MINISTRY OF HOUSING AND LOCAL GOVERNMENT
MALAYSIA

THE STUDY ON NATIONAL WASTE MINIMISATION IN MALAYSIA

FINAL REPORT

Supporting Report – 2
Local Action Plan

JULY 2006

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The Study on National Waste Minimisation in Malaysia

Final Report

FINAL REPORT COMPOSITION

The Final Report is composed of the following:

1. Summary
2. Volume I – Main Report
3. Volume II – Guidelines
4. Volume III – Pilot Projects
5. Supporting Report – 1 Additional Information
6. Supporting Report – 2 Local Action Plan

This Report is “Supporting Report-2 Local Action Plan”.

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Abbreviations

AFSB	Alam Flora Sdn Bhd
A/P	Action Plan
CBO	Community Based Organisation
C/P	Counterpart
DB	Dewan Bandaraya (City Hall)
DBKL	Dewan Bandaraya Kuala Lumpur (Kuala Lumpur City Hall)
DBKU	Dewan Bandaraya Kuching Utara (Kuching North City Hall)
DSWM	Division of Solid Waste Management
EPU	Economic Planning Unit
GOM	Government of Malaysia
G3RS	Guidelines for Enhancement of 3Rs Activities in School
IEC	Information, Education and Communication
IMS	Information Management System
JICA	Japan International Cooperation Agency
LA	Local Authority
LAP-WM	Local Action Plan on Waste Minimisation
LGD	Local Government Department
MB	Majlis Bandaraya (City Council)
MBJB	Majlis Bandaraya Johor Bahru (Johor Bahru City Council)
MBKS	Majlis Bandaraya Kuching Selatan (Kuching South City Council)
MBM	Majlis Bandaraya Miri (Miri City Council)
MBMB	Majlis Bandaraya Melaka Bersejarah (Melaka City Council)
MD	Majlis Daerah (District Council)
MDK	Majlis Daerah Kerian
MDKS	Majlis Daerah Kinta Selatan (South Kinta District Council)
MHLG	Ministry of Housing and Local Government
MIDA	Malaysian Industrial Development Authority
MITI	Ministry of International Trade and Industry
MOE	Ministry of Education
MONRE	Ministry of Natural Resources and Environment
MP	Majlis Pernadaran (Municipal Council)
M/P	Master Plan
MPK	Majlis Perbandaran Kuantan (Kuantan Municipal Council)
MPPP	Majlis Perbandaran Pulau Pinang (Penang Island Municipal Council)
MPPJ	Majlis Perbandaran Petaling Jaya (Petaling Jaya Municipal Council)
MPSJ	Majlis Perbandaran Subang Jaya (Subang Jaya Municipal Council)
MRF	Material Recovery Facility
MSW	Municipal Solid Waste
NCP3R	National Children's Programme on 3Rs
NGO	Non Governmental Organisation
NRD	National Recycling Day
NREB	National Resources and Environment Board
NRP	National Recycling Programme
NSP	National Strategic Plan on Solid Waste Management
OECD	Organisation for Economic Co-operation and Development
OPP3	Third Outline Perspective Plan
PDM	Project Design Matrix
PP	Pilot Project
PR	Public Relations
PWD	Public Works Department
RA	Residents Association

R&D	Research and Development
RIC	Recycling Information Centre
RM-8	Eighth Malaysian Plan
RM-9	Ninth Malaysian Plan
RNU	Recycling Networking Unit
SND	Stakeholders' Networking Database
SS	Source Separation
SW	Solid Waste
SWM	Solid Waste Management
SWM Act	Solid Waste Management Act
SWMD	Solid Waste Management Department
SWMSB	Southern Waste Management Sdn Bhd
TWG	Technical Working Group
WM	Waste Minimisation
WMU	Waste Minimisation Unit
WM-M/P	Waste Minimisation Master Plan
3RAG	3Rs Action Guide

PART 1

INTRODUCTION

Part 1 INTRODUCTION

A Local Action Plan on Waste Minimisation (LAP-WM) is required by each Local Authority (LA) to provide the road map for the Local Authority to achieve waste minimisation and recycling targets that are tailored to suit its own local conditions. Along with the achievements of targets set in the LAPs, ultimately the LAP helps the LAs to contribute towards the national goals of realising a "*Material Cycle Society*" (vision of the Waste Minimisation Master Plan) and achieving the national recycling target of 22% in the year 2020 set by the *National Strategic Plan for Solid waste Management*.

The steps involved in formulation of LAPs are explained in detail in the "*Guideline for Preparation of Local Action Plan on Waste Minimisation*", Volume 2 of this Report. In general, there are seven steps for the formulation of LAP as summarised below:

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

In the context of the LAP-WM, the LA is expected to play an important role to facilitate and coordinate plans, programme s and activities to encourage more widespread adoption of waste reducing, reusing and recycling initiatives. In particular the LA is expected to assume the following responsibilities:

1) To be the lead agency or focal point in the implementation of the LAP-WM
2) To facilitate networking and partnership among the stakeholders in recycling and waste minimisation
3) To monitor and report performance of recycling and waste minimisation programme s
4) To be the focal point for data and information related to recycling and waste minimisation
5) To be the link between the Federal Government and the State Government
6) To be the model for recycling and waste minimisation to other organisations ("Leadership by Example")

This Supporting Report - 2 details the LAPs-WM which were formulated by four (4) Model LAs, namely Majlis Daerah Kinta Selatan (MDKS), Majlis Perbandaran Subang Jaya (MPSJ), Majlis Bandaraya Miri (MBM) and Majlis Perbandaran Pulau Pinang (MPPP) during the Study on National Waste Minimisation in Malaysia (2004 - 2006). These LAPs-WM were formulated under the joint planning works between the local taskforce, which was organised by the LAs, and JICA Study Team as shown in Figure 1-1.

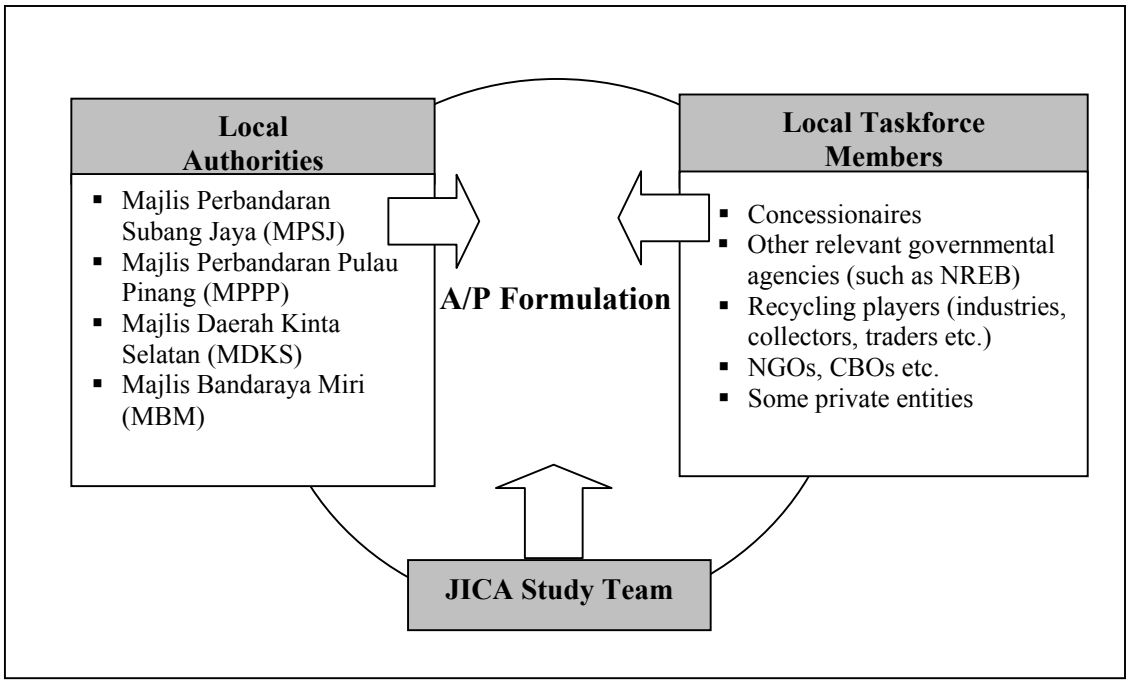

Figure 1-1 Organisation Framework for the A/P Formulations

Based on the experiences gained from preparing the LAPs-WM, a "*Guideline for Preparation of Local Action Plan on Waste Minimisation*" was prepared and is explained in detail in Part 3, Volume 2 of the Draft Final Report (2nd Edition). On the other hand, the complete documents of LAPs-WM formulated by the Model LAs are attached in Parts 2, 3, 4 and 5 of this Supporting Report-2. The contents of the LAPs-WM formulated were based on the following outline:

Chapter 1 (Introduction)

This chapter describes the background, objectives and scope of the action plans, including the organisation framework for the action plan formulation, as well as the role of all relevant stakeholders in the LA.

