisation for a LA is shown in **Appendix 3**.

TIP <Policy on Waste Minimisation>
The policy statement should be;
- Concise (one-page)
- Written for a wide audience
- Written in plain language
- Open to review in the future

CHAPTER 3 IDENTIFICATION OF CURRENT SWM & RECYCLING SCENARIOS

In order to plan for the future, it is imperative that the existing scenarios are examined and documented. This can be accomplished in the following ways: -

- Consultative meetings with stakeholders e.g. roundtable discussions
- Secondary information collected from published reports and studies
- Primary information from the conduct of new studies and surveys.

This chapter describes the Project Cycle Management (PCM) roundtable discussion and identification of core issues of SWM. The types of data that are required in describing the existing SWM and recycling scenarios, and the methods of estimating their values are described. With findings from discussions and calculations or estimations, a report on the existing solid waste management and recycling scenarios can be prepared.

3.1 PCM Roundtable Discussion

Project Cycle Management (PCM) roundtable discussions have been found to be useful as a forum for open discussion to find out the existing WM and recycling scenarios i.e. what activities are being carried out, what are the problems, and what their cause and effects are. This method was used in the process of formulating the LAP-WM for MPPP. MPSJ, MDKS and MBM. The List of Stakeholders described in section 2.2 may be used to identify who are to be invited to attend the PCM roundtable discussion. A sample programme for a PCM roundtable discussion is provided in **Appendix 4**.

The PCM group is expected to discuss the following:

i. Issue/Problems of WM and their Cause & Effects
ii. Objectives setting and their Ends & Means

As many issues/problems may be identified, it would be beneficial if they are prioritised and the **Core** problems are identified. This is followed by the identification of the "**cause & effects**" of each of the core problems. The problems trees of the three main problems can be developed and a sample is shown in **Appendix 5**. Based on the 'Problem Tree', the problems may be transformed into positive expressions referred to as their 'Objectives'.

3.2 Types of Data Required & Methods of Estimation

The key data required for proper planning of an LAP-WM is: -

- Solid waste mount and composition
- Current solid waste flow
- Recycling rates
- Current SWM and recycling cost

The types of data and how they can be calculated or estimated are described in detail below.

3.2.1 Solid Waste Amount and Composition

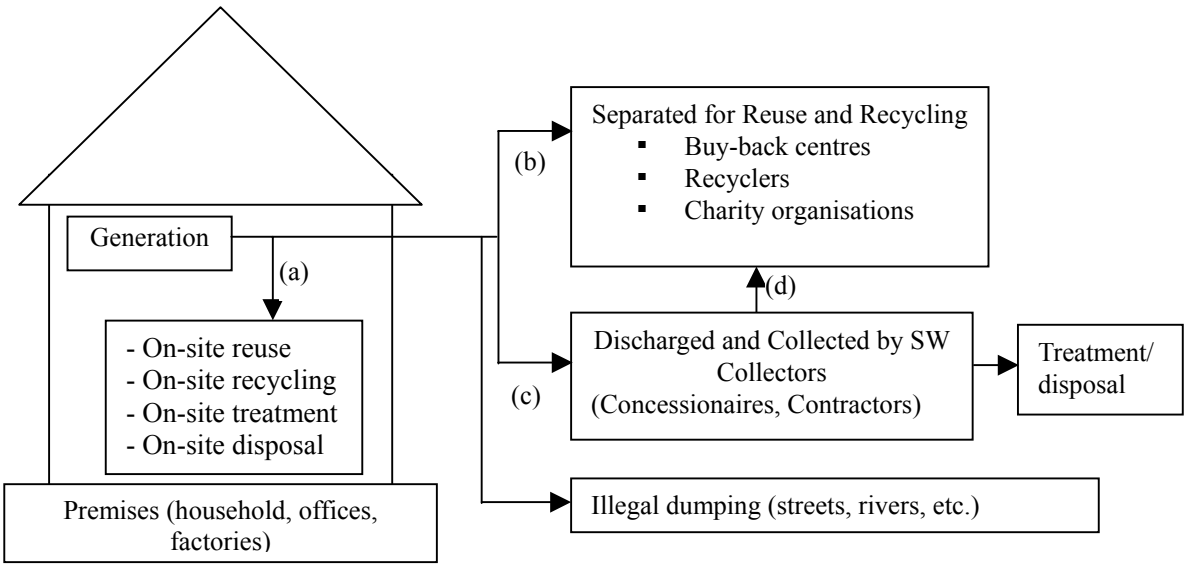
(1) Quantity of Waste Generated and Discharged

In identifying the actual amount of waste generation, the difference between waste

generated and discharged must be carefully considered.

Not all materials for which the generator has no further use for own purposes are discharged. For example, the person who has bought and read newspapers or magazines does not always discharge them as waste, but may give them to the others or may bring them to nearby buy-back centres (BBCs) or recyclers. In such cases, those newspapers and magazines are no longer useful for one person, but still useful for others. The issue here is that we should define them as "waste" or "non-waste". If we exclude such newspapers and magazines from waste or waste generation, a large portion of paper recycling activities cannot be included as "waste recycling", and this may invariably lead to an underestimation of the actual level of recycling activities. To avoid this underestimation, waste generation and discharging needs to be carefully defined to properly identify the actual conditions of waste handling at source. The general flow of waste generation and discharging is outlined in Figure 3-1 below.

According to the flow of solid waste shown in Figure 3-1, the actual waste generation is the result of subtracting (d) from the sum of (a), (b), (c) and the amount of illegal dumping. Taking into account the difficulty in capturing the amount of on-site handling of SW (a) and illegal dumping, the planner should first focus on capturing the amount of (b), (c), and (d) to identify quantifiable waste generation.



(a)	On-site handling of generated waste within the premises including: ▪ On-site reuse (use of glass/plastic bottles for other containers such as flower pots, etc.) ▪ On-site recycling/treatment (composting of food/garden waste for soil conditioners in the home garden, recycling of production residues and off-spec products as raw materials in factories, open burning, etc.) ▪ On-site disposal (disposal of the waste to fill the soil in the garden, disposal of waste at on-site landfills within the factory premises, etc.)
(b)	Separation of recyclable materials at premises for reuse and recycling
(c)	Discharged from the premises for collection by SW collectors
(d)	Separation of recyclables after collection of solid waste for recycling

Figure 3-1 Flow of Solid Waste from Generation to Discharging at Source

(2) Basic procedure for estimating the amount and composition of solid waste generation

The amount of solid waste generation is estimated in accordance with the procedure shown in Figure 3-2.

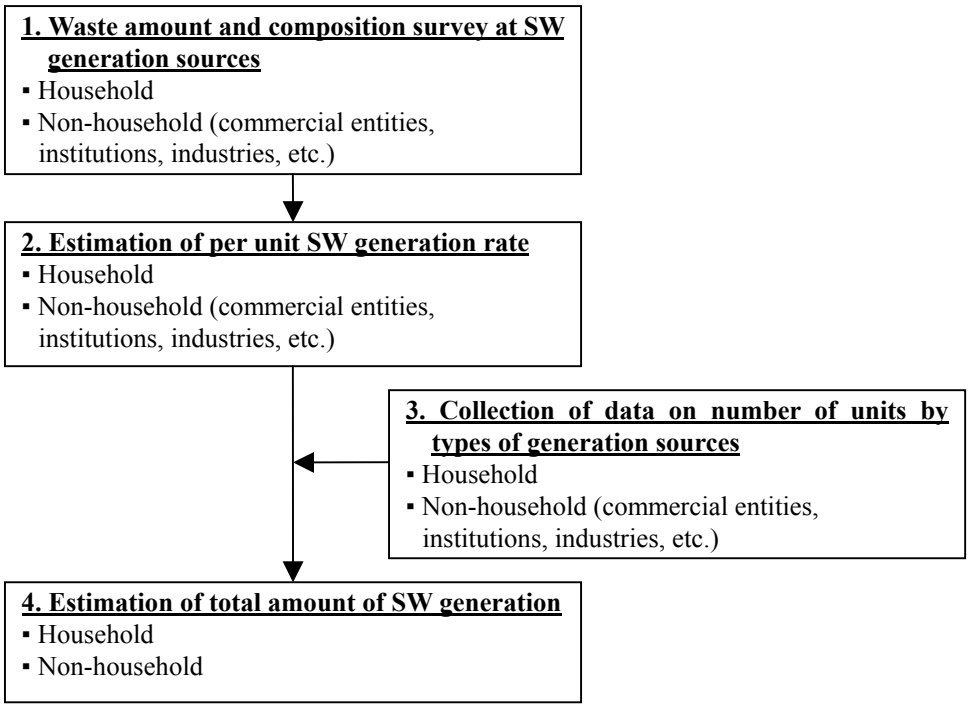


Figure 3-2 Basic Procedures for Estimating SW Generation

(3) Waste Amount and Composition Survey at SW Generation Sources

Waste amount and composition survey (WACS) is one of the most critical parts in identifying the current status of SWM and recycling as the amount and composition of waste generated keeps changing according to life style, climate, seasonal variation and so forth. In order to identify the most up-to-date conditions, the LAP-WM planner is required to conduct WACS survey.

Apart from its relevance in formulating the LAP-WM, the importance of accurate information and data on waste generation and composition is also crucial for the following reasons:

- Determining the best management methods for different materials based on the Best Available Technology Not Entailing Excessive Cost (BATNEEC) concept,
- Planning recycling or any other waste related programmes such as material recycling facilities (MRF), composting and waste minimisation by identifying the amounts of recyclable materials and organic materials generated from the sources,
- Designing and sizing of any waste treatment facility such as incinerator or any other waste-to-energy (WTE) facility based on the amount of combustible and non-combustible wastes in the waste stream, and
- Estimating the overall cost of the entire solid waste management system such as waste collection, transportation and final disposal.

1) Objectives of WACS

The main objectives of WACS are:

- To identify the amount of waste generated from relevant sources in the form of per unit waste generation rate,
- To analyse the composition and physical and chemical characteristics of waste generated from relevant sources, and
- To capture the amount and types of recyclable materials separated at relevant sources of waste generation.

2) Study Approach and Methodology

Assuming that the LAP-WM focuses on non-scheduled solid waste[3], the major sources of waste generation are households, business entities (public and private), institutions, and industries. However, the planner is required to determine the types of waste and generation sources are targeted in LAP-WM. The Study Approach and Methodology for WACS on house hold and non-household sources (business entities, institutions, and industries) are shown in **Appendix-6**.

(4) Estimation of Per Unit SW Generation Rate

Based on the results of WACS on household waste, the planner can estimate per capita SW generation rate of household by income level. It is therefore important to collect socio-economic information about the number of household members and monthly income or expenditure or the likes from each household participating in the WACS.

As to the WACS on non-household sources, the surveyor must collect information and data that indicates the type and scale of sources or activities that can be used for estimating per unit SW generation.

(5) Collection of Data on Number of Units by Types of Generation Sources

To estimate the total SW generation from household and non-household sources, the planner is required to collect data on the number of units by types of generation sources. In the case of household SW generation, the data on number of household by types of income level is required in order to estimate the total SW generation from household. For non-household sources, the data on total number of units that are applied to obtain per unit SW generation rate is required to be collected for each type of sources.

(6) Estimation of Total Amount of SW generation

Estimation of the total amount of SW generation is made by multiplying the per unit rate of generation (e.g. kg/household/day) by the number of units (household). For non-household sources, different units may be used for each type of source and activity as shown in Table 4, **Appendix-7**.

(7) Differentiation Between Waste And Recyclables Separately Retained At Sources

In the case of Malaysia, some of valuable recyclable materials such as newspapers, magazines, aluminium cans, etc, are not discharged as waste, but separately retained at source. The amount of such retained recyclable materials cannot be captured through

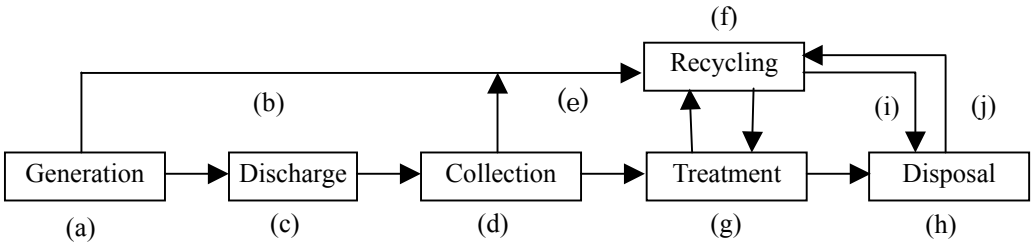
[3] Refers to wastes classified as "Scheduled Wastes" under the Environmental Quality (Scheduled Wastes) Regulations, 2005 enforced by the Department of Environment.

WACS since it is not discharged as waste from sources. In this regard, interview survey to the sources is of great importance to capture the amount actual recyclable materials retained at household as well as non-household sources.

3.2.2 Current SW Flow (Collection, Recycling, Treatment and Disposal)

What is Waste Flow?

The waste flow outlines a series of SW waste handling process starting from its generation to final disposal at landfills. A typical waste flow is shown in Figure 3-3.



Waste flow process	Definitions
(a)	SW generation from sources
(b)	Collection of recyclables directly from sources (based on source separation)
(c)	SW discharging from sources ((a)-(b))
(d)	SW collection ((c)=(d))
(e)	Collection of recyclables from the SW discharged and collected
(f)	SW recycling ((b)+(e)+(j)-(i)
(g)	Intermediate treatment of waste for volume reduction (incineration, etc.)
(h)	Final disposal of SW
(i)	Final disposal of recycling residue
(j)	Collection of recyclables at final disposal site (waste-picking, etc.)

Figure 3-3 Outline Of Waste Flow And Definitions By Waste Handling Process

Since the intermediate treatment of SW for volume reduction such as incineration is not currently carried out in Malaysia, the amount of (g) can be excluded from the waste flow. The amount of waste at other waste flow processes ranging from (a) to (j) above are required to be estimated for identification of current SW flow in each locality.
To complete SW flow in each local authority, the planner is required to estimate the amount of SW for each waste flow process as shown in Figure 3-3. The methods of estimating SW amount items from (a) to (j) are explained in **Appendix -10**.

3.2.3 Recycling Rates

The figures obtained for quantities of waste generated and actual data on quantities of recyclables recovered/collected may be used to provide an indication of levels of recycling. The rates may be calculated on a monthly basis and consolidated into annual recycling rates.

The level of recycling or the level of recovery of recyclables from waste streams may be calculated using the following formula:

$$\text{Recycling Rate (\%)} = \frac{\text{Total Quantity of Recyclables Collected (TRC)}}{\text{TRC + Total Waste Disposed (TWD) + Others}} \times 100\%$$

"Others" include open burnt, illegal dump, waste treated or other waste losses.

3.2.4 Current SWM and Recycling Cost

(1) Current SWM Cost And Relevant Parameters

To identify the financial and economic effect of promoting waste minimisation through implementation of LAP-WM, the planner is required to properly identify the current cost of SWM. The cost of SWM includes all the cost arising from SW collection, haulage, treatment and disposal. The detail cost items by types of SW handling is shown in Table 3-1:

Table 3-1 The Major Cost Items by Types of SW Handling

Types of SW handling	Detail Cost Items	
	Investment Cost	Operation Cost
Collection/haulage	▪ Collection/haulage vehicles ▪ Construction of Vehicles maintenance building ▪ Vehicles maintenance equipment ▪ Construction of transfer stations ▪ Equipment in transfer stations	▪ Manpower cost (all manpower related to collection and haulage) ▪ Fuel cost of vehicles, equipment and building ▪ Utility cost of buildings and facilities ▪ Maintenance cost of vehicles and equipment ▪ Miscellaneous operation cost
Treatment	▪ Construction of treatment facilities (incineration plants, or other treatment plants) ▪ Relevant facilities and equipment used in the plants ▪ (Land acquisition cost)	▪ Manpower cost ▪ Fuel cost (if applicable) ▪ Cost of chemicals (if applicable) ▪ Utility cost of the plant ▪ Maintenance cost of the plant ▪ Miscellaneous operation cost
Final disposal	▪ Civil works ▪ Cost of facilities and equipment in the final disposal landfills (leachate treatment plant, bulldozers, etc.) ▪ (Land acquisition cost)	▪ Manpower cost ▪ Fuel cost (for the equipment) ▪ Utility cost ▪ Soil (for surface cover) and other materials ▪ Maintenance cost of facilities and equipment ▪ Miscellaneous operation cost

The planner is required to convert all the above cost into annual average cost. Investment cost needs to be converted into annual depreciation cost based on the available data on useful life of each facility and equipment and its scrap value after the useful life.

If the planner cannot collect or estimate the cost of SWM at the level of detail as shown in the table above, it is still required to estimate the total cost of SWM on annual basis that includes most of the items shown in Table 3-1 for collection/haulage, treatment, and final disposal separately.

Once the planner obtains or estimates the current cost of SWM in the target areas, he can estimate the cost of SWM per capita serviced as well as per ton of SW handled.

Such information is great importance in terms of:

- Comparing the cost of SWM among each stage of waste handling process (collection/haulage, treatment, and final disposal),
- Estimating the future cost of SWM in accordance with the growth of population,

service areas, and amount of SW to be handled, and
- Estimating the possible reduction of SWM cost by promoting waste minimisation.

(2) Methods of Estimating The Recycling Cost And Relevant Parameters

To estimate the recycling cost, the planner is required to obtain cost data from relevant recyclers or estimate it by his own. The recycling cost is mainly divided into the items shown in Table 3-2.

Table 3-2 Cost items of Recycling

Types of recyclables handling	Cost Items	
	Investment Cost	Operation Cost
Collection/haulage	▪ Collection vehicles and equipment ▪ Construction cost of facilities for collecting recyclables, e.g. buy-back, drop-off centres (inc. land cost if applicable) or storage of collected recyclable materials	▪ Manpower cost ▪ Fuel cost of vehicles and equipment ▪ Utility cost of facilities ▪ Maintenance cost of facilities and equipment ▪ Miscellaneous operation cost
Recycling cost	▪ Cost of recycling facilities and/or equipment (inc. land cost if applicable)	▪ Manpower cost ▪ Fuel cost (if applicable) ▪ Utility cost of facilities and equipment ▪ Maintenance cost of facilities and equipment ▪ Haulage cost of recycled materials to end-users (if applicable) ▪ Miscellaneous operation cost

In the case of recycling, the planner is also required to collect the data on the trading price of recyclable materials in the domestic as well as international market to identify the potential revenue from recycling activities. The price of recyclable materials in the domestic market can only be obtained from the existing recyclers. In addition, the planner must consider the difference in price of recyclable materials depending upon what types of recyclers are involved in their trading. For example, the price of recyclable materials traded between the primary collectors from sources and their buyers is different from the trade price of recycled materials after reprocessing for end-users since the materials have value-added after reprocessing. The planner is required to identify such price mechanism by each target recyclable item based on collection of data and information from recyclers in operation in the target areas.

3.3 Documenting Information on Current SWM & Recycling Scenarios

Using the results of the PCM roundtable discussions (core issues, cause and effects of problems, and objectives) as well the results of measurement or estimation, the planner can prepare a report. This serves as baseline upon which the targets of the LAP-WM will be based.

TIP

< What happens if an LA is unable to gather all the information described in section 3.2?>

It is recognised that LAs are likely to face problems in gathering data and processing them at the levels described. In that event, they may work with whatever data is available or use data for similar situation or use data from reports on the national situation.

Gaps in data availability should be noted and plans made for actual measurement. Data may also need to be gathered from the LA's partners in waste minimisation i.e. the SWM concessionaire and their contractors, as well as recycling agents and collectors. This may require the assistance of consultants or research organisations, which are capable of carrying out the relevant studies.

CHAPTER 4 DETERMINATION OF SCOPE OF LAP-WM

The scope of LAP-WM consists of:

- Target area covered
- Types of solid waste covered
- Target year of the LAP-WM
- Target recyclable items

This chapter describes each of the above items.

4.1 Target Area Covered

The planner must determine which area is to be covered by the LAP-WM. As far as the local authority is concerned, the target area should be the same as the area of administration of the LA. However, where some areas of the LA are not provided with SWM services e.g. rural or remote areas, the planner should consider whether to include such areas in the LAP-WM. In doing so, the planner should take into account the current and future plans for SWM within its jurisdiction, and in the State.

4.2 Types of Solid Waste Covered

Determination of the targeted solid waste is one of the important steps for formulation of LAP-WM. The planner must carefully consider what types of SW are to be covered by the LAP-WM.

According to the categorisation of solid waste currently applied in Malaysia, types of solid waste are defined as shown in Table 4-1.

Table 4-1 Types and Definitions of Solid Waste in Malaysia

Types	Definitions
Household Waste	Solid waste that is generated from household.
Commercial Waste	Solid waste that is generated from commercial entities including shops, markets, supermarkets, departments, restaurants, business offices of various services, and the likes.
Institutional Waste	Solid waste that is generated from various institutions including government offices, offices and facilities of public services, public facilities such as stadiums, museums, and the likes.
Industrial Waste	Solid waste that is generated from industries. Industrial waste is further divided into process and non-process waste. Process waste is defined as the waste generated from industrial production process while non-process waste means the waste generated from non-production sources in the industrial premises.
Construction Waste	Solid waste that is generated from construction and demolition activities.

Remark: The above definitions are subject to change in accordance with the SWM Act, which is now under preparation.

In addition to the categorisation of solid waste by activity sources above, solid waste is also divided into scheduled and non-scheduled waste in accordance with the Environmental Quality (Scheduled Wastes) Regulations 2005 made under the Environmental Quality Act, 1974.

Taking into account the similarity in nature and composition of these wastes and urgency of proper actions to control them, the "***Waste Minimisation Master Plan***" focuses on household, commercial, institutional and non-process industrial wastes. It

is noted that scheduled wastes from these sources are not included in the Master Plan since it is under the control of the DOE, Ministry of Natural Resources and the Environment.

The planner is required to determine what types of wastes are covered in LAP-WM considering the specific local conditions of solid waste.

4.3 Target Year of the LAP-WM

The planner must determine the planning period of LAP-WM with its target year. Taking into account potential the changes in characteristics of waste streams with socio-economic development, a 5-year plan is recommended for LAP-WM.

4.4 Target Recyclable Items

Determination of target recyclable items is the most important part in the initial stage of formulating LAP-WM. It is recommended that the planner selects target recyclable items, based broadly on available information on the current status of waste minimisation activities in its locality. After investigation of the current conditions and identification of waste minimisation issues, the planner will be able to finalise the list of target recyclable items in the LAP-WM.

Some criteria for selecting the target recyclable items in this initial stage are:

- Impact upon final disposal at landfills in terms of the volume (weight and cubic volume),
- Gap between the existing potential of recycling (existence of collectors, traders, and end-users of recyclable items) and actual ratio of recycling,
- Potential future increase of recycle items

If no or very limited information is available regarding the current status of recycling, the following types of waste items may be considered as potential target recyclables at the initial stage.

- Paper (newspapers, magazines, cardboard, packages, etc.)
- Glass bottles (clear & coloured)
- Aluminium and Tin Cans
- Plastic bottles and containers

In addition to the above four items, Food waste (organic component) may be considered for recycling. Food items (with or without green waste) may be separated from the waste stream for treatment to produce products such as soil conditioner.

CHAPTER 5 PROJECTION OF FUTURE WASTE STREAMS

To project future SW Streams in the target area, the planner is required to set the socio-economic framework represented by population and economic growth indicators. This section first discusses the basic methodology for setting the socio-economic framework required for projecting the future SW generation.
Projection of the future SW generation can be done according to the process shown in Figure 5-1.

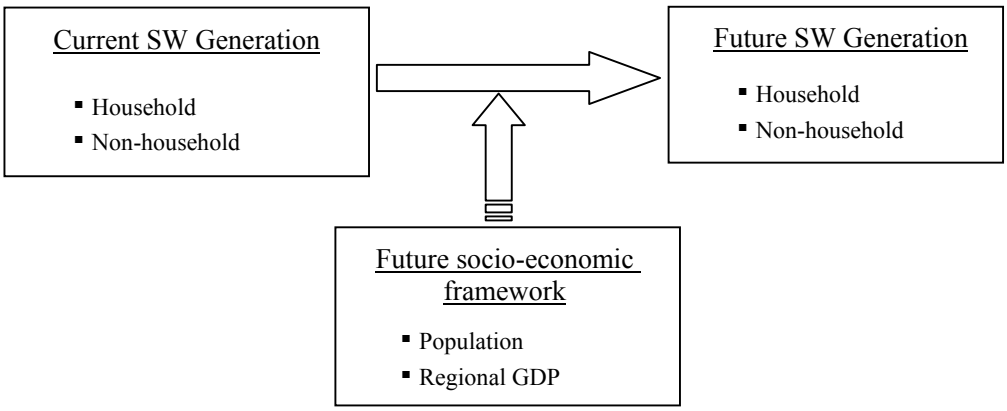


Figure 5-1 Outline of Procedure For Projecting the Future SW Generation

This chapter describes the methodologies for projection of future SW generation according to the steps shown in the figure above.

5.1 Establish the Future Socio-Economic Framework

To project the future SW generation, the future socio-economic framework needs to be established mainly for the indicators shown in Table 5-1.

Table 5-1 Indicators to be used for setting the future socio-economic framework

Indicators	Required data
Population	▪ Past and current population in the target areas ▪ Future projection of population or population growth in the target areas ▪ Population distribution by household income levels
Economic indicators	▪ Past and current trend of Regional Gross Domestic Product (RGDP) ▪ Future projection of RGDP ▪ Any other available indicators that represents the economy of target areas

(1) Population

In most countries, data on current and future population is available from population census. The planner may identify the population data of relevant target areas from the latest census (Department of Statistics).

In the case of Malaysia, population data is available from population census including its projection for the future 5 to 10 years. Population data on local level is also available in the census. Therefore, the planner is recommended to use the official figure of local population including the future projection from the population census as

far as it is available. However, the planner may be able to find the past and current population data from census or other sources while he may not be able to find enough data for the future projection. In such a case, the simplest and mostly applied method for future projection of population in this kind of study is the projection by linear regression analysis of past trend. The simple model for future projection of population on this method is available in spreadsheet application software such as Microsoft Excel. If the planner can put the past and current population data, the future projection of population based on linear regression analysis can be easily estimated with such software. If the past and current population data is available by income levels, the planner can project the future population in the same specifications.

(2) Economy

The future projection of economy is required for predicting the future possible change in the amount of per unit SW generation since it usually increases with the growth of economy according to the past experience in other countries. Therefore, the planner is required to project the future growth of economy in the target areas.

However, it takes time and resource consuming to make the future economic growth projection by making use of a economic model while per unit SW generation will not make any big changes in the short time frame such as five years of LAP-WM according to the experience in other countries.

Taking into account such situation, the planner is recommended to use the projected or planned future economic growth available in the locality, region, or national level if the local economic data is not available. At least, the expected national level economic growth rate in the future is available in the latest Malaysian Development Plan or other relevant sources.

5.2 Projection of the Future SW Generation

After setting the future socio-economic framework (based on by the future population and economic growth), the planner can estimate the future SW generation in accordance with the equation below:

$$WGn = mn \times Pn$$

where,

WG: the amount of waste generated in tons per year

m: unit generation rate of SW (tons/unit/year)

P: number of units

n: the year

Taking the household for example, the total SW generation from household in the specific year is estimated as the product of multiplying the average per capita SW generation (ton/capita/year) by the population in that year. Since the future projected population is given by year from the established socio-economic framework, the planner is now required to project the change in per unit generation rate of SW based on the current SW generation rate and projected future economic growth.