Chapter 2 (State of Waste Management and Recycling in the LAs)

This chapter describes the background information and available data on existing solid waste management and recycling system in the LA. The information on SMW includes the institutional frameworks, service areas, waste generation rate and compositions, waste storage, collection, treatment and disposal systems etc. On the other hand, information on recycling includes some history and background of recycling practices in the LA, types of recycling players involved, types and amount of recyclable materials collected, performance of recycling in the LA, issues and problems faced with some proposed countermeasures etc.

Chapter 3 (Targets of Waste Minimisation and Recycling)

This chapter describes the potential and targets of waste minimisation and recycling in the LA, including some projections of future waste generation, composition and recyclable materials production within the LA areas in the coming five (5) years. This chapter also proposes the target recycling rates to be achieved by the LAs based on the recycling potential and local conditions.

Chapter 4 (Actions to Achieve the Targets)

This chapter describes some proposed key actions to be carried out by the LA in order to achieve the recycling targets. This includes some legislative instruments, economic instruments, information and awareness campaigns, strengthening of recycling players etc. It also summarises some proposed actions to be taken by specific generation sources such as households, commercial entities, restaurants, hotels, offices and manufacturers. In addition, cost implications of implementing the key actions are also presented.

Chapter 5 (Monitoring and Implementation Schedule for the A/Ps)

This chapter describes some proposed monitoring and evaluation measures for the performance of the action plan implementation. Some performance indicators are recommended and periodical reporting system was introduced. On the other hand, an implementation schedule for the entire proposed action plan is presented in this chapter for the LA.

Throughout the entire process of preparing the LAPs-WM, some problems and issues were encountered and appropriate countermeasures were taken to ensure successful completion of the LAP-WM formulations. Some experiences learned are summarised and documented in Part 2 of this Supporting Report-2.

With the experiences learned to formulate the LAPs-WM in the Model LAs, and based on the "Guideline for Preparation of Local Action Plan on Waste Minimisation", a complete set of guidance towards formulating a LAP-WM on waste minimisation for other LAs is now available. With formulations and implementations of more LAPs-WM in LAs throughout the country, ultimately it helps towards achieving the national recycling target of 22% in the year 2020.

PART 2

Issues and Measures for the Preparation of LAP

Part 2 ISSUES AND MEASURES FOR THE PREPARATION OF LAP

Throughout the entire process of preparing the LAPs-WM in the Model Local Authorities (LAs), some issues have been identified and lessons have been learnt as described hereafter.

2.1 Consent from the Top Management

It is crucial to have the consent of the top management of the LA (such as the Council's President) to formulate and implement the LAP-WM. The top management's recognition on the benefits and importance of implementing a LAP-WM is sometimes lacking, due to information gap and priority for implementing some other plans instead of the LAP-WM on waste minimisation.

In the case of this study, top managements' consents from all the Model LAs were obtained without much problem due to the fact that these LAs were selected by MHLG based on certain criteria which included willingness to participate in this programme and the advantage that funding of some of the required expenses was shouldered by the study. However, based on several meetings and discussions with other LAs, it was recognised that in many cases, consent from the top management will be one of the biggest obstacle for implementing a LAP-WM in a LA. A few major factors have been identified as common concerns by the top management:

- Why is there a necessity for the LAs to have a LAP-WM?
- How much budget is required for the formulation and implementation of the LAP-WM?
- Is the LA having sufficient manpower for the formulation and implementation of the LAP-WM?
- Are the officers of the LA technically capable to carry out such LAP-WM?
- What are the consequences of implementing the LAP-WM to the public, industries, etc?

It is therefore necessary to present a comprehensive proposal to the top management of the LA clearly outlining the importance and benefits of implementing 3Rs and waste minimisation. Prior to this proposal, of course commitments from dedicated officers are crucial in the preparatory works for such a proposal.

In addition, it was recognised that the Model LAs should play a role to convey information about the importance and benefits of implementing a LAP-WM in the Model LA to the top management of other LAs. It is believed that this will be more effective to convince the top management because of the "peer pressure" that comes from another LA.

2.2 Lack of Manpower

In many LAs, it was found that there are only a few officers that are taking responsibility on matters related to solid waste management. This is particularly evident in LAs where the concessionaire is providing the entire solid waste management services in the council.

In this matter, it was found that effective involvement of the limited human resources is very important. One of the effective measures to encourage the person

in-charge is to establish the Waste Minimisation Unit (WMU) and appoint the personnel in WMU.

In addition, an inter-departmental committee could be set up for the formulation of LAP-WM, which would involve more people from the LA. Some departments that were involved in the formulation of LAPs-WM in the Model LAs were:

- Department of Public / Environmental Health
- Department of Urban Services
- Department of Licensing
- Department of Enforcement
- Department of Town Planning
- Department of Social and Community Development

Besides, some other stakeholders on waste minimisation and recycling who are active in the LA should be invited to participate in the formulation of LAPs-WM that more ideas from different players can be obtained.

2.3 Lack of Commitments

One of the problems faced in some LAs is the commitment from the officers in charge of the formulation of LAP-WM. In many cases, the commitments were found only from one or two dedicated officers while the others in the team or committee showed very low commitment and lack of interest. The lack of commitment can cause unnecessary delay of works and subsequently affect the overall process of LAP-WM formulation and implementation.

One of the possible ways to increase the commitments is to attract the interest of the officers by creating more attractive activities, such as exchanging visits amongst the stakeholders, etc instead of only having internal roundtable discussions. In addition, the commitment and leadership of the "chief officer" is also crucial so that the overall performance of the team or committees is well managed.

2.4 Lack of Expertise

It was also commonly found that the officers of the LAs are lacking in expertise and experience in issues related to waste minimisation and recycling. During the Study, for the Model LAs, the process of LAP-WM formulations were guided and assisted by the experts of the study team. In the future it is important that the other LAs, refer to the *"Guideline for Formulation of Local Action Plan on Waste Minimisation"* so that the responsible officers are guided towards the formulation of LAP-WM.

In the long run, more capacity building and training programmes could be carried out for the LA officers on waste minimisation and recycling issues by MHLG. A "Core Team" consisting of model LAs and MHLG officials who participated in the JICA Study, when formed will have a role to disseminate experiences of the Study; i.e. preparation of LAP-WM etc to other LA officials.

2.5 Lack of Budget

Lacking of budget or financial constraint is another major problem faced in many LAs especially on matters related to solid waste management, waste minimisation and recycling.

At the formulation stage, some budget for LAP-WM formulation is required especially in cases where the data on the existing conditions of the LA is not available or needs to be updated through surveys, such as waste generation data, composition data, etc. From the experience of formulating LAPs-WM in the Model LAs, it was found that the overall budget required can be minimised, except if some primary data collection needs to be done. In general, some required budget items (excluding the budget required for data collection) include:

- Budget for organisation of meetings, discussions and workshops etc with the stakeholders.
- Budget for travelling to surrounding areas within the LA to investigate the existing conditions.
- Budget for paper works and preparation of LAP-WM.

On the other hand if primary data collection is required, then the budget required can be significantly higher (waste amount & composition survey and/or waste flow survey should be carried out). In this matter, one possible solution is to make use of whatever available data as well as some "default" data from other sources, such as average waste composition data published and national per capita waste generation rate etc. Such data may also be available at scientific academies or universities, when collected in the course of researches.