The correlation between economic growth and SW generation rate is preferably determined based on the correlation analysis of previous years' data on economic

growth and SW generation. However, since such data is mostly not provided enough at local levels, the planner is recommended to use the national level data for setting the growth rate of per unit SW generation. Based on national level data, the planner can estimate the correlation coefficient as the result of dividing the growth rate of SW generation by the economic growth rate in that year. If the national level data is also not enough for conducting correlation analysis, the planner is required to use default correlation coefficient based on the data available in other countries.

In the case of the Waste Minimisation Master Plan in Malaysia, the default co-efficient of 0.5 is applied to estimate the change in per unit SW generation. It means that per unit SW generation is increased at the rate of the half of economic growth rate. The planner can use this co-efficient as default until the data on SW generation is accumulated enough to conduct correlation analysis.

5.3 Projection of the Future SW Composition

Currently, no concrete and adequate method is available for projecting the future SW composition since the factors affecting the composition of SW have a wide variety and difficult to build a projection model. Therefore, especially for the short-term projection within 5 years, the planner usually assumes the same SW composition for the future years. However, if the planner can obtain the data on the past trend of SW composition or any concrete information and data on the future production of specific materials such as papers, plastics, industrial configuration or any other factors that can be used as explanatory factors for projection of the future SW composition, it should be considered as much as possible. In addition, if the SW composition data is accumulated year by year through the period of LAP-WM, the planner should consider the trend of SW composition in these years at the time of formulating another LAP-WM in next phase.

TIP

< Data Collection & Analysis >

For this stage of LAP-WM preparation, which involves the collection of specific data and their analysis, the LA may need assistance. They may seek assistance from research organisations or consultants with experience in waste management in their service area.

In the MPPP experience, this work was largely handled by the NGO of Penang, which was directly involved with recycling programmes and waste management projects in the state.

CHAPTER 6 SETTING THE TARGETS OF WASTE MINIMISATION

There are various targets that may be applied in a LAP-WM. In fact, the targets set in various plans in relation to waste minimisation vary from one country to another. In an effort to promote harmony and comparability, there are initiatives to build a common understanding, and uniform definitions and monitoring methods for waste minimisation. This chapter describes the process for target setting, their definitions, methods for monitoring and required data for evaluating performance in achieving the targets. The planner is expected to select the targets to be set for LAP-WM, taking into account conditions of data availability, monitoring capacity, and current practice of waste minimisation in the target areas.

6.1 Consider Existing Scenarios & Projections

In setting the targets for WM, the planner will consider information gathered and processed in the previous sections in particular, sections 2.2 and 2.4. One of the most critical factors is the capacity of the LA. In the absence of a WMU, the process of formulating an LAP-WM presents an opportunity for examining capacity building needs and any re-organisation that would benefit the LA's waste minimisation plan. The LAP-WM may be used to justify capacity building needs at the LA.

6.2 Select the Target Indicators (Parameters)

Targets may be set based on a number of indicators or parameters. These will be decided in the context of the Scope of the LAP-WM described in section 2.3. These targets may include the following: -

- Recycling Rate of All Recyclables (consolidated)
- Recycling Rate of Each Recyclables (according to Type)
- Level of Participation in Waste Minimisation

These targets are elaborated below.

6.2.1 Recycling Rate of All Recyclables (consolidated)

The National Recycling Rate Target is 22 per cent in year 2020[4]. This is an average or consolidated target for all recyclables identified i.e. Paper, Plastics, Metals and Glass. In formulating the four model LAPs-WM, each LA decided on a Recycling Rate that was considered appropriate to the conditions prevailing in the LA. Some examples are given below; for municipal councils of MPSJ AND MPPP, and District Council of MDKS.

[4] Master Plan for Waste Minimisation

MPSJ (Municipal Council)

Recycling Targets (%)				
2006	2007	2008	2009	2010
3 %	4 %	5 %	7 %	10 %

Target Recyclables
<Plastics, Paper, Glass, Al Cans, Ferrous Metals>
Source: Local Action Plan for Waste Minimisation, MPSJ

MPPP (Municipal Council)

Recycling Targets (%)				
2006	2007	2008	2009	2010
20 %	21 %	22 %	23 %	25 %

Target Recyclables
<Plastics, Paper, Glass, Al Cans, Ferrous Metals>
Source: Local Action Plan for Waste Minimisation, MPPP

MDKS (District Council)

Recycling Targets (%)				
2006	2007	2008	2009	2010
5 %	7 %	9 %	11 %	13 %

Target Recyclables
<Plastics, Paper, Glass, Al Cans, Ferrous Metals>
Source: Local Action Plan for Waste Minimisation, MDKS

It is evident from the above that the two municipal LAs of MPSJ and MPPP, have decided on overall targets that are quite different. MPSJ used a base target of 3 % for 2006, while MPPP used a target of 20 %. Each LA has proposed progressive rates, which have been based on the agreed baseline recycling rate. In the case of MPSJ, the rate closer to the MHLG national range of 2-5 % was used. In MPPP's case, based on their own monitoring and a published rate of 15.6 % in 2004, they have proposed rates that exceed the proposed national rates. In the case of A District Council, MDKS, they have based their targets on a base of 5 % recycling rate in 2006.

6.2.2 Recycling Rate of Each Recyclable (According to Type)

It is noted that the recyclable items have their own specific Recycling Rate i.e. the rate of recovery of paper may be much higher than for glass. At the same time the rates may also vary spatially, the rate of glass recovery in MPSJ may be higher compared to the rate in MPPP.

Based on the above, a LA may consider different recycling rates for different recyclables. For example if data shows that the recovery of paper is almost saturated, then the LA may focus on other recyclables and propose specific Recycling Rates. Some examples are given in Table 6-1, and these are compared with the provisional recycling rates proposed in the National Strategic Plan for SWM.

Table 6-1 Example of Possible Recycling Rates for Specific Recyclable

Recyclable Item	Recycling Rate (%)		
	2005	2010	2020*
Plastics	5	15	15
Aluminum cans	40	70	70
Glass	20	40	40

Note: Provisional Targets, National Strategic Plan for SWM

6.3 Setting the Target Compliance Schedule

In Chapter 3, it was mentioned that the target year of the LAP-WM needs to be defined. A 5-year plan period is recommended. Then in section 6.2.1, the planner has decided on the target recycling rate to be achieved each year.

Further to this, the planner is recommended to formulate a target implementation or compliance schedule. This is normally presented in the form of a gant chart, which lists out activities, the duration of the activity implementation, milestones and target compliance date. A sample implementation schedule is shown in **Appendix 8**.

CHAPTER 7 DETERMINATION OF ACTIONS TO ACHIEVE THE TARGETS

After setting WM Targets, the LA or planner would need to examine how they can achieve those targets. There are six main steps in this stage of LAP-WM formulation. They are:

1. Identify Strategy & Approaches
2. Formulate Programmes and Activities
3. Select Tools for Implementing Programmes
4. Prepare Schedule of Implementation
5. Prepare a Budget for LAP-WM Implementation
6. Select Performance Indicators

This chapter describes each step.

7.1 Identify Strategy & Approaches

7.1.1 Strategy

In line with the WM Policy described in Chapter 1 (Note that this is not compulsory but helps to provide direction), the planner may formulate a Strategy for adoption during the next stages of implementation, monitoring and improvement. In formulating this strategy, the planner should refer to the "***Waste Minimisation Master Plan and Action***" (Refer to Figure 1-1). An example is given below.

TIP < Example >

MPPP's strategy for achieving the set targets within the period 2006-2010 will consist of:

- Improving Networking & Partnership among Waste Minimisation Partners.
- Employing a Balance of Incentives and Disincentives (dependent upon new SWM Act).
- Open to review in the future

(Source: Local Action Plan for Waste Minimisation, MPPP (2006-2010))

7.1.2 Approaches

Following the adoption of a strategy for WM, the planner may examine a number of approaches such as: -

- The Legal or Statutory Approach
- The Social Approach
- The Economic Approach
- A Combination of Approaches

(1) The Legal Approach

This refers to the use of laws or By-laws in the case of LAs, to require the practice of WM, and where if it is not complied with, the by-laws provide penalties as deterrent.

By-Laws

If this approach is preferred, the Planner shall consider the following activities in consultation with relevant stakeholders:

- Studies shall be undertaken to investigate and ensure that all relevant existing legislation or by-laws are compatible with the goals of waste minimisation and recycling programmes. If necessary, this legislation or by-law shall be amended.
- The LA may examine the need to draft new by-laws to address WM issues and needs. Such by-laws shall be pursuant to provisions of the proposed SWM Act.
- By-laws may be promulgated requiring the preparation of waste minimisation plans, and their implementation as part of specified permitting/licensing requirements for business entities.

TIP < "Policy" should be set-up. >
By-laws should be amended and/or prepared in line with the SWM Act. However, it takes some time for the enactment of the SWM Act. Based on this understanding, as shown in Section 2.4, LAs should set-up the "policy" on waste minimisation, and based on the policy, LAP-WM should be prepared and implemented (as a practical measures before enactment of SWM Act).

(2) The Social Approach

This refers to the use of "Education" in instilling "Good Citizenry" or "Corporate Social Responsibility" in promoting WM, with the view of creating an "Environmentally Sustainable Society".

Raising Awareness

This approach is normally a long-term one and requires good cooperation between an LA and its partners. It is all about raising awareness and developing a conscience about waste generation, and the need to minimise waste. It is about providing relevant information to the all waste generators so that they are aware of the impacts of their actions, as well as the benefits derived from WM efforts. Some points that should be noted in this context are given below.

- Awareness programmes on source separation should be organised on a continual basis for all groups of the public/stakeholders.
- More information on waste reduction and reuse should be disseminated and balanced with previous initiatives on recycling.
- Information materials on source separation (brochures, website, and directory) should be maintained and updated at proper intervals. New ones e.g. on electrical & electronic waste, household hazardous waste should be considered.
- LAs should organise regular meetings (e.g. quarterly) to keep network members informed, and to get feedback.
- LAs should organise regular briefing and feedback sessions with recycling players to encourage and improve reporting of recyclables recovery so that more accurate reports may be sent to MHLG.

WM in Schools

In order to educate the public from young age, awareness and education programmes on waste minimisation and recycling at schools could be emphasised, such as giving awareness talks and forming recycling clubs e.g. 'Kelab Cinta Alam' in all primary schools so that recycling activities can be carried out voluntarily and as an on-going co-curriculum activity (on par with boys scouts / girl guides). The LA and schools interested in promoting WM in schools may refer to the "***Guidelines for Enhancement of 3Rs Activities in School***".

Recognition

The Social Approach would benefit from the inclusion of 'Recognition' or 'Acknowledgment' of efforts in WM. Such recognition may be given to individuals, a group of individuals or to organisations (private and public sectors). Examples of different forms of recognition are given below.

TIP < Recognition >
- Annual Awards e.g. for "Community with Best WM Programme"
- WM Champion of the Year

Media

The "Social Approach" benefits from close cooperation with the media. Events and performance should be reported on a regular basis.

(3) The Economic Approach

This refers to the use of economic incentives and disincentives by LAs to promote WM. The economic approach may be used on waste generators, recyclable collectors or agents, recyclable re-processors, on the general public.

Incentives

Some incentives that may be considered are: -

- Exchange recyclables for parking coupons, shopping vouchers (with collaboration of shopping complex) etc.
- Subsidies from existing funds for demonstration projects etc.
- Financial assistance to organisations involved in WM activities e.g. funding of recyclable collection bins and recycling centres; providing mobile buy back system for collection of recyclable materials from generation sources; and providing free plastic bags for separation of recyclable materials at source.

Disincentives

Some disincentives that may be considered are: -

- LAs introduce "Landfill Tax"
- LAs introduce "Waste Collection e.g. charge a levy for collection of SW above a specified ceiling
- Retail outlets introduce Charges for packaging material e.g. plastic shopping bags

(4) The Combined Approach

This refers to the use of a combination of the three approaches described above. The

A/P prepared for the Federal Government is a combination of the 3 approaches. They are summarised below.

Table 7-1 Summary of Strategy & Approaches in Federal WM Action Plan

Approach	Strategy	Actions
Legal	Development of Institutional Mechanism	• Strengthen legal & regulatory mechanisms • Capacity development
Economic	Development of Institutional Mechanism	• Strategise financial Incentives
Social	Strengthening of Partnership Enhancement of Awareness	• Expand source separation • Develop network & partnership • Enhance under National Recycling Programme • Enhance under Schools 3Rs Programme

7.2 Formulate Programmes & Activities

After deciding the strategy and approach best suited to the LA, the planner is then in a better position to propose actions to achieve the targets. Again, the process of coming up with as many suggestions and selecting the most appropriate would benefit from joint effort e.g. via the C-LAP. (In MPPP's case, the proposed actions to achieve WM Targets were the outcome of a consultative process via discussions of the WM Task Force.)

7.2.1 Proposing Actions, Programmes & Activities

It is noted that the "***Action Plan for WM***" for the Federal Government consists of five (5) Key Actions, each with their programmes that are to be achieved during the 5-year plan period. The 5 actions are summarised below.

Table 7-2 Summary of Actions & Responsible Agencies

Action	Description	Responsible Agencies
1	Enhancement of Awareness	MHLG, MITI, **LAs**
2	3Rs Activities in Schools	MHLG, MOE, State Governments, **LAs**, Schools
3	Enhancement Stakeholders Networking & Partnership	MHLG, **LAs**, Private Sector, NGO/CBOs
4	Strengthening Legal Framework	EPU, MHLG, **LAs**
5	Capacity Development	MHLG, , **LAs**, Concessionaires

From the above, it is evident that LAs have been identified as being responsible for almost all the actions. Therefore the planner may want to refer to these actions in recommending actions at local level. Once the key actions are identified, specific programmes can then be identified. These programmes would need to be connected with specific SW generators, type of source, type of waste or recyclable and the approach that best suits the programme. The LA's partners for each programme should also be identified.

The key actions and programmes under each action may be tabulated for easy reference as shown in **Appendix 9**.

This may be further refined in defining actions for a specific type waste generator. For example, the actions recommended for households may differ from those recommended

for food & beverage outlets (coffee shops, fast food outlets, and restaurants (within & outside hotels). These actions for specific generators may be summarised as shown in **Appendix 10**.

7.2.2 Demonstration Projects

A key component of a waste minimisation programme is the implementation of 'waste minimisation and source separation' demonstration projects. The LA is expected to play an important coordinating and initiating role in the implementation of these projects, which may be undertaken in selected target areas, and involving certain waste generators. These generators may be commercial entities e.g. shopping complex, government department, schools or offices.

For further information, the "***Guidelines on Source Separation of Municipal Solid Waste***" should be referred to. Guidance may also be sought from the personnel involved in the pilot projects carried out at the four LAs; MPPP, MPSJ, MDKS and MBM. Contact address of each four LA officials is shown in **Appendix-11**.

> **TIP < "Core Team" >**
> It is noted that "Core Team" composed of MHLG and four (4) model LAs has been formulated in order to disseminate information/ experiences of 1st LAP-WM preparation and 2nd source separation practices.

7.2.3 Networking

It is acknowledged that WM stakeholders need to work together in order to succeed in WM plans and programmes. Experience in particular in the four model LAs have shown that networking has benefited all parties involved. The "List of Stakeholders" described in section 2.2 may form the basis of this networking, and facilitate the sharing of experience and enhance communication between one group with another e.g. a generator of plastics will be able to identify a user of plastic recyclables in the network and make contact.

7.3 Select Tools for Implementing Programmes

To assist the LAs in their efforts to achieve their WM targets, they may consider the use of a combination of tools. These tools may be selected from several types summarised in Table 7-3.

Table 7-3 Tools for Implementing LAP-WM Programmes

No.	Tools	Examples
1	Internet	Website, Interactive site
2	Information Materials	Leaflets, brochures, banners, streamers, newsletters, guidelines, recyclable collection schedules
3	Corporate Identity	Mascot, Slogan, Logo for LAP-WM
4	Media (printed & electronic)	Publicity campaigns
5	Special Events	Exhibitions, Trade Fairs, Recycling Market
6	New WM Infrastructure	"National Recycling Day"
7	WM Champion	Mobile Recyclable Collecting Vehicles

7.4 Prepare Schedule of Implementation

The duration of the Action Plan is five (5) years. The actions, programmes and activities will be spread out during this period. Some will be carried out on a continuous basis while others may be periodic events. The schedule of the implementation of a LAP-WM may resemble the one shown below.

Table 7-4 Proposed Schedule for Implementation of Action Plan (Sample)

No	Action Plan	2006	2007	2008	2009	2010
1	Establish a "waste minimisation unit" or "recycling taskforce" within the LA					
2	Establish formal registration system for recycling players					
3	Mandatory registration of recycling players					
4	Mandatory waste management plans been carried out along with licensing of BEs					
5	Establish a Recycling Information Centre (if necessary)					
6	Establish and introduce a user-friendly "recording system" to be reported periodically by the recycling players					
7	Implement demonstration projects in the LA areas (such as in schools, offices etc.)					
8	Education / Development of guidelines (booklets) for distributions					
9	Provision of incentives (such as parking coupons, shopping vouchers etc.)					
10	Provision of incentive to players (recycling bins, recycling plastic bags, posters and other facilities)					
11	Monitoring and periodical reporting					

7.5 Prepare a Budget for LAP-WM Implementation

After the actions, plans and programmes have been identified, the LA would need to develop a budget for implementing the LAP-WM. The budget for WM will depend on the scale, coverage and frequency of programmes and activities selected. The budget will consist of Operating Expenditure (OPEX) and Capital Expenditure (CAPEX). In the government sector, CAPEX is normally referred to as the "Development" budget. For the plan period, an indicative budget may be prepared and presented to the LA's top management. According to normal practice, detailed annual budgets are then prepared.

OPEX will include the usual administrative costs including printing of materials and funding of WM events. Another important item is 'Training' needs of WMU personnel and for key partners e.g. training of trainers for outreach programmes. Where possible, funding of events may be shared with WM partners. Operating costs also include salaries and allowances of personnel involved. It is noted that the costs associated with the setting up of a new WMU and/or re-organisation may or may not be covered by this Budget (if it is taken up as part of overall re-organisation of LA). A sample of items that may be considered in drawing up an annual budget is given below.

Table 7-5 Sample of LA Budget Items for LAP-WM

(Unit: RM)

Item	Description			
1.0	OPERATING BUDGET			
		Unit cost	Quantity	Total Cost
1.1	Equipment & Supplies -Weighing Scale -Plastic Bags -Stationery			
1.2	Documents -Reference Books -Magazines/ Reports			
1.3	Printing & Copying -Printing Annual Report of WM -Photocopying charges -Film & Developing charges -WM Information & Promotional Items			
1.4	Awards -Trophy/-Cash Prizes/honorarium -Certificate of Appreciation			
1.5	Food & Beverage -Meetings -Events			
1.6	Utilities e.g. electricity for BBC			
1.7	Transportation -Accommodation & subsistence Allowance -Fuel costs/mileage			
1.8	Training -LA staff -Training of Trainers			
1.9	Salaries -Permanent Staff -Contract Staff			
	Sub-Total			
2.0	DEVELOPMENT BUDGET			
		Unit cost	Quantity	Total Cost
2.1	Recyclable Collection Vehicle			
2.2	Buy-back centre			
2.4	SWM Studies/ surveys			
2.3	Others			
	Sub-Total			
	TOTAL			

The Development Budget will involve capital expenditure needs in particular infrastructure for WM. It will also include other important items e.g. special studies and surveys for collecting information required for proper planning and management of SWM. Where possible collaboration with local research institutions and universities should be encouraged.

7.6 Identify Key Performance Indicators

Key performance indicators (KPIs) are useful in measuring the performance of WM programmes and activities. The KPIs will provide an indication of their applicability and effectiveness. They will also serve to indicate the benefits of WM. Some KPIs that may be considered are shown below:

OPERATIONAL INDICATORS

- Waste Generation rate per capita
- Recycling Rates
- Recycling Rates of Specific Recyclables
- Composition of SW Destined for Disposal
- Savings in Waste Disposal Costs/year
- Savings in Waste Collection Costs/year
- Waste Minimisation costs per population served
- Level of Public Awareness on Waste Minimisation

Environmental Indicators

- Rate of use of landfill space
- Frequency & magnitude of illegal dumping

It is recognised that LAs may begin with a minimum number of KPIs and revise or add more when LA capacity improves.

CHAPTER 8 MONITORING & EVALUATION

In order to monitor and evaluate the progress and performance of the WM programmes and activities proposed in the LAP-WM, the Planner shall prepare a Monitoring Plan that is to be carried out during the implementation stage. This Monitoring Plan would be based on the Performance Indicators selected (described in section 7.6).

The data under this monitoring exercise may be collected directly by the LA or reported by its WM partners e.g. recyclable collectors and agents. The data is critical in the process of improving the database for SWM and WM, so that future planning and decision-making may be based on more reliable information.

This chapter describes the monitoring parameters that may be considered by the LA, how they may be measured (data collection), evaluation of results and reporting.

8.1 Parameters for Monitoring

Based on the Performance Indicators selected, the LA is able to decide on the parameters that they are able to monitor. Two examples of KPIs and the parameters to be measured are shown in Table 8-1.

Table 8-1 Examples of KPIs and Parameters to be Measured

No.	KPI	Monitoring Parameters
1	Recycling Rates	1. Quantity of waste disposal at landfill (or Quantity of waste generation) 2. Quantity of recyclables collected (per day/month/year)
2	Savings in Waste Disposal Costs/year	1. Quantity of Waste Disposed at Landfill 2. Cost of Disposal at Landfill (tipping fees) (per day/month/year)

The parameters for this monthly reports include:

- Quantities of SW collected by LA
- Quantities of Recyclables collected within the LA (including by concessionaire & contractors)
- Quantity of SW disposed at landfills

Proper records should be kept of results of monitoring and these should be properly stored and maintained. They should be readily retrieved when required.

8.2 Data Collection Methods

There are various ways of collecting data and with WM, much data needs to be collected from WM partners in particular the recyclable collectors and agents. The LA should take note of the most suitable method, taking account of their capacity and the reporting needs of the State Government and MHLG. Some data collection methods pertaining to specific parameters are shown in Table 8-2.

Table 8-2 Examples of Parameters and Methods of Data Collection

No	Performance	
	Parameter	Data Collection Method
1	Quantity of wastes generated from sources (households, business entities, industries etc.)	Carry out questionnaire surveys, or primary data collection (Sampling of waste at source & waste characterisation study).
2	Quantity of wastes disposed at landfill site	Carry out data collection from the landfill site or Transfer Station (weighbridge data).
3	Quality of waste retained at source (households, business entities, industries etc.)	Observation of waste separation efforts, as well as the waste handling methods.
4	Number of recycling players registered	Waste Composition Survey at Source.
5	Quantity of recyclables collected and breakdown according to type of recyclable (paper, plastics, metals glass, others)	Establish a Register of the recycling players & produce "Directory of Stakeholders".
6	Quantity of recyclables collected by LA-operated public recycling bins / centres	Establish a system for recycling players to submit monthly returns to the WMU using standard formats.

Depending on the actions and programmes that are formulated in the LAP-WM, the planner may have chosen "Level of Public Participation" as a KPI. Table 8-3 shows the examples of data collection methods for participation.

Table 8-3 Examples of Participation Targets to be Set in LAP-WM

Participation Targets	Monitoring and Data Collection Methods
Participation rate of source separation	If the LAP-WM promotes source separation of recyclable materials in a target areas, the progress of its implementation can be monitored by estimating the participation rate. This is done by dividing the number of households or other premises/entities by the total number in the target area.
Participation rate of other waste minimisation programme	If the LAP-WM promotes some specific waste minimisation programme, the progress of its implementation can also be monitored by estimating the participation rate in the same way as mentioned above. Such participation includes:

8.3 Evaluation of Monitoring Results & Corrective Actions

Findings from monitoring will be analysed and reports prepared. The findings will indicate whether the targets have been achieved. If the targets **have not been achieved**, then actions should be taken to correct or remedy the situation. Corrective actions may include making changes to the targets, programmes and activities. They may also involve organisational, technical, financial and strategic matters. If the targets have been met, then the LA may decide to revise the targets, expand the programmes or begin new ones.

8.4 Reporting

The **Reporting Needs** of the LAP-WM have to be defined. The LA needs to prepare and send periodic reports to:

- LA Top Management (after endorsement by the C-LAP/Task Force)
- The MHLG

Pro-forma Reports should be used (e.g. those issued by MHLG) and where facilities are available, reports should be made and transmitted in **Electronic** form.

Reports may be disseminated to the public (subject to LA top management approval), and to its waste minimisation partners. The website is a useful tool for this purpose.

Some periodic reporting requirements for monitoring and evaluation of performance of WM activities in an LA are listed below.

Table 8-4 Reporting of Data Required for Monitoring of Performance

No	Regular Data Collection	Recommended Frequency
1	Reports from registered recycling players, and/or compilation of recycling information system	Monthly
2	Reports from public recycling bins / centres on the quantity of recyclable materials collected	Monthly
3	Questionnaires to the registered recycling players to determine the issues, problems faced and comments from the players to improve the entire recycling practices	Half yearly
4	Questionnaires to the selected numbers of waste generation sources (households, BEs and industries etc.) to find out the practice of waste retained, waste handling and subsequently to determine the issues, problems faced and comments from the waste generators to improve the entire recycling system	Yearly
5	Annual reports on the development and implementation of the overall waste minimisation and recycling programmes	Yearly

All reports in relation to waste minimisation and recycling in an LA should be the responsibility of the "Waste Minimisation Unit" or whichever group of LA personnel entrusted with WM tasks. The collected data should be compiled, analysed and reported to related authorities such as the Ministry of Housing and Local Government (MHLG) and State Government, according to the frequency specified. The suggested framework for WM reporting system is as follows:

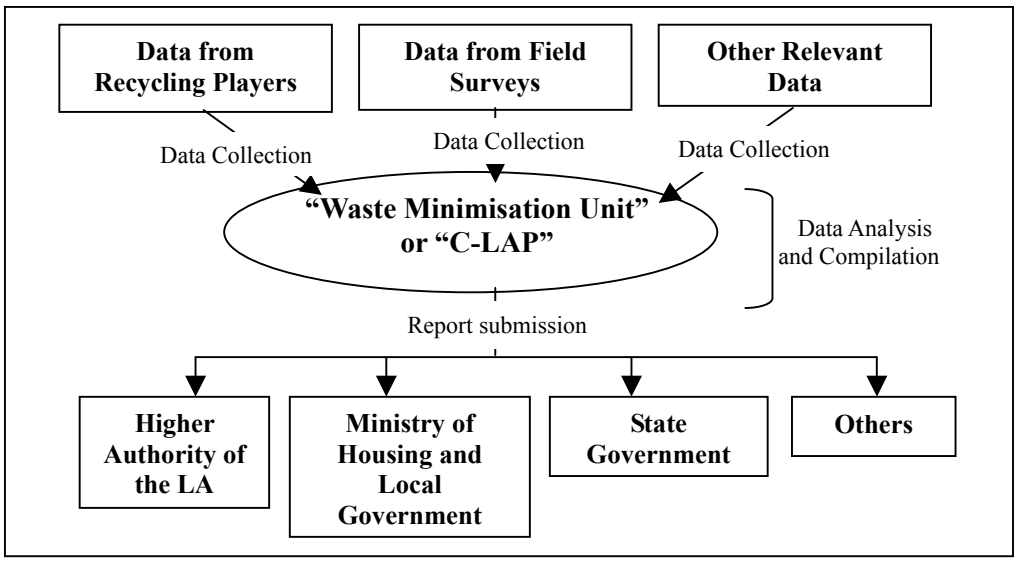


Figure 8-1 Suggested Framework for Entire Reporting System

Appendix-1: Typical Table of Contents of a LAP-WM

TABLE OF CONTENTS

Appendix-2: Leaflet of LAP-WM for MPPP, MPSJ, MDKS and MBM

1. Leaflet of LAP-WM for MPPP
2. Leaflet of LAP-WM for MPSJ
3. Leaflet of LAP-WM for MDKS
4. Leaflet of LAP-WM for MBM

"KURANGKAN SISA PEPEJAL,
TINGKATKAN KUALITI HIDUP"
(Reduce Solid Waste, Enhance Quality of Life)

WASTE MINIMISATION

MPPP LOCAL ACTION PLAN (2006- 2010)

First REDUCE, then REUSE, then RECYCLE

KPKT

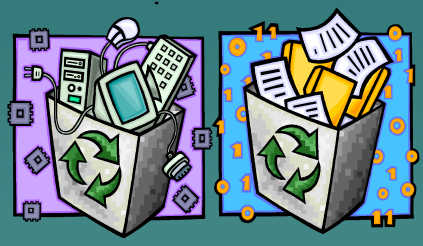
JICA Japan International Cooperation Agency

MPPP Municipal Council of Penang Island

Introduction:

The "Action Plan for Waste Minimisation in Penang Island Municipal Council or Majlis Perbandaran Pulau Pinang (MPPP) is a tool for guiding MPPP and its 3Rs Partners (private sector, NGOs/CBOs, and educational institutions) for planning, implementing and improving its Waste Minimisation plans.