Furthermore, it was found that most of the LAs are very concerned on the availability of budget in the future for the implementation of the 5-year LAPs-WM. This has created obstacles for the LAs to formulate the plan. Therefore, the activities and actions to be taken to achieve the targets set in the LAPs-WM should be comfortable and not create an excessive burden on the LAs. However a certain budget for the implementation of the 5-year LAPs-WM will be necessary. In case of constraints within the LA, budget allocations by the Federal government to LAs will be one of the options to be considered.

2.6 Lack of Cooperation from the Stakeholders

Involvement of other stakeholders in the formulation of LAP-WM is important so that a practical plan can be produced which is acceptable to every stakeholder. However, experiences in the Model LAs show that cooperation from the stakeholders was sometimes low. In many cases, the stakeholders were not very keen to participate in the activities or meetings arranged by the LAs, generally because they felt comfortable with the current conditions, and reluctant to have any new changes. In other words, the stakeholders especially from the private sectors such as the industries, recycling agents etc. were very concerned about the impacts or consequence of the LAP-WM on their business in the future.

In this matter, the LA plays a very important role to explain clearly to the stakeholders about the benefits and purpose of LAP-WM, and need for the involvement of all the stakeholders in the formulation and implementation of the LAP-WM. It is particularly important for the LA to appreciate and recognise the roles of the stakeholders in this matter so that they are more cooperative and contribute towards the LAP-WM formulation.

2.7 Reluctance to Accept Changes

Alike some stakeholders, the LAs are themselves sometimes also reluctant to accept changes particularly for things that involve much red-tape, require many approvals

and involve many other parties such as other departments or other agencies etc. One good example is the idea of compulsory registration or licensing of the recycling players; this will involve many levels of approval and many other departments will be involved such as Licensing Department, Law Department and Enforcement Department etc. Therefore this has created an obstacle and some LAs feel reluctant to adopt such an idea.

In this matter, ideas that might not be favoured by the LA could be modified as much as possible to reduce the red-tapes etc, so that it is acceptable and more easily to be adopted. In the case of registration of recycling players for example, instead of compulsory registration, it could be modified as voluntary registration system, which would not require many approvals and amendments of by-laws etc.

2.8 Lack of Confidence in Implementing the LAP-WM

It was found from experiences of formulating the LAPs-WM in the Model LAs that some LAs have a lack of confidence in their capability to implement the 5-year LAP-WM. This may be because the LAP-WM formulations in the Model LAs were carried out with the assistance of the study team. Whereas the actual implementation of the actions stated in the LAP-WM would be carried out later by the LAs themselves without the assistance of the Study team.

In this matter, it is very important to ensure that the entire LAP-WM of a LA is formulated based on their particular needs and requirements. This is to ensure that they are more comfortable on what they need and what they can do, so that they are more confident when they come to the implementation of the LAP-WM. The part on "actions to be taken to achieve the targets" should be clearly understood and decided by the LA based on their own capability and local conditions.

In summary, based on the experiences of formulating the LAPs-WM in the Model LAs, some issues or problems faced throughout the whole process of formulating the LAPs-WM are summarised in Table 2-1 below including some counter-measures taken to overcome these issues:

Table 2-1 Issues Faced and Countermeasures Taken for the Formulation of LAPs-WM

No	Issues / Problems	Countermeasures
1	Consent from the top management	• Comprehensive proposal • Commitments from dedicated officers • Conveyance of information from the Model LAs (Creation of "peer pressure")
2	Lack of manpower	• Effective involvement of the limited human resources • Involvement of many departments through inter-departmental committees • Involvement of other stakeholders
3	Lack of commitments	• Attract the interest of the officers by creating more attractive activities • Firm commitment and leadership of the "chief officer"
4	Lack of Expertise	• The *"Guideline for Formulation of Local Action Plan on Waste Minimisation"* should be referred to so that the officers are guided towards formulation of LAP-WM • Carry out more training and capacity building programmes for the officers by MHLG
5	Lack of budget	• Make use of whatever available data as well as some "default" data from other sources • Create affordable and not burdensome LAP-WM for the LAs • Budget allocation from Federal government to LAs
6	Lack of cooperation from the stakeholders	• Explain clearly to the stakeholders about the benefits and purpose of LAP-WM • Appreciate and recognise the roles of the stakeholders by the LA
7	Reluctance to accept changes	• Modify ideas to reduce the red-tapes etc, so that they are acceptable and more easily to be adopted
8	Lack of confidence in implementing the LAP-WM	• Ensure that the entire LAP-WM is prepared based on the LA's own needs and requirements • Ensure that the "Actions to be taken" are clearly understood and decided by the LA based on their own capability and local conditions

In conclusion it is recognised that many of the LAs face problems of lack of manpower, budget and expertise as well as low levels of cooperation from relevant stakeholders; conditions which would discourage them to formulate and implement LAPs-WM. The *"Guideline for Formulation of Local Action Plan on Waste Minimisation"* understands these issues and has been designed to permit the LAs to take the first steps in preparing their LAPs-WM based on their individual conditions and within their particular limitations in spite of the problems they are facing.

PART 3

LOCAL ACTION PLAN IN MB MIRI

Waste Minimisation

Majlis Bandaraya Miri (MBM)

" 3Rs for a Better Tomorrow "

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Preface

The problem of solid waste is now a global issue, where the discussion on the problem is becoming more distinctive than ever before. The amount of solid waste generated in the world is increasing, along with the increase in urban populations as well as the change in human lifestyles. In Malaysia, about 8 million tons of solid wastes are generated every year (2004) and this figure is expected to increase tremendously to about 15 million tons/year in 2020. It is therefore crucial to take some prevention measures against the waste problem, including promotion of a recycling oriented society that understands and participates effectively in recycling and waste minimisation practices.

The LA is directly playing an important role in promoting recycling and waste minimisation among the communities within the local boundary. The LA should lead, monitor and work together with various local stakeholders on recycling to ensure successful and sustainable recycling programmes.

This LAP-WM serves as a guideline for the LA to effectively implement waste minimisation and recycling programmes with focuses on respective waste generation sources, such as residential households, commercial enterprises, offices, hotels, restaurants and manufacturers. Some targets are set in this Action Plan and performance indicators are recommended for monitoring purpose. Some possible actions to be taken to achieve the targets are short-listed in this plan based on the local conditions of the local authority's areas.

With this Action Plan, it is hoped that a *"Material Cycle Society"* can be promoted, which could subsequently be extended to some other LAs in the country.

Majlis Bandaraya Miri
April 2006

Miri Fact Sheet

Area (square kilometres)		977.43
Total Population (2000)[1]		219,571
Total Population (2004)[2] estimates		245,600
Average annual population growth rate, 2000 - 2005 (%)		N/A
Estimated annual population growth rate, 2006 – 2010 (%)		2.50
Ethnic group composition of Malaysian citizens (%)	*Bumiputera*	N/A
	Chinese	N/A
	Indian	N/A
	Others	N/A
Age Structure	Population aged 0 – 14 years old (%)	N/A
	Population aged 15 – 64 years old (%)	N/A
	Population aged 65+ years old (%)	N/A
	Dependency ratio (%)	N/A
Sex Ratio		N/A
Total Households		N/A
Total Living Quarters		N/A
Economic (2004 Estimates): 1) Gross Domestic Product (1987 real prices) • Agriculture, livestock, forestry and fishing • Mining and quarrying • Manufacturing • Construction • Services 2) Labour Force (2004 estimates) • Labour Force • Labour Force Participation Rate • Unemployment 3) Employment by Sectors (2004 Estimates) • Agriculture, livestock, forestry and fishing • Mining and quarrying • Manufacturing • Construction • Services		N/A

[1] *All data are from Population Distribution by LA and Mukims, DOS 2001 except growth projections*

[2] *Projection from Subang Jaya Local Plan, 2000 - 2010*

Abbreviations

AFSB	Alam Flora Sdn Bhd
BEs	Business Entities
CBO	Community-based Organisation
ISO	International Standard Organisation
JICA	Japan International Cooperation Agency
JST	JICA Study Team
Kg/cap/day	Kilogram per capita per day
KL	Kuala Lumpur
LA	Local Authority
LA21	Local Agenda 21
LAP-WM	Local Action Plan on Waste Minimisation
MBM	Majlis Bandaraya Miri (Miri City Council)
MHLG	Ministry of Housing and Local Government
MSW	Municipal Solid Wastes
NGO	Non-governmental Organisation
NREB	Natural Resource and Environment Board (Sarawak)
PET	Polyethylene Terephthalate (plastic)
RNU	Recycling Network unit
SRJK (C)	Sekolah Rendah Jenis Kebangsaan (C) [Chinese National Primary School]
SWM	Solid Waste Management
WMU	Waste Minimisation Unit