This leaflet contains information about the Targets for Waste Management for the period 2006 until 2010. These targets can only be achieved if the people of Penang are aware of their responsibilities and cooperate with MPPP in the implementation of programmes and activities to achieve the targets set for Penang Island.



Our Slogan is:

"KURANGKAN SISA PEPEJAL, TINGKATKAN KUALITI HIDUP"
(Reduce Solid Waste, Enhance Quality of Life)

Approach:

- Continual Enhancement of Public Awareness
- Networking & Partnership Among All Waste Minimisation Players

REDUCE	**STOP Waste Before It Happens**
REUSE	**Use Things More Than Once**
RECYCLE	**Separate Waste Materials So That They Can Be made into Other Products**

Targets:

MPPP has improved its recycling rate from 0.03 % in 1993 to 15.6 % in 2004. With support from the people of Penang Island, MPPP has proposed the following recycling targets:

Recycling Targets (%)					
2005	**2006**	**2007**	**2008**	**2009**	**2010**
20%	21%	22%	23%	24%	25%

Target Recyclables:

Main Items

- Paper & Cardboard
- Plastics (including PET)
- Metals (Ferrous & Non-ferrous)
- Glass

Additional Items

- Batteries
- Fluorescent Tubes
- Computers & Peripherals
- Electrical Appliances

Target Sources of Solid Wastes:

HOUSEHOLDS	**Flats, Apartments, Bungalows, Terraced houses, Kampung houses, etc.**
INSTITUTIONAL	**Government offices, Schools, Colleges, Universities, Hospitals, etc.**
COMMERCIAL	**Shop houses, shoplots, supermarkets, wet markets, hotels, restaurants, etc.**
INDUSTRIAL	**Factories, Manufacturing plants, etc.**

MPPP Roles:

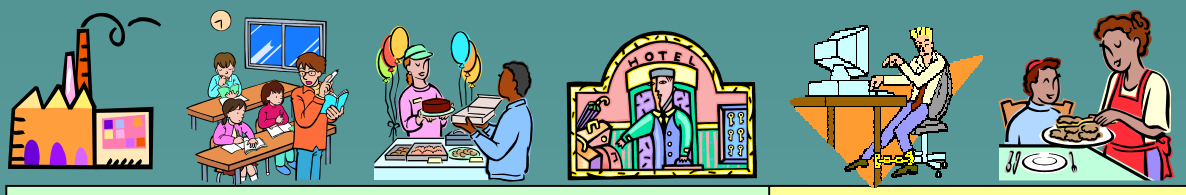
- Provide Infrastructure e.g. recyclables collection centre & bins
- Coordinate action among partners
- Provide Information & Guidance
- Enforce laws & guidelines
- Monitor waste minimisation performance
- Liaise & coordinate with Ministry of Housing & Local Government in planning and implementing waste minimisation programmes

Public/Community's Roles:

- Buy wisely and reduce waste
- Reduce energy and water consumption
- Separate Waste at Source
- Reuse
- Recycle
- Compost kitchen & Garden Waste
- Separate household hazardous waste for safe disposal
- Participate in Community Waste Minimisation Programmes

Private Sector's Roles:

- Reduce unnecessary packaging
- Design and manufacture eco-friendly products
- Substitute/reduce use of toxic/hazardous materials in manufacturing
- Increase recyclable content in products
- Provide facilities for take-back/buy-back of recyclables
- Participate in Community Waste Minimisation Programmes



For Enquiries Contact:

Waste Minimisation Unit (WMU)
Urban Services Department
Penang Island Municipal Council
Jalan Padang Kota Lama
10200 Pulau Pinang
Tel: 04-263 3000 Fax: 04-263 3036
Email: rnumppp@gmail.com

Website: www.rnumppp.net

Contact Persons:
Haji Zulkifli bin Zakaria
Syed Alwi Syed Omar

KITAR SEMULA
FIKIR DULU SEBELUM BUANG

Local Action Plan

3Rs Start Today

By:
Majlis Perbandaran Subang Jaya (MPSJ)

Supported by:
Ministry of Housing and Local Government (MHLG)

Japan International Cooperation Agency (JICA)

Introduction

Majlis Perbandaran Subang Jaya (MPSJ) has committed to formulate our “Local Action Plan for Waste Minimisation and Recycling”, supported under Ministry of Housing and Local Government (MHLG) and Japan International Cooperation Agency (JICA). This Local Action Plan serves as a guideline for MPSJ to effectively implement waste minimisation and recycling programmes so that to ensure a better environment for better living in MPSJ.

Our Objective

"To achieve Material Cycle Society in MPSJ"

What is Recycling Rate ?

$$\text{Recycling rate (\%)} = \frac{\text{Total Recyclables Collected (TRC) x 100\%}}{\text{TRC + Total Waste Disposed + Others}}$$

Note: Others include open burnt, illegal dump, waste treated or other wastes loses

What are our targets ?

Recycling Targets (%)				
2006	**2007**	**2008**	**2009**	**2010**
3%	4%	5%	7%	10%

- Plastics
- Aluminium Cans
- Ferrous Metals

- Glass
- Papers

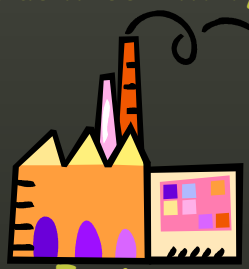
What are your responsibilities ?

Individual

Office

Hotel

Business entity



Factory

School

- **No matter you are an individual, office, hotel, business entity, school, factory etc… take ACTIONS !!**

Reduce

- Avoid using disposables, use durable products
- Share magazines, newspapers with others
- Use shopping bags / own food container
- Use less packaging products
- Use more electronic copies than printed copies
- Use refillable cartridges /inks
- Educate children/employees/staff on waste minimisation
- Reduce unnecessary wastage (food etc.)

Reuse

- Reuse empty bottles / containers
- Reuse old newspapers / waste papers for wrapping etc.
- Use both sides of papers
- Feed food residues to animals
- Educate children/employees/staff on reuse of wastes

Recycle

- Separate recyclable materials from wastes for collection
- Bring / sell recyclables to collectors / centers
- Carry out composting of organic wastes (such as food residues, garden wastes etc.)
- Educate children/employees/staff on recycling
- Participate in recycling campaigns / activities

- If you are a recycling player (collector / middleman / agent / industry etc.)

Please register with MPSJ !!

All about Wastes in MPSJ

In MPSJ we generate **445.6 tons** of waste everyday or **162,645 tons** every year !!

Composition	Overall (%)
Food waste	37.0
Papers	31.4
Plastics	8.2
Glass	4.0
Ferrous Metals	1.8
Aluminium	0.6
Others	17.0

Projection

Total Waste Generation (tons/year)					
2005	2006	2007	2008	2009	2010
162,645	167,723	175,381	183,404	191,810	200,617

The volume of wastes in year 2010 is equivalent to 40,000 trips of normal waste trucks or 16 football fields with 0.5m heights of wastes !!!

Our Actions to Achieve the Targets

- Setting up of Waste Minimisation Unit (WMU) in MPSJ
- Registration of Recycling Players/ Stakeholders
- Introduction of Source Separation
- Implementation of Awareness Campaigns

For information, please contact:

Waste Minimisation Unit (WMU)
Majlis Perbandaran Subang Jaya (MPSJ)
Persiaran Perpaduan
Jalan USJ 5, 46710 Subang Jaya
Tel: 03-80263161; Fax: 80245235

Local Action Plan (2006 - 2010)

Waste Minimisation

for

Majlis Daerah Kinta Selatan (MDKS)

"Jom Pakat Kitar Semula"

By:
Majlis Daerah Kinta Selatan (MDKS)

Supported by:
Ministry of Housing and Local Government (MHLG)

Japan International Cooperation Agency (JICA)

Introduction

Majlis Daerah Kinta Selatan (MDKS) has committed to formulate our “Local Action Plan for Waste Minimisation and Recycling”, supported under Ministry of Housing and Local Government (MHLG) and Japan International Cooperation Agency (JICA). This Local Action Plan serves as a guideline for MDKS to effectively implement waste minimisation and recycling programmes so that to ensure a better environment for better living in MDKS.

Our Objective

"To achieve Material Cycle Society in MDKS"

What is Recycling Rate ?

$$\text{Recycling rate (\%)} = \frac{\text{Total Recyclables Collected (TRC) x 100\%}}{\text{TRC + Total Waste Disposed + Others}}$$

Note: Others include open burnt, illegal dump, waste treated or other wastes loses

What are our targets ?

Recycling Targets (%)				
2006	2007	2008	2009	2010
5%	7%	9%	11%	13%

- Plastics
- Aluminium Cans
- Ferrous Metals

- Glass
- Papers

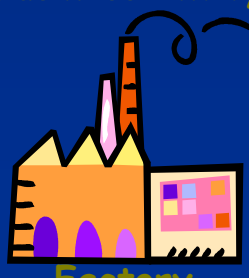
What are your responsibilities ?

Individual

Office

Hotel

Business entity



Factory

School

- **No matter you are an individual, office, hotel, business entity, school, factory etc… take ACTIONS !!**

Reduce

- Avoid using disposables, use durable products
- Share magazines, newspapers with others
- Use shopping bags / own food container
- Use less packaging products
- Use more electronic copies than printed copies
- Use refillable cartridges /inks
- Educate children/employees/staff on waste minimisation
- Reduce unnecessary wastage (food etc.)

Reuse

- Reuse empty bottles / containers
- Reuse old newspapers / waste papers for wrapping etc.
- Use both sides of papers
- Feed food residues to animals
- Educate children/employees/staff on reuse of wastes

Recycle

- Separate recyclable materials from wastes for collection
- Bring / sell recyclables to collectors / centers
- Carry out composting of organic wastes (such as food residues, garden wastes etc.)
- Educate children/employees/staff on recycling
- Participate in recycling campaigns / activities

- If you are a recycling player (collector / middleman / agent / industry etc.)

Please register with MDKS !!

All about Wastes in MDKS

In MDKS, we generate **77.8 tons** of waste everyday or **28,397 tons** every year !!

Composition	Overall (%)
Food waste	38.4
Papers	31.3
Plastics	8.1
Glass	3.8
Ferrous Metals	1.7
Aluminium	0.6
Others	16.1

Projection ...

Total Waste Generation (tons/year)					
2005	2006	2007	2008	2009	2010
29,160.15	30,429.69	31,756.47	33,143.18	34,592.62	36,107.78

The volume of wastes in year 2010 is equivalent to 7,200 trips of normal waste trucks or 3 football fields with 0.5m height of wastes !!!

Our Actions to Achieve the Targets

- Establishment of Waste Minimisation Unit (WMU) in MDKS
- Registration of Existing Recycling Players
- Increase Awareness & Recycling Practices

"Kitar Semula Kreatifkan Minda, Bersihkan Alam Sekitar"

For information, please contact:

Waste Minimisation Unit (WMU)
Majlis Daerah Kinta Selatan (MDKS)
Jalan Iskandar
31900 Kampar, Perak
Tel: 05-4671020 / 4671030

Waste Minimisation

Majlis Bandaraya Miri (MBM)

Local Action Plan

(2006 - 2010)

"3Rs for a Better Tomorrow"

By:
Majlis Bandaraya Miri (MCC)

Supported by:
Ministry of Housing and Local Government (MHLG)

Japan International Cooperation Agency (JICA)

Introduction

Majlis Bandaraya Miri (MBM) has committed to formulate our "Local Action Plan for Waste Minimisation and Recycling", supported under Ministry of Housing and Local Government (MHLG) and Japan International Cooperation Agency (JICA). This Local Action Plan serves as a guideline for MCC to effectively implement waste minimisation and recycling programmes so that to ensure a better environment for better living in MBM.

Our Objective

"To achieve Material Cycle Society in MBM"

What is Recycling Rate ?

$$\text{Recycling rate (\%)} = \frac{\text{Total Recyclables Collected (TRC)} \times 100\%}{\text{TRC + Total Waste Disposed + Others}}$$

Note: Others include open burnt, illegal dump, waste treated or other wastes loses

What are our targets ?