Key Definitions

Some key definitions that are used within the scope of this A/P 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 discharged regularly from households, commercial or business premises, institutions and industries (excluding the processed industrial wastes, sludge, household hazardous wastes, and 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) The 3Rs

- ***Reduction at source**, which is defined as to reduce the amount of waste that will enter into the waste stream through the changes of lifestyle and/or manner of consumption, improvement of manufacturing processes, green purchasing and so on,*
- ***Reuse**, which is defined as the multiple use of a product in its original form, for its original purpose or for an alternative, with or without re-conditioning, and*
- ***Material Recycling**, which is defined as to utilise a waste for other purposes by processing (including segregation, washing, melting, transforming, etc.) but most of the fractions of the waste shall be utilised for other purposes.*

C) Recycling Rate

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

where,

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 Background and Objectives

With the stable growth of the economy and active commercial and industrial activities, management of solid waste becomes one of the central concerns in Malaysia. Due to limited availability of the land, minimising the amount of solid waste disposal at landfills is the acute issue to be addressed through partnership of all relevant stakeholders including federal/local governments, recyclers, concessionaires, business entities, NGOs, and general public.

Responding to the urgent needs of reducing the amount of solid waste disposal, the Ministry of Housing and Local Government (MHLG) and Japan International Cooperation Agency (JICA) have jointly conducted the Study for formulation of the Master Plan on National Waste Minimisation in Malaysia (WM-MP) since June 2004. The Study includes identification of the status and issues of waste minimisation in Malaysia. To realise the Master Plan at local level, the Study, working together with the 4 selected authorities (model LAs), also formulated the Local Action Plan on Waste Minimisation (LAP-WM). The LAP-WM is formulated for providing all the relevant 3Rs players clear targets to achieve and actions to be taken.

1.2 Scope of the Action Plan

LAP-WM basically targets minimisation of municipal solid wastes while non-municipal waste such as industrial wastes, construction/demolition wastes, medical wastes and scheduled wastes are not subject to LAP-WM. The minimisation is defined as minimizing the amount of municipal solid waste to be disposed at landfill. The efforts of waste minimisation are represented by 3Rs (Reduce, Reuse, Recycle) activities. LAP-WM mainly consists of the following planning components:

1) Current Status and Issues of SWM and Recycling
2) Projection of Future SW Generation
3) Waste Minimisation Targets and Compliance Schedule
4) Actions to Achieve the Targets
5) Monitoring and Evaluation of LAP-WM

CHAPTER 2 STATE OF WASTE MANAGEMENHT AND RRCYCLING IN MBM

2.1 Solid Waste Management in General

Municipal Solid Waste (MSW) is essentially household waste and also includes organic wastes from commercial and institutional sectors (Agamuthu *et. al.* 2003). Different studies record varying averages for waste generation in Malaysia.

In 1997, the total solid waste generated throughout Malaysia was 5.6 million tons or 15,000 tons/day. Out of this, 80% was domestic wastes and the other 20% was commercial wastes. Increase of population is the main contributor to the increase of waste generation. Other factors include changes in lifestyle, consumption patterns, and rising of income levels. In 1998, the MSW generated has increased to about 6.0 million tons, with an average of 0.5 to 0.8 kg/capita/day [Agamuthu et. al 2003]. The per capita waste generation rate has again reported to be increased in Malaysia from 0.7 kg/cap/day in 1990 to 1.2 kg/cap/day in 2000.

Other studies note that the average waste generation, depending on the economic status of the area, varies from 0.45 to 1.44 kg/cap/day [Hassan, 2001]. However, in the latest studies carried out by JICA Study Team in selected areas in 2005, the per capita generation rate was found to be 0.897 kg/cap/day in average (0.628 kg/cap/day from households and 0.269 kg/cap/day from business entities).

2.1.1 Institutional Framework for SWM

SWM is under the administration of Public Cleansing and Maintenance Section of MBM, which comes under the Services and Health Division. Their main responsibilities that are relevant to SWM are public cleansing and solid waste collection and disposal.

The general organisational framework for SWM in MBM under the Services and Health Division is shown in Figure 2.1.

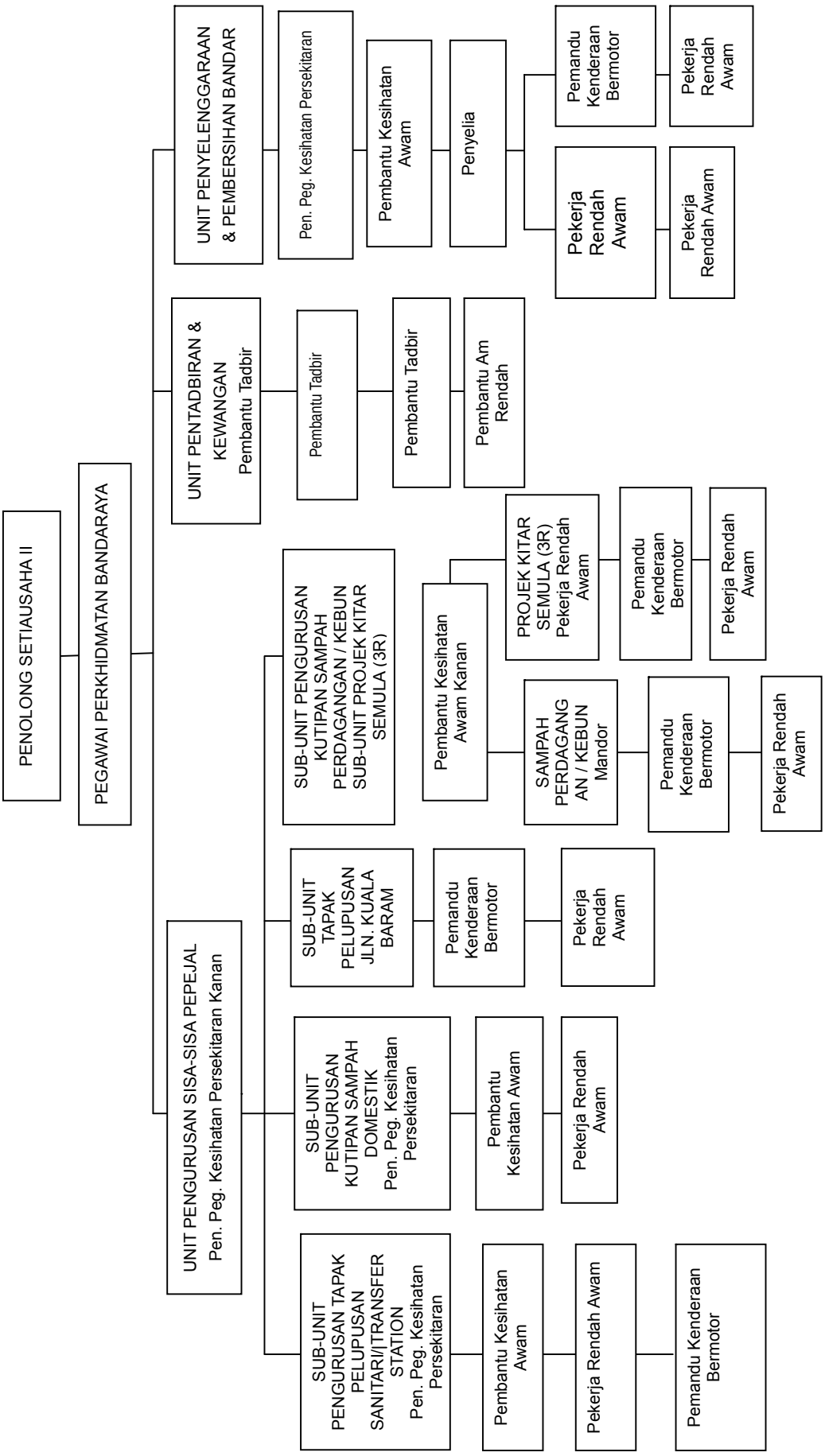

Figure 2.1 Organisation Structure of Services and Health Division

Waste Minimisation Unit

In relation to 3Rs, the section has a Waste Minimisation Unit with two officers, four workers and one driver. One truck is utilised for public awareness programmes and collection of recyclables upon request. Information is collected not only in relation to MBM's activities but the unit also receives reports of recyclables collection from schools and recycling agents on a monthly basis.

Local Agenda 21

In 1999, Majlis Perbandaran Miri (at that time) was selected as one of the fours sites for implementing the pilot project in Malaysia. The implementation of Local Agenda 21 programme in Miri is continuously supported by MHLG and is based on 5 elements which are partnership, community based issues analysis, action plan, implementation and monitoring as well as evaluation and feedback. Three (3) main issues have been identified and one is solid waste management. Therefore, 3 working groups were formed together with the action plans to facilitate in solving the issues namely:

(i) Pollution control of rivers in Miri Implementation Working Group.

(ii) Miri Drainage Network Implementation Working Group.

(iii) Solid Waste Reduction Implementation Working Group.

There are 4 sub-groups under solid waste Implementation Working Group to implement action plan which are:

1) Glass & Plastic Sub-group.
2) Organic waste composting sub-group.
3) Flea market sub-group.
4) 3Rs award sub-group for schools

Other projects include the publication of a 3Rs information booklet called "Ecopack" and the setting up of two (2) collection centres manned by NGO: one in the Council Multi-storey carpark building and the other one in the Regional market at Lorong 10 market.

2.1.2 The MSW Service Areas

The total area under the administration of MBM is about 977.43 km^2 and is divided into two functional areas:

- The operational or service area is 195.58 km^2 (20%)
- The non-operational area is 781.9 km^2 (80%)

The population of Miri in 2000 was 219,571 with an annual growth rate of 3.42% from 1991 to 2000. For the period of year 2000 to 2010, population projections are made based on 4.24% annual growth rate per annum. As such the population is estimated to be around 270,238 in year 2005 and grows to about 281,069 in year 2010.

In terms of population in year 2005, MBM estimates that about 216,191 persons (80% of the total) are served or covered by the waste collection services. In addition, the services also estimated to cover about 100% of the total business entities in Miri.

2.1.3 Waste Generation and Compositions

a) Waste Generation

MBM reports that there are about 40,000 properties within their jurisdiction in the year 2004; this comprises of residential, commercial, industrial and institutional premises. The main sources of municipal solid waste generation in Miri are from households. Apart from households, other sources of MSW include:

- Commercial (including service industries)
- Institutional (government agencies, schools, hospitals excluding clinical wastes)
- Community (parks, beaches, public drainage and road cleansing)
- Industrial (excluding hazardous / scheduled wastes)

Based on 2004 data (landfill data), MBM estimates that about 120 tons of solid waste are disposed in Miri daily. While in year 2005, the total waste disposed to landfill is found to be increased to 150 tons/day.

Based on this data, the per capita disposal rate was calculated as follows:

Table 2.1 Waste Disposal Rates in Miri (Landfill Data)

No	Generation Sources	Waste as Disposed (tons/day)	Percentage
1	Household	112.5	75.0%
2	Business entities	37.5	25.0%
Total		150.0	100.0%
Per capital waste disposal rate (kg/cap/day)		0.69kg/cap/day	

Source: MBM (2005)

It should be noted that the data estimated were based mainly on landfill data where the wastes are disposed from various sources including households, business entities and industries etc. However, for the case of Miri, almost 75% of the wastes recorded are municipal wastes from households (about 34,000 households) and 25% are from business and industrial entities (about 4,600 business entities).

By using the figures obtained from the JICA study for the waste recycling rate at source, therefore the total waste generation rate for MBM in 2005 was estimated and summarised in Table 2.2 as follows:

Table 2.2 Total Waste Generation Rate in MBM (2005)

No	Sources	Per Capita Rate (kg/cap/day)		
		Waste as Disposed (kg/cap/day)	Waste as Recovered at Source* (kg/cap/day)	Total Waste Generation rate (kg/cap/day)
1	Household	0.52	0.092	0.61
2	Business entities	0.17	0.090	0.26
Total		0.69	0.183	0.87

Note: * Estimations from JICA Study (2005)

The actual amount of wastes generated in MBM areas are higher than the 0.69 kg/cap/day as recorded at the disposal site, because there are some portions of recyclable materials that are retained1 at source to be recycled or sold to recycling agents directly.

Therefore, based on the population of 270,238 in MBM (2005), the estimated amounts of actual wastes generated, retained and disposed are calculated as follows:

a) Waste generation = 270,238 x 0.87 kg/cap/day
= 235.1 tons/day

b) Waste retained = 270,238 x 0.18kg/cap/day
= 49.5 tons/day

c) Waste disposed= 270,238 x 0.69 kg/cap/day
= 186.5 tons/day
(Where 150 tons/day are collected by MSW service that dispose of to landfill)

Based on these rough estimations, the percentage of wastes retained for MBM is calculated as:

$$\frac{49.5 \text{ tons/day}}{235.1 \text{ tons/day}} \quad X\ 100\% = 21.0\%$$

b) Waste Composition

There is no known published report on waste compositions and characteristics at source for Miri. Various studies carried out by government and universities give some indication of waste composition. An estimation of typical waste composition in Miri is presented in the "EcoPack" as shown in Table 2.3 below:

Table 2.3 Waste Composition in Miri (EcoPack, 2003)

Waste Compositions	% by Weight
Food Wastes	50.0
Paper	21.0
Plastics/rubber	8.0
Metal	6.0
Wood	5.0
Glass	4.0
Textiles	3.0
Miscellaneous	3.0

Source: Miri's EcoPack, Jan. 2003

As comparison, the results of the detailed waste composition study done by JICA Study on households are referred, as shown in Table 2.4 below:

[1]Waste retained includes all un-accounted for waste generated but not included in the official disposal amounts; such as recyclables separated at source and directly transferred to recyclers by the generators or waste illegally dumped or open dumped.

Table 2.4 Waste Compositions in Different Income Levels

No	Categories	High Income	Medium income	Low Income	Average
		Unit in %			
Organic					
1	Food waste	40.47	48.62	55.02	48.04
2	Bones	1.69	0.52	1.57	1.26
3	waste papers	16.34	20.09	14.84	17.09
4	Plastics (F)	4.46	5.33	6.25	5.35
5	Plastics (R)	3.53	4.18	3.47	3.73
6	Polystyrene	0.41	0.85	0.47	0.58
7	Textile	0.92	0.92	3.70	1.85
8	Rubber & Leather	4.75	0.25	0.47	1.82
9	Wood	0.09	0.34	0.23	0.22
10	Yard waste	14.20	5.40	0.15	6.58
11	Diapers	6.36	2.06	6.75	5.06
Sub-total for organic		93.19	88.53	92.90	91.57
Inorganic					
12	Glass	3.40	4.33	3.41	3.71
13	Ferrous	1.25	1.81	1.76	1.61
14	Non-ferrous	0.01	0.05	0.00	0.02
15	Aluminium	0.52	0.47	0.13	0.37
16	Batteries	0.00	0.04	0.06	0.03
17	Electrical & Electronics	0.08	0.02	0.43	0.18
18	Others	1.57	4.75	1.32	2.50
Sub-total for inorganic		6.81	11.47	7.11	8.42
TOTAL		100	100	100	100

Source: JICA Study 2005

However, it should be noted that the abovementioned figures are compositions of the wastes discharged from the generation sources, it is technically different from the composition of actual wastes generated due to the reason that some wastes are retained at source for recycling or other purposes. After some adjustments done by JST on the waste compositions, the summarised waste compositions as generated from both households and business entities are shown in Table 2.5 as follows:

Table 2.5 Waste Compositions for Households and Business Entities

Composition	EcoPack (2003)	Households	Business Entities	Overall
	All units in %			
Food waste	50.0	39.7	18.1	37.0
Papers	21.0	31.2	32.4	31.4
Plastics	8.0	8.1	8.8	8.2
Glass	4.0	3.5	7.7	4.0
Ferrous Metals	6.0	1.6	2.9	1.8
Aluminium		0.6	0.9	0.6
Others	11.0	15.3	29.2	17.0

Note: Ratio of Households to Business Entities in MBM is 3 to 1

2.1.4 Waste Storage and Collection

a) Waste Storage

Various types of waste storage bins are used in MBM areas. However, some standardised common types of bins are provided by MBM, i.e. 120 liter bins for households, 660 litter bins for commercial premises and 10m3 Roll bins for markets and industries and 15 m³ RORO bins for industrial/market and squatters.

b) Collection

Municipal solid wastes generated in Miri are collected by MBM appointed contractors including wastes from households, business entities and industries (non-scheduled wastes) but exclude wood waste, construction debris and agriculture waste. Collections of such waste from all types of bins are carried out by the Council's contractors, whereas Council's own open trucks collect bulky waste from households on an ad hoc basis.