Recycling Targets (%)				
2006	2007	2008	2009	2010
8%	10%	12%	14%	16%

- Plastics
- Aluminium Cans
- Ferrous Metals

- Glass
- Papers

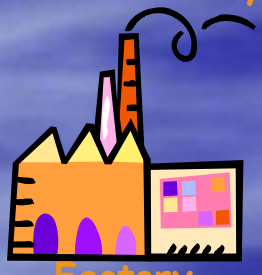
What are your responsibilities ?

Individual

Office

Hotel

Business entity



Factory

School

- **No matter you are an individual, office, hotel, business entity, school, factory etc… take ACTIONS !!**

Reduce

- Avoid using disposables, use durable products
- Share magazines, newspapers with others
- Use shopping bags / own food container
- Use less packaging products
- Use more electronic copies than printed copies
- Use refillable cartridges /inks
- Educate children/employees/staff on waste minimisation
- Reduce unnecessary wastage (food etc.)

Reuse

- Reuse empty bottles / containers
- Reuse old newspapers / waste papers for wrapping etc.
- Use both sides of papers
- Feed food residues to animals
- Educate children/employees/staff on reuse of wastes

Recycle

- Separate recyclable materials from wastes for collection
- Bring / sell recyclables to collectors / centres
- Carry out composting of organic wastes (such as food residues, garden wastes etc.)
- Educate children/employees/staff on recycling
- Participate in recycling campaigns / activities

- If you are a recycling player (collector / middleman / agent / industry etc.)

Please register with MBM !!

All about Wastes in MBM

In MCC, we generate **235 tons** of waste everyday or **85,814 tons** every year !!

Composition	Overall (%)
Food waste	37.0
Papers	31.4
Plastics	8.2
Glass	4.0
Ferrous Metals	1.8
Aluminium	0.6
Others	17.0

Projection

Total Waste Generation (tons/year)					
2005	2006	2007	2008	2009	2010
85,814.08	91,776.30	98,160.59	104,997.4	112,319.5	120,162.0

The volume of wastes in year 2010 is equivalent to 24,000 trips of normal waste trucks or 10 football fields of 0.5m height of waste!!!

Our Actions to Achieve the Targets

- Institutional Setup at Management & Operation Levels
- Registration of Existing Recycling Players
- Increase Awareness & Recycling Practices

For information, please contact:

Waste Minimisation Unit (WMU)
Majlis Bandaraya Miri (MBM)
Jalan Raja
98000, Miri, Sarawak
Tel: 085-426984; Fax: 085-415486

Appendix-3: Example of Waste Minimisation Policy of LA

POLICY ON WASTE MINIMISATION

Recognising the importance of a safe, healthy and clean environment for the population in _____, the Local Authority of _____ is committed towards taking reasonable measures to REDUCE, REUSE and RECYCLE wastes and to work towards achieving the national recycling target of 22 per cent by 2020.

It is the policy of the Local Authority of _____ to:

- **Provide adequate resources for the enhancement of awareness about good waste minimisation practices to its employees, clients and stakeholders.**
- **Ensure that its waste management and minimisation practices conform to and are in compliance National Policy and Strategy, and with the relevant laws and regulations, standards and best practices.**
- **Review its 3Rs policy, plan and programmes periodically and make improvements, as part of the continual improvement process.**

The Local Authority's employees are expected to be actively involved in the Local Action Plan for Waste Minimisation and programmes implemented in connection with this policy.

(Signature)

.....

President/Mayor

_____ Date:

……

Appendix-4: Example of PCM Roundtable Discussion Programme

LOCAL ACTION PLAN FOR WASTE MINIMISATION IN (LA)_____

PROJECT CYCLE MANAGEMENT (PCM) ROUNDTABLE

Venue:_____
Date:_____

Objectives: -

- To confirm list of stakeholders in waste minimisation in ____(LA)_____.
- To obtain inputs from key stakeholders about issues pertaining to waste minimisation in ____(LA)_____..
- To analyse cause & effects of key issues identified.
- To recommend measures to achieve ____(LA)_____waste minimisation objectives.

PROGRAMME:

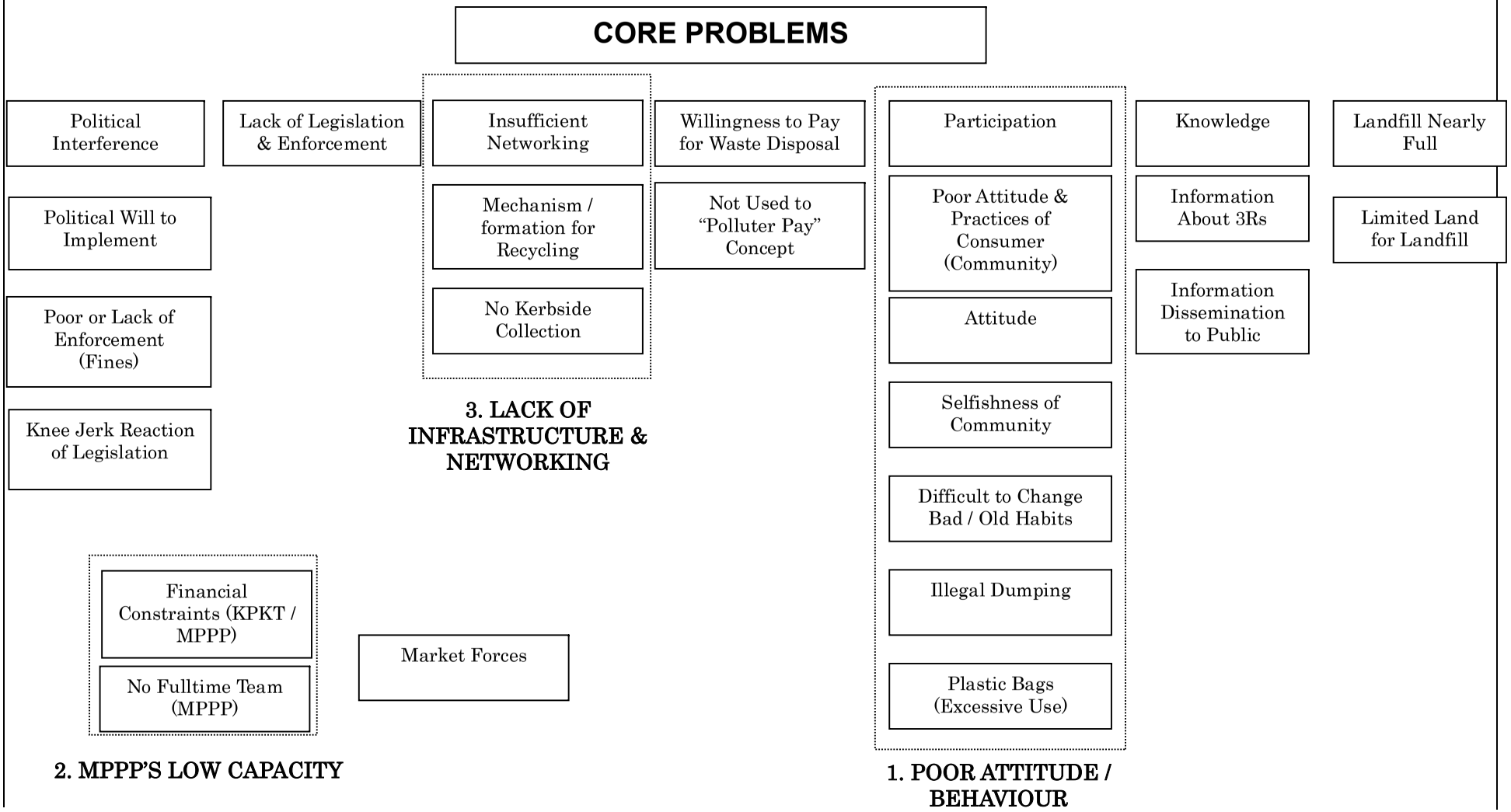
09.00 - 09:30	**Registration**
09: 30- 09.40	**Welcome Remarks by _____ Secretary, LA**
09.40 – 09: 45	**Introduction to PCM Roundtable by _____ Task Force Leader, LA**
09:45 – 11.30	**PCM Session**
	1: Introduction to PCM
	2: Roundtable Discussion
11:30 – 11.40	**Tea Break**
11.40 – 12.00	**Presentation of Roundtable Findings**

~~~~~~

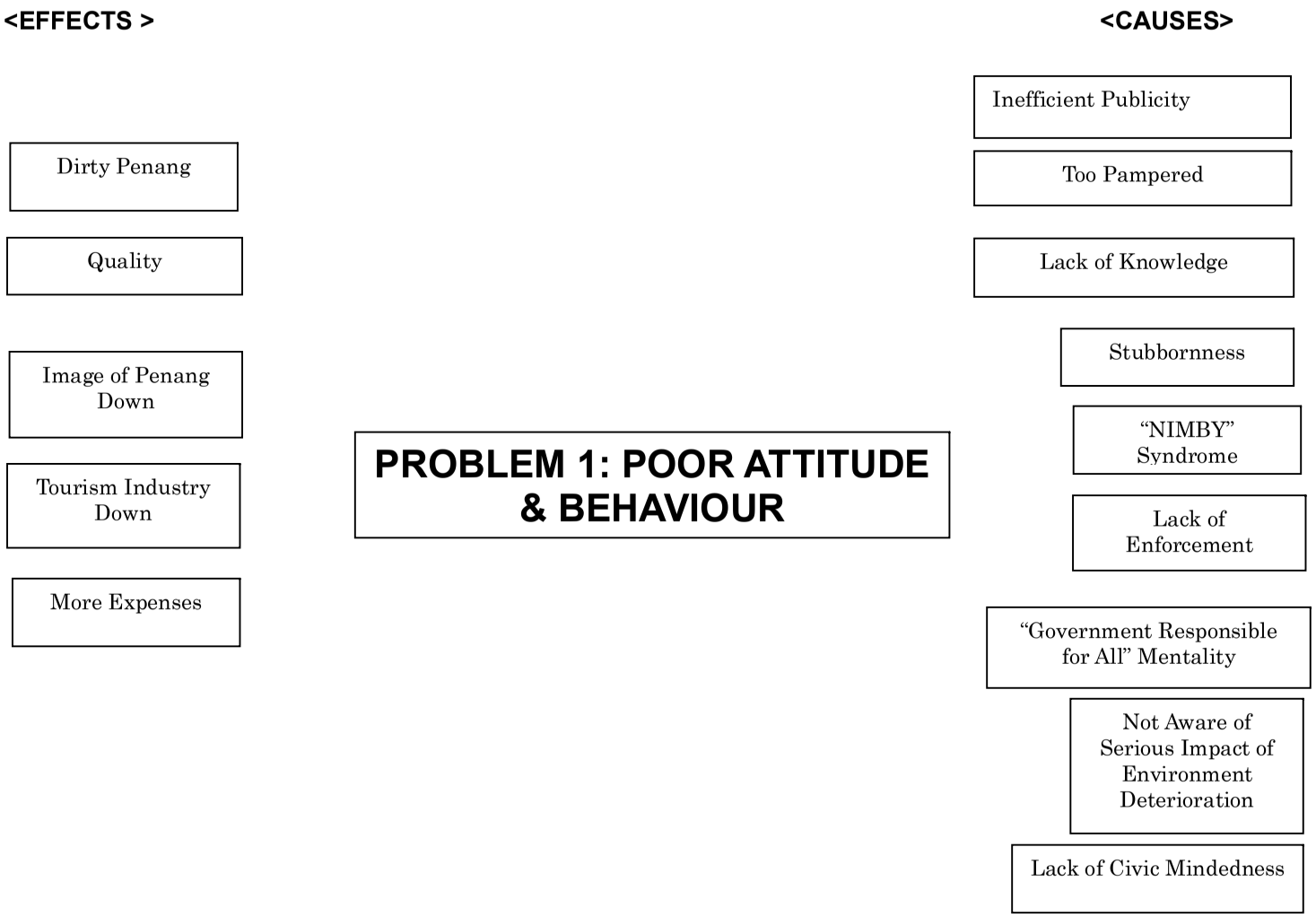
Rules of PCM:

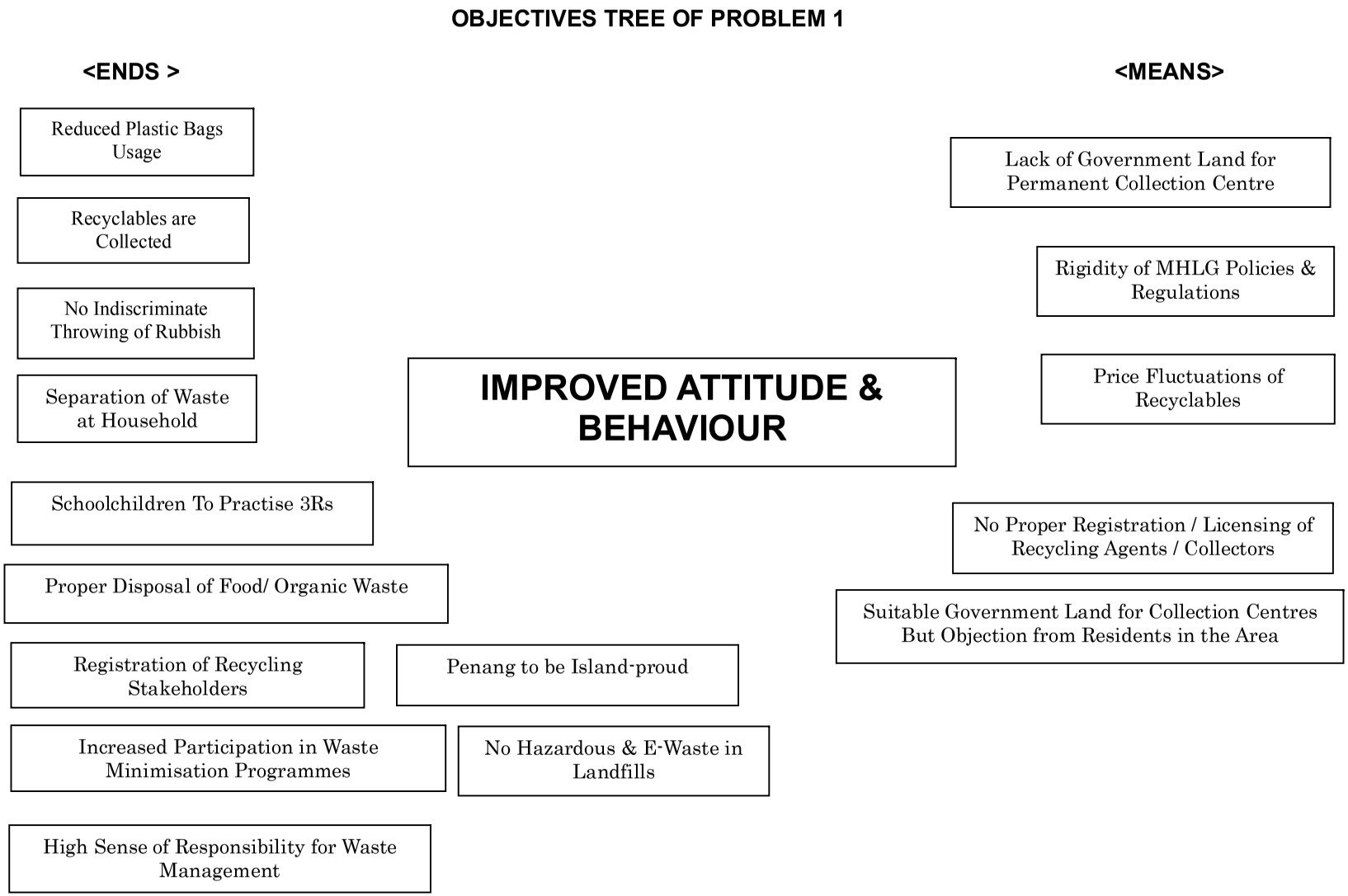
- Participants to write down own idea.
- One idea on one card.
- Use key words for each idea.
- The idea should be concrete one.
- Card first, discussion second.
- Card put on board agreed to/removed only by consensus.
~~~~~~