The collection frequency in Miri is generally 3 times/week for residential premises and daily collection for commercial premises. The average cost of collection is about RM5.80/month for each household bin to RM85/month for each commercial bin. Solid waste management is funded from the rates collected (23.5% of Annual Ratable Value of property), and about 17% the rate collected is for solid waste management fund, which is amounting to about 5 million annually.

2.1.5 Waste Treatment and Disposal

a) Transfer Station, Transportation and Landfill Disposal

The method of MSW disposal employed by MBM is landfilling. In mid 2003, the sanitary landfill at Sibuti, Bekenu, Subis District commenced operations. This new landfill cell is lined and equipped with a leachate treatment and pond system for further treatment. Solid waste collected is transported to a temporary Transfer Station (Lambir Mile 8), 14 km from Miri town centre for transfer to larger secondary transfer trucks. At the station, the waste is further compacted by stationary compactors, then loaded onto 30-foot containers to be hauled to the sanitary landfill for disposal. Construction & demolition waste is usually used for landfilling works and not allowed to be disposed at MBM's landfill. Scavengers are not allowed to operate at landfill and transfer station. In the future, this sanitary landfill may include composting of green waste, recycling of building waste, sludge treatment and an incinerator for the recycling of energy from construction wood waste. Before this, MBM disposed of the MSW by controlled tipping, with occasional covering, at a disposal site at km-17, Lutong, Kuala Baram Road.

Table 2.6 below shows records kept on the quantities of waste disposed at Sibuti landfill in 2004. The total quantity disposed in 2004 is estimated to be around 43,434 tons. This means that the average quantity disposed in 2003 was about 3,620 tons per month, peaking at approximately 4,000 tons in the months of January and December.

Table 2.6 Quantity of Solid Waste Disposed at MBM's Landfill, 2004

Landfill	Month	Tonnage
Sibuti, Bekenu	January	3,968.47
	February	3,296.90
	March	3,414.65
	April	3,275.77
	May	3,483.32
	June	3,607.42
	July	3,760.63
	August	3,828.80
	September	3,479.59
	October	3,645.85
	November	3,656.24
	December	4,016.31
Total (Tons / Year)		43,433.95
Average (Tons / Month)		3,619.50
Average (Tons / Day)		120.65

Source: MBM (2004)

b) Illegal Dumping

Illegal dumping of MSW is not a major problem in Miri. Illegal dumps have been found at roadsides of some housing and industries estates, dead-end roads or open spaces where there are no surrounding buildings. Dumping on private land is not a problem. Types of waste dumped include household, garden, industrial as well as construction and demolition wastes. MBM has no records on the quantity of illegally dumped wastes.

2.2 Recycling of Municipal Solid Wastes in Miri

MBM initiated their recycling programmes in 2000 as part of MHLG's nationwide project for all municipal/ city councils to implement pilot recycling programmes. Under this programme, MHLG has provided technical support by supplying recycling bins, recycling collection centres, leaflets, posters and training/ seminars for MBM personnel and relevant stakeholders. MBM has since then adopted the 3Rs concepts (Reduce, Reuse, and Recycle) with cooperation from all stakeholders; the recovery of recyclables from waste stream has been on-going. Monthly data of recyclables collected by private business and NGO has been forwarded to both the state and Federal Ministries.

2.2.1 Types and Amount of Recyclable Materials

Based on the data on waste compositions, the amount of recyclable materials expected from the wastes stream in MBM is calculated in Table 2.7:

Table 2.7 Amount of Recyclable Materials in MBM

No	Composition	Households		Business Entities		Total Amount (tons/year)
		%	Amount (tons/year)	%	Amount (tons/year)	
1	Papers	31.2	18,772.57	32.4	8,309.17	27,081.74
2	Plastic	8.1	4,873.65	8.8	2,256.81	7,130.46
3	Glass	3.5	2,105.90	7.7	1,974.71	4,080.61
4	Ferrous metals	1.6	962.70	2.9	743.72	1,706.42
5	Aluminium	0.6	361.01	0.9	230.81	591.82
6	Others (Non recyclables)	55.0	33,092.67	47.3	12,130.36	45,223.03
Total		100.0	60,168.50	100.0	25,645.58	85,814.08
Total amount of recyclable materials available (tons/year) =						40,591.05
Total amount of recyclable materials available (%) =						47.3%

Note: 1) other non recyclables include major portion of food wastes
2) Assuming that the waste composition as discarded from sources are same as the composition as disposed to landfill

As shown in Table 2.7 about 47.3% of the wastes disposed of from the generation sources are recyclable materials (40,591.1 tons/year). Out of this figure, the main recyclable materials found is paper (27,081.7 tons/year), followed by plastics (7,130.5 tons/year).

2.2.2 Types of Recycling Players

The key players in recycling in Miri can be categorised into three main groups, namely the recycling collecting agents, the participating groups and MBM as shown in Figure 2.2 below.

Among all the players, the private recycling agents or vendors are playing the most significant role in collecting the recyclables in Miri. However, many of these players are not registered under MBM and therefore only 15 recyclable collecting agents are captured by MBM within its area of jurisdiction. All these players collect the main recyclable materials, i.e. papers, metals and aluminium cans etc. Only one company was found collecting plastics. Details of these players and types of recyclables collected are summarised in Table 2.8 below:

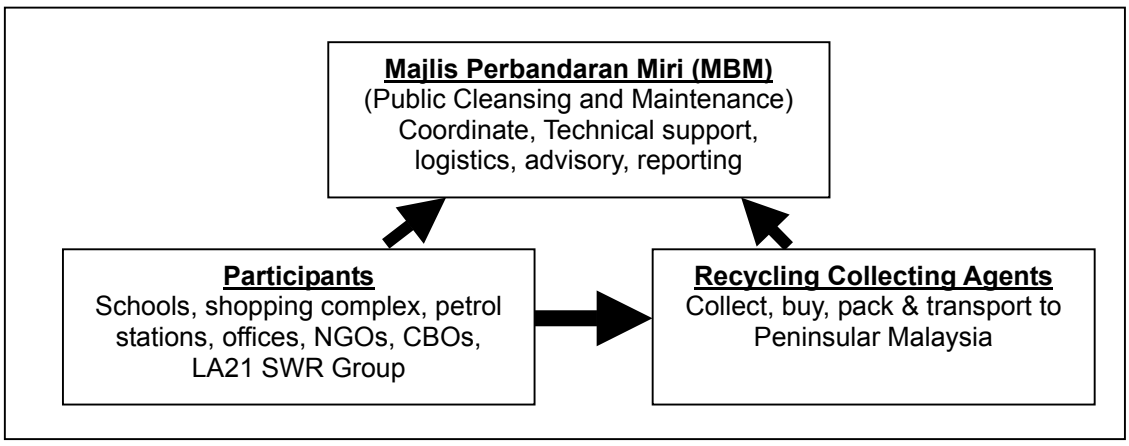

Figure 2.2 Key Players on Recycling in Miri

Table 2.8 List of Recyclable Collecting Agents in Miri, 2005

No	Recyclable Collecting Agents	Types of Recyclables
1	Eng Wei Trading	Paper, old newspaper, glass, bottles, aluminium cans, vehicles batteries
2	3Rs Enterprise	Paper, Carton paper, vehicles batteries
3	Wili Trading Co.	Scrap metal, aluminium cans
4	Rajawali Trading Co	Scrap metal, aluminium cans
5	Chai Trading Co	Aluminium cans & vehicle batteries
6	Buddhist Tzu Chi Merit Society Malaysia (Miri liason)	Most of the recyclables & items for reuse are from housing areas
7	K.S. Metal (Miri) Sdn. Bhd	Scrap metal, aluminium cans
8	Syabas Synergy Sdn Bhd	Plastics
9	Ting's Metal Enterprise	Scrap metal
10	Yong Teck Sin Scrap Metal Trading Co.	Scrap metal / old newspaper / glass bottle / aluminium can
11	Lambir Distillery Sdn. Bhd.	Aluminium and glass
12	Insan Pali	Aluminium cans, scrap metal
13	Thomas Chua	Aluminium cans, copper wire
14	Choon Sen Enterprise	Scrap metal, copper, alloy, aluminium can, batteries vehicle.
15	Malai Trading	Scrap metal, copper, alloy, aluminium can, batteries vehicle.

Some of the listed collecting do not report to the Council on recyclables collected.

2.2.3 Existing Recycling Systems / Practices

In Miri, recyclables are collected by several methods:

- From 3Rs bins at participating sources (e.g. schools, offices, shopping complexes)
- From collection centres provided by MBM and operated by NGOs and CBOs
- From collectors (e.g. street pickers, truck workers, scavengers)

3Rs Bins

The tri-colour 3Rs bins are placed at different locations in Miri; this includes schools, petrol stations, shopping complexes, government departments, hotels, clubs, some private companies, NGOs and others. The details of the locations of 3Rs bins are listed as follows:

able 2.9 List of 3Rs Bin Locations in Miri

No	Locations	No	Locations
A. Schools			
1	SMK St Columbia Miri	23	SK Agama Miri
2	SMK Chung Hua Miri	24	SRK Lutong
3	SMK St Joseph Miri	25	SRK Chung Hua Lutong
4	Kolej TDT Hj. Bujang	26	Pei Min Middle school
5	SM Sains Miri, Jalan Bakam	27	SRK Chung San Riam
6	SMK Agama Miri, Jalan Bakam	28	SR Sri Mawar
7	SMK Lopeng Miri	29	Maktab Perguruan

No	Locations	No	Locations
8	SMK Dato Permaisuri	30	SK Pendidikan Khas
9	SMK Lutong	31	SK Anchi
10	SMK Riam, Taman Tuanku	32	SK Jalan Bintang
11	SK St. Joseph Miri	33	SK Kg. Luak
12	SRK North	34	SK Lambir Village
13	SK St Columbia Miri	35	SK Pujut Corner
14	SK Pujut Corner	36	SMK Luak
15	SK Pulau Melayu	37	SMK Merbau
16	SK Riam Batu Dua	38	SJK Chung Hua, Bakam
17	SK sayed Othman	39	SJK Kpg. Bakam, 98000 Miri
18	SK South, Brighton Rd	40	SJK(C) Tukau
19	SK. Tem. Datuk Muip	41	Tadika Seri Indah
20	SK Tudan	42	Tadika Chung Hua Krokop
21	SMK Baru Miri	43	Curtin University
22	Riam Middle School		
B. Hotels			
1	Marriot Hotel Miri	3	Dynasty Hotel
2	Park City Miri		
C. Shopping Complex			
1	Bintang Plaza	3	Imperial Mall Shopping Complex
2	Boulevard Shopping Complex		
D. PLACE OF WORSHIP			
1	Mei Ann Methodhist Church		
E. NGOs			
1	Malaysia Red Crescent Society	2	Miri Bahai Society
F. Governmental Departments			
1	Jabatan Kastam Miri	2	Pustaka Miri
G. Private Company			
1	Pusat Bahasa Titian Jaya S/B	2	Nippon Oil Exploration (M) LTD, Miri

Collection Centres

MBM has set up 8 collection centres at strategic locations. Some of the centres were funded by MHLG while some were established under the Miri LA21 programme:

a) Funded by MHLG:

- Piasau Jaya 2 (residential area)
- Pujut 1B (residential area)
- Taman Tunku (residential area)
- Desa Senadin (residential area)
- Krokop Lorong 5 (residential area)
- Bulatan Park (recreational park)
- Permyjaya (residential area)
- Lutong (commercial area)

b) Under Miri LA21 Programme:

- Lorong 10 Krokop (market)
- MMC multi-storey carpark building

2.2.4 Current Recycling Performance

Recycling activities in Miri focus mainly on old newspapers, carton boxes, other categories of papers, ferrous metals and aluminium cans. Recently, there is also collection of plastics for recycling when one plastic recycling company started its operation in Miri since late 2004 and began collection of plastic material from 2005. On the other hand, some glass bottles are collected to be reused instead of recycling. Broken glass from glass bottles is not collected due to less incentive.

Data obtained on recycling activities in MBM was mainly derived from the recycling activities that are known to MBM as well as some data from landfill scavenger activities. Very limited information is available on the recycling activities carried out by the recycle players particularly in the private sectors. Based on latest data given by MBM for recyclables collected in years 2003 and 2004, the total amount of recyclable materials collected as recorded by MBM is shown in Table 2.10.

The figures show that majority of the recyclables collected were papers. Some other categories of recyclables collected were glass, aluminium cans and car batteries. Plastics were not a common recyclable item in Miri in 2003 and 2004 but it was started to be collected in 2005. However, it should be noted that the data obtained is capturing only very limited portions of the total recycling activities in Miri, as many of the activities carried out by private recyclers are not well known by MBM. This is particularly true in the case of scrap metals and aluminium cans where data obtained by MBM from the private companies, are not actually reflecting the real situation as some private companies refused to give information on actual data.

Table 2.10 Types of Recyclables Collected in Miri, 2003-2004

No	Recyclable	Quantity (tons)			
		2001	2002	2003	2004
1	Old newspapers, carton boxes, mixed papers etc	295.09	2,160.88	3,037.77	3,282.60
2	Plastic	-	-	-	-
3	Glass	-	-	-	-
4	Aluminium cans	361.36	628.54	116.28	204.20
5	Metal	-	-	-	-
6	Old clothing	-	-	2.58	3.05
7	Batteries	1.78	19.61	114.49	178.46
8	Glass Bottle	0.15	22.38	122.12	231.10
9	Bottle Plastic	0.10	0.36	0.73	0.39
TOTAL		**658.48**	**2,831.77**	**3,393.97**	**3,899.80**

Source: MBM (2004)

In other words, the data obtained by MBM is covering very limited information of recycling activities in the areas. By using the equation of calculating recycling rate for year 2004, i.e.

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

$$\text{Recycling rate (\%)} = \frac{3{,}899.8 \text{ t/year}}{3{,}899.8 \text{ t/year} + (150.0 \text{ t/day}) \times 365} \times 100\%$$

$$= 6.65\%$$

Note: It should be noted that the recycling rate calculated is showing only part of the recycling activities in MBM.

From this calculation, it is clearly shown that the recycling rate calculated is much lower as compared to the figure calculated for un-accounted waste, which is about 21.0% (Page 14). This is because many of the un-accounted wastes are being retained and recycled and are not known by MBM, and therefore the data on recyclables collected is not captured and reported.

Organic Recycling

In addition, other recyclable materials such as electronic wastes, scrap computers etc. are not commonly being recycled at the moment. Some food wastes were used as animal feed especially by pig farmers, but the collected amount is very low. MBM's owns two (2) units of High Speed Fermentation Machine called "Biomate", to convert organic waste to fertilizer located in the Town Fish Market and Regional Market at Krokop Lorong 10 respectively. The former has yet to be commissioned. Some data from the one at Krokop Lorong 10 are as shown on Table 2.11 below:

Table 2.11 Data on Organic Recycling by Using Biomate Machine

	Bacteria (kg)	Organic waste (kg)	Sawdust (kg)	Produced Compost / Fertilizer
February	2	315	40	107
March	1	1,240	62	417
April	1	1,072	90	360
May	1	967	75	333
June	1	1,110	62	360
July	1	797	118	378
August	1	887	25	155
September	1	824	23	174
Total		7,212	495	2,284

2.2.5 Other issues on Recycling in Miri

Based on previous experience, some issues or problems learnt from recycling and waste minimisation activities in Miri are:

- Recyclable collection is better for marketable items e.g. newspapers and cardboard cartons, collection of plastics and glass is still low.
- Some recyclers are not known or not registered under MBM.
- No proper networking between the recyclers, industries, MBM and other recycling players.
- Lack of human resources capacity, funds and technology.
- There is no formal collection of recyclables at source (households).
- No source separation, recyclable materials are normally mixed and dirty, which require further sorting and cleaning.
- Low awareness / Lack of information and education on recycling.
- Many of the recycling centres / 3-colour bins located at various locations are not being properly used.