Appendix-5: Sample of Problem Tree and Objective Tree



PROBLEM TREE OF POOR ATTITUDE & BEHAVIOUR




OBJECTIVES TREE OF PROBLEM 1
<ENDS >
<MEANS>
Reduced Plastic Bags Usage
Recyclables are Collected
No Indiscriminate Throwing of Rubbish
Separation of Waste at Household
Schoolchildren To Practise 3Rs
Proper Disposal of Food/ Organic Waste
Registration of Recycling Stakeholders
Penang to be Island-proud
Increased Participation in Waste Minimisation Programmes
No Hazardous & E-Waste in Landfills
High Sense of Responsibility for Waste Management
IMPROVED ATTITUDE & BEHAVIOUR
Lack of Government Land for Permanent Collection Centre
Rigidity of MHLG Policies & Regulations
Price Fluctuations of Recyclables
No Proper Registration / Licensing of Recycling Agents / Collectors
Suitable Government Land for Collection Centres But Objection from Residents in the Area

Appendix-6: Study Approach and Methodology of Waste Amount and Composition Survey (WACS)

Waste Amount and Composition Survey (WACS)

Assuming that LAP-WM focuses on non-scheduled solid waste; its major sources are household, business (public and private) entities, institutions, and industries. However, the planner is required to determine what types of waste and generation sources are targeted in LAP-WM.

1. WACS on Household

The major steps of conducting WACS on household are as follows:

Step 1:	**Determining the survey areas based on sampling of households in accordance with income levels**

To estimate the average unit SW generation rate and composition from household, the planner is required to determine the survey areas and households that can represent their SW generation characteristics. If the statistical data is available on population or number of household by income level, it is suitable to sample the households in accordance with their income levels. The planner is required to determine the survey area by each income level. To do this, the planner must geographically categorise the residential areas in their locality by income levels. Such categorisation can be made based on the types of houses/residences of the households. The table below shows an example of sampling the households based on types of residences and assumed income levels in WACS survey in Klang Valley area, Kuala Lumpur.

Table 1: Sampling location, types of houses and income categories in WACS, Klang Valley Area, KL

No.	Location	No. samples	Category
1	Bangsar (Bungalow)	10	High income
2	Subang (Condominium)	15	High income
3	Subang Jaya (Terrace)	25	Medium income
4	Bangsar (Apartment)	20	Medium income
5	Kg. Abdullah Hukum (Squatter)	10	Low income
6	San Peng (Flat)	20	Low income
Total		100	

Step 2:	**Conduct WACS on sampled households**

The WACS survey on households consists of the following activities.

- Samples Collection
- Samples Sorting and Weighing
- Questionnaire Survey

(i) Samples Collection

To obtain the samples of generated SW from household, the surveyors are required to visit each household to seek for agreement to participate in WACS. The participating households are asked to retain their generated wastes for the study before disposing it to the collection trucks or communal bins. The surveyors distribute two different colour plastic bags with labels to each participating household, one is for the organic wastes (mainly food wastes) and the other is for other wastes including recyclable materials. This is to avoid the transfer of moisture from the organic wastes to the recyclable materials and subsequently reduce the errors of the results because the waste composition is all reported on weight basis. The wastes generated from each participating household are collected and analysed for 8 consecutive days. In this case, the samples collected on the first day must not be used, as it is unlikely to represent the actual amount of waste generated on that day due to the bias from participating household.

(ii) Samples Sorting and Weighing

The collected wastes were sorted manually and weighed on each day by types of waste:

The table below shows the example of categories of waste applied in WACS.

Table 2: An Example of Waste Category applied in WACS

▪ Food wastes	▪ Textile	▪ Other metal scraps
▪ Yard wastes	▪ Rubber/leathers	▪ Batteries
▪ Wood	▪ Glass bottles	▪ Others
▪ Papers (Newspapers, Magazines, others)	▪ Other glass waste	
▪ Plastics (rigid & film)	▪ Aluminium cans	
▪ Polystyrene	▪ Steel cans	

The process of sample collection, sorting and weighing are conducted at each participated household for 8 consecutive days, and the results for each day was recorded by using a standard "waste sorting record sheet" as shown in Table 3.

Form no:

Table 3: MSW Composition Study Waste Sorting Record SHEET

Date: _____Location: _____ Address:

_____

Total waste received: _____ (kg) Person in-charge: _____

No.	Waste composition	Weight (kg)								Total	(%)
		1	2	3	4	5	6	7	8		
1	Food Waste										
2	Yard Waste										
3	Newspapers										
4	Magazines										
5	Other Papers										
6	Plastics (rigid)										
7	Plastics (film)										
8	Plastics (polystyrene)										
9	Textile/garment										
10	Rubber/leathers										
11	Glass bottles										
12	Other glass waste										
13	Aluminium cans										
14	Steel cans										
15	Other metal scraps										
16	Batteries (car batteries, dry batteries)										
17	Others										
									Total Weight (kg)		

(iii) Questionnaire Survey

To collect the background information of the participated households as well as to carry out some surveys on the issues and activities of recycling at households, the surveyors are also required to conduct face-to-face interviews with the participated households and recorded them for analysis. Information to be collected from interviews includes:

- Basic information of the respondent
- Background information of the household including income, number of household members, type of house etc.
- Information on the household recyclable materials, that are separated form waste at home (types, amount, destination)

2. Identification of SW Generation from Non-household Sources (Business Entities, Institutions, and Industries)

There are two ways of identifying the amount of SW generation from non-household sources, i.e. one is to conduct similar WACS on non-household sources, and the other is to estimate it based on the difference between the amounts of total SW collection and estimated SW collection from household source. Practically, it is very time and resource consuming to conduct WACS on non-household sources as they vary with types activities. It is also difficult to determine per unit generation of SW from non-household SW generation sources since different unit is required to be set by types of facilities and premises as shown in the table below.

Table 4: Unit to be set for SW generation from non-household sources

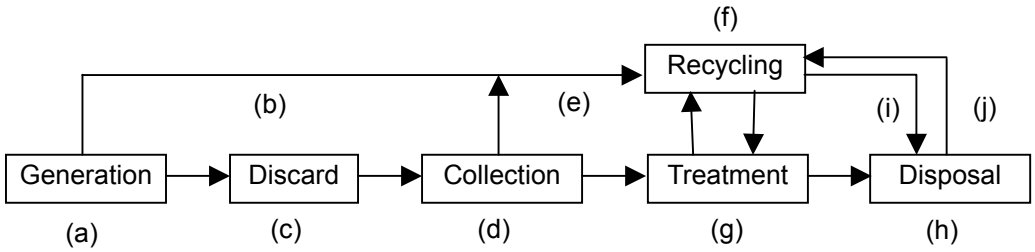
Non-household Sources	Standard Unit for SW generation
Offices	Kg/employee/day
Restaurants	Kg/table/day Kg/guest/day (number of guests) Kg/dollar/day (sales)
Hotels	Kg/guest/day (number of guests) Kg/room/day Kg/dollar/day (sales)
Supermarket/groceries	Kg/square meter/day Kg/dollar/day (sales)
Factory	Kg/employee/day
Market	Kg/stall/day

In the case of non-household sources above, it is difficult to obtain per unit SW generation since the data on number of units are not always available in the statistics as population or number of households. If such data is available, it is useful for the planner to conduct WACS to obtain per unit SW generation by types of non-household waste sources. The planner is required to sample non-household sources by each type of premises for WACS as well as interviews in the same way as household.

Appendix-7 Methods of estimating the amount of waste by each waste flow process

Estimation of Solid Waste Flow

To complete SW flow in each local authority, the planner is required to estimate the amount of SW for each waste flow process as shown in Figure 1.



Waste flow process	Definitions
(a)	SW generation from sources
(b)	Collection of recyclables directly from sources (based on source separation)
(c)	SW discharging from sources ((a)-(b))
(d)	SW collection ((c)=(d))
(e)	Collection of recyclables from the SW discharged and collected
(f)	SW recycling ((b)+(e)+(j)-(i)
(g)	Intermediate treatment of waste for volume reduction (incineration, etc.)
(h)	Final disposal of SW
(i)	Final disposal of recycling residue
(j)	Collection of recyclables at final disposal site (waste-picking, etc.)

Figure 1: Outline of Waste Flow and definitions by waste handling process

The methods of estimating SW amount is discussed below for each waste flow process.

(1) SW generation from sources: (a)

SW generation from sources is estimated as the sum of the amount of SW discharged (c) and recyclables collected directly from sources (b).

(2) Recyclables collection directly from sources: (b)

The amount of recyclables collected directly from sources must need information and data from recyclers. If the planner can properly capture the recyclers who collect recyclables directly from sources in the target areas and obtain data from them, it is the most suitable way to capture the amount of recyclables collected. However, there are usually various recyclers, many of which are not captured by LA such as primary individual collectors of recyclables, traders, buyers, end-users, and so forth. Buy-back centres and/or drop-off centres are also included in this category.

If the planner sums up the amount of recyclables collected from all of these recyclers, he will obviously overestimate it since recyclables are transferred also among these recyclers. To avoid such overestimation, the planner is required to focus on the primary collectors and receivers of recyclables directly from the sources based on the exact identification of the route of recyclable collection from sources to final destinations.

The other way of estimation is to conduct the sampling survey on source separation of recyclables at sources to obtain per unit amount of separated recyclables at sources and multiply it by number of units for each source. However, this type of estimation is time and resource consuming while its result always includes considerable uncertainties. The planner is strongly recommended to rely on the actual data to be provided by primary collectors and receivers of recyclables directly from the sources.

If there is no or only limited access to such recyclers, the planner may be required to consider to introduce registration of recyclers and reporting of their activities to the LA.

(3) SW discharging and collection: (c) and (d)

The amount of SW discharged can be estimated based on the result of WACS described in Section 3.1.2 above. The other method of estimating the discharging amount of SW is to estimate the amount of SW collection based on the data from SW collectors. If the LA contracted out the SW collection to the concessionaires or other contractors, the data on the amount of SW collection may be available. If it is not available, the planner is required to measure the weight of loaded SW collection trucks and vehicles by weighbridge (truck scale) to identify the average loaded amount of SW per trip per truck. Based on this, the average daily amount of SW collection from service area can be estimated by multiplying the number of daily truck trips by its average loaded amount of SW. Per capita SW discharging can also be estimated as the result of dividing the total amount SW collection by the population served with that SW collection. If some of the target areas or population is currently not served with SW collection service, the amount of SW discharging from such areas can also be estimated by using this per capita SW discharging.

In obtaining the SW collection data from concessionaires and contractors, the planner is required to carefully distinguish target SW from non-target waste to avoid its overestimation.

(4) Collection of recyclables from SW discharged: (e)

The data from SW collectors is the only source of obtaining the amount of recyclables collected from SW discharged. If SW collection is contracted out to concessionaires or contractors, the planner is required to obtain the data from those collection agents. In the case of Malaysia, some recyclable materials are collected by SW collection workers, who are called “tailgate collectors”, although it is difficult to capture such individual informal collection activities. The planner is recommended to focus on the amount of recyclables collection officially conducted by concessionaires or SW contractors.

(5) Total amount of SW recycled: (f)

The total amount of SW recycled is estimated as the sum of the recyclables collected directory from sources, the recyclables collected from SW discharged from sources and the recyclables collected from final disposal landfills. If the planner can properly capture the primary collectors and receivers of recyclable materials, it will be possible to estimate the total amount of SW recycled based on the data obtained from them. However, the route of recyclable materials needs to be carefully reviewed and assessed to avoid double counting as mentioned in (2) of this section above.

(6) The amount of SW treated for volume reduction: (g)

Currently, most of the SW collected is brought to landfills for final disposal except for those recycled. Intermediate treatment facilities for volume reduction such as waste incinerators are not yet introduced in Malaysia. If such facilities are introduced in the future, the amount waste reduced through such treatment is required to be captured by the planner to identify the total flow of solid waste. In addition, the planner is required to be careful about the amount and destinations of the residue generated from such treatment since the handling of such residue is one important issue to be properly handled to minimise its impact upon the environment.

(7) The amount of Final Disposal and collection of recyclables at final disposal sites: (h), (i) and (j)

The data on the amount of final disposal is usually available at the final disposal landfills equipped with weighbridges. By collecting the weighbridge data, the planner can estimate the amount of final disposal. Even if such data is not available due to lack of weighbridge at final disposal landfills, no existence of landfills in the locality, or any other reasons, the planner still can estimate the amount of disposal by subtracting the amount of collected recyclables from the SW collected from the total amount of SW collected. Both types of information can be obtained from the SW collectors. The result of above calculation equals to the amount of SW brought to final disposal landfills by SW collectors/haulers. Although this result does not consider the amount of recyclables collection at final disposal landfills, the planner is recommended to exclude the amount of recyclables collection at landfills since such activities should be eliminated or converted to recyclables collection of more appropriate manner such as collection of recyclables from sources where they are properly separated.

In addition, the planner is also required to carefully consider the amount of residue generated from recycling activities. Not all of the collected recyclable materials are recycled, but some residue and/or non-recyclable materials are usually produced from recycling industries. The destinations of such residue and non-recyclable materials need to be carefully monitored to avoid possible negative impacts upon the environment by them.

Appendix-8 Schedule of Preparation and Implementation of LAP-WM (Sample)

Preparation and Implementation Schedule of LAP-WM (Sample)

Item	Month of the Year											
	1	2	3	4	5	6	7	8	9	10	11	12
1. Establish Institutional Framework												
-Prepare paper for management approval	■	■										
-Identify key stakeholders	■	■										
-Set up C-LAP		■	■									
-Formulate WM policy		■	△									
2. Identify Current SWM Scenarios												
-Conduct PCM roundtable			■									
-Collect/update data			■	■								
-Analyse data & prepare tables/graphs etc.				△								
3. Determine Scope of LAP-WM												
-Present data to C-LAP					■							
-Discuss scope in C-LAP					■							
-Present scope to LA top management (TM)						△						
4. Project Future Waste Streams												
-Examine data						■						
-Make projections						■						
-Prepare findings						■	△					
5. Set WM targets												
-Examine data & projections							■					
-Define objectives & targets							■	△				
6. Determine Actions to Achieve Targets												
-Discuss possible actions								■				
-Select performance indicators								■				
-Prepare schedule								■				
-Prepare budget								■				
-Finalise LAP-WM									■			
-Present LAP-WM to TM for approval									■	△		

Remarks; <△: Milestone/ 1-6>

1. Approval to proceed is obtained from LA Top Management
2. Information on Current SWM & recycling Scenarios documented
3. LA Top Management endorses Scope of LAP-WM
4. Information on waste projections is ready
5. WM Targets are defined
6. LA Top Management endorses & approves LAP-WM

Appendix-9 Summary of Local Action Plan for Waste Minimisation and Recycling

Key Action Categories	Targets	Strategies	Actions to be taken
By-Laws	To capture as much as possible the existing recycling players	▪ Set up by-law to formally register the recycling players ▪ Mandatory registration of recycling players within the LA areas	▪ Prepare registration forms and establish database system; advertise in local newspapers, circulate notice to players, carry out workshop or dialogue with the players.
	To ensure proper recycling and waste minimisation	▪ Mandatory waste management plans been carried out along with licensing of BEs	▪ Prepare criteria and guideline for waste management plans; circulate notice to BEs; carry out workshop or dialogue with the BEs.
Advocacy	To properly and specifically manage matters related to recycling in the LA	▪ Establish a "recycling unit" or "recycling taskforce" within the LA ▪ Establish a Recycling Information Centre (RIC) within the LA if necessary ▪ Practice and purchase recycled materials (such as papers) for the LA	▪ Identify appropriate number of members required in the unit; create specific job descriptions and responsibilities, circulate notice to the BEs, players and public announcing the set up of the unit. ▪ Identify strategic venue for the R-centre; determine detailed set up and identify materials to be included in the centre; design, publicise the R-centre; seek for sponsorship (if required). ▪ Identify suppliers for recycled materials; purchase and use recycled materials (such as papers) stage by stage.

Key Action Categories	Targets	Strategies	Actions to be taken
	To enhance local markets for recyclable materials	▪ Monitor the prices, imports and exports of recyclable materials ▪ Find possible markets in areas outside the LA ▪ Purchase of recyclable materials at minimum price by the LA (optional)	▪ Periodically monitor the prices and flows of recyclable materials. ▪ Communicate / create networking with nearby Local Authorities to identify possible market for recyclables. ▪ Negotiate with recycling industries to fix minimum purchase prices for recyclables.
	To consistently collect data on on-going recycling activities	▪ Establish and introduce a user-friendly "recording system" to be reported periodically by the recycling players	▪ Prepare the reporting form; provide guidance to the players to perform the reporting; carry out workshop or dialogue with the players.
	To encourage / promote more effective recycling activities	▪ Implement demonstration projects in the LA areas (such as in schools, offices etc.) ▪ Promotion of ISO 14000 and 3Rs concepts for hotels and manufacturers etc. ▪ Recognition / award for successful recycling programmes.	▪ Select appropriate participating schools, offices etc; set up sub-committee and discuss in detailed about the demonstration projects (such as provision of recycling bins etc.); publicise the demonstration projects. ▪ Design and circulate pamphlets to introduce concepts of ISO 14000 and 3Rs to hotels and manufacturers. ▪ Create criteria for evaluation; identify successful programmes, give award or recognition and publicise the programmes.

Key Action Categories	Targets	Strategies	Actions to be taken
Public Participation and Behavior Change	To increase awareness on waste minimisation and recycling (public and BEs)	▪ Public awareness campaigns, school awareness campaigns through mass media etc ▪ Education / Development of guidelines (booklets) for distributions ▪ Establish community-based recycling centres as necessary	▪ Design and prepare education materials (guideline, booklets etc.); distribute to schools; carry out seminar, talks and campaigns in schools. ▪ Publicise the school awareness campaigns; give full supports such as provision of recycling bins, purchase of recyclable collected etc. ▪ Recognition of successful school awareness campaigns through award of certificate, presents etc. ▪ Negotiate and work together with relevant parties (such as NGOs, collectors etc.); publicise the recycling centres, carry out campaigns to targeted community.
	To increase participation in recycling	▪ Provision of incentives (such as parking coupons, shopping vouchers etc.)	▪ Negotiate with potential sponsors; collaborate with recycling centres (such as buy back centres). ▪ Publicise the incentive through mass media.
Economic Instrument	To encourage / promote more effective recycling activities	▪ Provision of incentive to players (recycling bins, recycling plastic bags, posters and other facilities) ▪ Provision of incentives to public (such as parking coupons, shopping vouchers etc.)	▪ Identify potential sponsors or suppliers for support; ▪ Publicise the incentive through mass media.

Appendix-10 Summary of Proposed Actions to be Taken at Specific Waste Generation Sources

Targets		Actions to be Taken
Households	Reduction of wastes	▪ Awareness / Education campaigns on reduction of wastes from households by various means, such as using own containers for buying food; using own shopping bags; avoid using disposable utensils; sharing newspapers and magazines; avoid buying unnecessary items etc. ▪ Awareness / Education campaigns on reuse of wastes, such as reuse of plastic containers, glass bottles etc. ▪ Development of guideline/booklet on reduction of wastes at home.
	Proper handling of wastes	▪ Awareness / Education campaigns on proper separation of wastes at home, proper handling of recyclable materials such as cleaning of glass bottles, cleaning and compacting of PET and aluminium bottles etc. ▪ Provision of plastic bags / bins for proper separation of recyclable wastes and non-recyclable wastes.
	Increase public participation in recycling	▪ Awareness / Education campaigns to create awareness and subsequently increase the public participation on the recycling activities in public recycling centres / bins etc. ▪ Provision of incentive for participation in public recycling, such as provision of parking coupons, shopping vouchers etc.
Commercial Enterprises	Reduction of wastes	▪ Awareness / Education campaigns on reduction of wastes from commercial premises by various means, such as using less packaging materials; avoid using disposable utensils etc.
	Proper handling of wastes	▪ Awareness / Education campaigns on proper separation of wastes at source, proper handling of recyclable materials such as cleaning of glass bottles, cleaning and compacting of PET and aluminium bottles etc. ▪ Provision of plastic bags / bins for proper separation of recyclable wastes and non-recyclable wastes. ▪ Development of guideline for waste minimisation and recycling in commercial premises.
	Increase participation in recycling	▪ Provision of incentives such as tax reduction, subsidies on purchase of recycling related equipment, machinery etc.

Targets		Actions to be Taken
Hotels and Restaurants	Reduction of wastes	▪ Awareness / Education campaigns on reduction of wastes from hotels and restaurants by various means, such as using less packaging materials (use dispensers instead of bottled soup); avoid using disposable utensils etc.
	Proper handling of wastes	▪ Awareness / Education campaigns on proper separation of wastes at source, proper handling of recyclable materials such as cleaning of glass bottles, cleaning and compacting of PET and aluminium bottles etc. ▪ Provision of information on proper handling of food wastes (such as composting or high speed fermentation technology). ▪ Provision of plastic bags / bins for proper separation of recyclable wastes and non-recyclable wastes. ▪ Development of guideline for waste minimisation and recycling in hotels and restaurants.
	Increase participation in recycling	▪ Provision of incentives such as tax reduction, subsidies on purchase of recycling related equipment, machinery etc. ▪ Promotion of ISO 14000 certification and Eco-tourism concepts (particularly for hotels)
Offices	Reduction of wastes	▪ Awareness / Education campaigns on reduction of wastes from offices by various means, such as using less packaging materials; using both paper sides; substituting hardcopies by electronic copies; avoid using disposable utensils in office; use refillable cartridge etc.
	Proper handling of wastes	▪ Awareness / Education campaigns on proper separation of wastes at source, proper handling of recyclable materials such as cleaning of glass bottles, cleaning and compacting of PET and aluminium bottles etc. ▪ Provision of plastic bags / bins for proper separation of recyclable wastes and non-recyclable wastes. ▪ Development of guideline for waste minimisation and recycling in offices.
	Increase participation in recycling	▪ Provision of incentives such as tax reduction, subsidies on purchase of recycling related equipment, machinery etc. ▪ Promotion of ISO 14000 certification

Targets		Actions to be Taken
Manufacturers	Reduction of wastes	▪ Awareness / Education campaigns on reduction of wastes from manufacturers by various means, such as using less packaging raw materials; "waste exchange" between manufacturers; using less packaging for products; using both paper sides in the office; avoid using disposable utensils in canteen etc.
	Proper handling of wastes	▪ Awareness / Education campaigns on proper separation of wastes at source, proper handling of recyclable materials such as cleaning of glass bottles, cleaning and compacting of PET and aluminium bottles etc. ▪ Provision of plastic bags / bins for proper separation of recyclable wastes and non-recyclable wastes. ▪ Development of guideline for waste minimisation and recycling in manufacturer based on specific type of manufacturer.
	Increase participation in recycling	▪ Provision of incentives such as tax reduction, subsidies on purchase of recycling related equipment, machinery etc. ▪ Promotion of ISO 14000 certification

Appendix-11 List of Contacts

LIST OF CONTACTS

No.	Name	Address	Contact Number
1.0	LOCAL AUTHORITY		
1.1	Majlis Bandaraya Miri (MBM) <u>Contact Persons</u> Mr Sam Kai Khiong Mr Jackson Agan	Miri City Council Public Services Section/Recycling Network Init Jalan Kingsway 98000 MIRI	Tel: 085-426 984 Fax: 085-415 486 www.rnu.mbm.net
1.2	Majlis Perbandaran Pulau Pinang (MPPP) <u>Contact Persons</u> Tuan Haji Zulkifli Zakaria Mr. Lim Leong Soon	Recycling Network Unit, Urban Services Department, Jalan Padang Kota Lama, 10200 PULAU PINANG	Tel: 04-263 3000 Fax: 04-263 3036 www.rnumppp.net
1.3	Majlis Perbandaran Subang Jaya (MPSJ)	Waste Management Unit, Majlis Perbandaran Subang Jaya, Persiaran Perpaduan Jalan USJ 5, 47610 SUBANG JAYA	Tel: 03-8026 3161 Fax: 03-8024 5235 www.rnumpsj.net
1.4	Majlis Daerah Kinta Selatan (MDKS)	Majlis Daerah Kinta Selatan, Jalan Iskandar, 31900 KAMPAR	Tel: 05-467 1020/ 05-467 1030

Appendix-12 Questionnaire on Guidelines for LAP-WM

LOCAL ACTION PLAN ON WASTE MINIMISATION (LAP-WM)

QUESTIONNAIRE

1. Have you started the process of preparing a Local Action Plan for Waste Minimisation (LAP-WM) for your local authority? *Yes* □ *No* □

2. If Yes, how far in the process are you at now?

Forming Task Force/C-LAP	□	Formulating Actions	□
PCM/Explanatory Meetings	□	Identifying KPIs	□
Waste Survey/Data Collection	□	Awaiting approval of LAP	□
Setting Targets	□	Implementation	□

3. Which parts/sections of these Guidelines do you find useful? And why?

Guidelines (main text) □

Examples □

Waste Survey □

Others_____ □

Reasons Guidance is useful

_____

_____

_____

4. Which parts/sections of these Guidelines do you NOT find useful, and Why?

_____

_____

_____

5. Are you satisfied with the guidance provided in the Guidelines?

Yes □ *No* □

If No, what additional materials would you like to suggest?

_____

_____

_____

6. Would you like to offer any **recommendations** for improving the Guidelines?

_____

_____

_____

Name: _____

Local Authority: _____

Address: _____

_____

_____

Poskod:_____ **Negeri**:_____