Some possible countermeasures for these issues are summarised in Table 2.12 as follows:

Table 2.12 Issues on Recycling in MBM and the Countermeasures

No	Issues	Possible Countermeasures
1	Recycling focuses only on certain materials	Find possible markets for recyclables from outside MBM
2	Many recyclers are not known	Create a registration system for recycling players within MBM areas
3	No proper networking between the recycling players	Proper database management and registration system to create networking between the recycling players
4	No formal collection of recyclables at source	Cooperation and incentives to collectors to collect recyclables from source; formally register the collectors that already collecting the recyclables from source.
5	No source separation	Awareness campaigns to educate the public on source separation
6	Low awareness / Lack of information on recycling	Awareness campaigns to educate the public, setting up recycling plaza or recycling information centre for public (if necessary)
7	Many of the 3-colour bins are not properly used	Remove the unused recycling bins and relocate the bins at more strategic locations
8	Lack of human resource capacity, funds and technology	Provide training on recycling and waste minimisation to MBM officers (particularly the officers of Waste Minimisation Unit); getting sponsorship from various possible sponsors as well as federal government.

2.3 Improvement and Promotion of Waste Minimisation

There is no source separation and waste minimisation being carried out at households and business entities in MBM (except some materials are sorted out to be sold to collectors especially old newspapers and aluminium cans etc). Concepts of waste minimisation and source separation for recycling purpose are not introduced. Recycling activities carried out are mainly market driven due to the values of the recyclable materials.

There is no by-law, act and guideline on waste minimisation and source separation. There are generally three key issues that should be focused in the improvement of overall waste minimisation and recycling efforts in Miri, i.e. improvement of public awareness and attitudes, improvement of necessary infrastructure and improvement of regulations and enforcements.

2.3.1 Key Issues in Waste Minimisation

There are several core problems identified as key obstacles for waste minimisation efforts in Miri:

- Low awareness / Lack of information and education on waste minimisation and source separation.
- Mind-set of the public, not easy to accept new concepts and follow instructions.
- No allocation of proper bins and other required facilities.
- No proper recyclable collectors appointed for collection of separated wastes.
- Volumes of recyclable materials separated at source are too low and not feasible to be collected.
- Lack of regulations, enforcements and financial constraints

Some possible countermeasures for these issues are summarised in Table 2.13 as follows:

Table 2.13 Issues on Waste Minimisation and Source Separation in MBM and the Possible Countermeasures

No	Issues	Possible Countermeasures
1	Low awareness / Lack of information and education on waste minimisation and source separation	Awareness campaigns to educate the public on concepts of waste minimisation and source separation
2	Mind-set of the public	Awareness campaigns to educate the public on concepts of waste minimisation and source separation; Education at school level with direct involvements of parents, teachers and school children
3	No allocation of proper bins and other required facilities	Provide appropriate recycling bins at curbside or community recycling bins; provide recycling plastic bags etc.
4	No proper recyclable collectors	Cooperation with private contractors to collect recyclables; provision of incentives for private collectors, etc.
5	Volumes of recyclable materials separated at source are too low	Educate the public to properly handle and store the recyclables at source; Encourage active participation in community recycling bins / centre by incentives, etc; Provision of incentives for private collectors to collect recyclables at lower quantity from sources
6	Lack of regulations, enforcement and financial constraints	Establish by-law on recycling and waste minimisation (long term basis); strict enforcement on the registration of recycling players; monitor the prices of recyclable materials; raise funds by getting sponsorships from various possible sponsors as well as federal government.

CHAPTER 3 TARGETS OF WASTE MINIMISATION AND RRCYCLING

3.1 Projection of Future Waste Generation

The projection of future waste generation in MBM from households for years 2006 to 2010 was done and is summarised as follows, (assuming that there is no significant change in the waste composition):

Table 3.1 Projection of Waste Generation from Household (2006-2010)

Categories		2005	2006	2007	2008	2009	2010
		(tons/year)					
1	Food wastes	23,886.89	25,397.69	27,004.04	28,711.99	30,527.97	32,458.80
2	Waste papers	18,772.57	19,959.90	21,222.32	22,564.59	23,991.75	25,509.19
3	Plastics	4,873.65	5,181.90	5,509.64	5,858.11	6,228.63	6,622.58
4	Glass	2,105.90	2,239.09	2,380.71	2,531.28	2,691.38	2,861.61
5	Ferrous Metals	962.70	1,023.58	1,088.32	1,157.16	1,230.35	1,308.16
6	Aluminium	361.01	383.84	408.12	433.93	461.38	490.56
7	Others	9,205.78	9,788.03	10,407.10	11,065.33	11,765.19	12,509.31
TOTAL		60,168.49	63,974.03	68,020.26	72,322.40	76,896.65	81,760.21

Note: 1) Annual waste growth rate for household used = 2%
2) Population growth rate = 4.24% per year
3) Waste composition assumed to be unchanged

On the other hand, projection was also done for future waste generation in MBM for business entities from years 2006 to 2010 as shown in Table 3.2. It was again assumed that there was no significant change in the waste composition, as well as the total number of business entities.

Table 3.2 Projection of Wastes Generation from BE (2006-2010)

Categories		2005	2006	2007	2008	2009	2010
		(tons/year)					
1	Food wastes	4,641.85	5,032.21	5,455.40	5,914.18	6,411.54	6,950.72
2	Waste papers	8,309.17	9,007.94	9,765.47	10,586.71	11,477.01	12,442.18
3	Plastics	2,256.81	2,446.60	2,652.35	2,875.40	3,117.21	3,379.36
4	Glass	1,974.71	2,140.78	2,320.81	2,515.98	2,727.56	2,956.94
5	Ferrous Metals	743.72	806.27	874.07	947.58	1,027.26	1,113.65
6	Aluminium	230.81	250.22	271.26	294.08	318.81	345.62
7	Others	7,488.51	8,118.27	8,800.98	9,541.11	10,343.47	11,213.32
TOTAL		25,645.59	27,802.28	30,140.34	32,675.02	35,422.86	38,401.78

Note: 1) Annual waste growth rate for business entities used = 4%
2) Population growth rate = 4.24% per year
3) Waste composition assumed to be constant for the coming years

In summary, the total waste generation from both households and business entities are shown in Table 3.3 below:

Table 3.3 Projection of Total Wastes Generation in Miri (2006-2010)

Categories		2005	2006	2007	2008	2009	2010
		(tons/year)					
1	Households	60,168.49	63,974.03	68,020.26	72,322.40	76,896.65	81,760.21
2	Business Entities	25,645.59	27,802.28	30,140.34	32,675.02	35,422.86	38,401.78
TOTAL		85,814.08	91,776.30	98,160.59	104,997.42	112,319.51	120,161.99

In terms of recyclable materials, the projection of the total main targeted recyclable materials generated in MBM from both households and business entities for year 2006 to 2010 is estimated as shown in Table 3.4 follows:

Table 3.4 Projection of Total Recyclables (2006-2010)

No	Materials	2005	2006	2007	2008	2009	2010
		(Tons/year)					
1	Papers	27,081.74	28,967.83	30,987.79	33,151.30	35,468.76	37,951.36
2	Plastics	7,130.46	7,628.50	8,161.99	8,733.52	9,345.84	10,001.93
3	Glass	4,080.61	4,379.87	4,701.51	5,047.26	5,418.94	5,818.54
4	Ferrous Metals	1,706.42	1,829.85	1,962.39	2,104.73	2,257.61	2,421.81
5	Aluminium	591.82	634.06	679.38	728.01	780.19	836.18
Total		40,591.04	43,440.11	46,493.07	49,764.82	53,271.34	57,029.83

Note: 1) Annual waste growth rate for household used = 2%, business entities = 4%
2) Population growth rate = 4.24% per year
3) Papers include old newspapers, magazines, white papers and other paper categories
4) Ferrous Metals include scrap iron, steel cans etc.

3.2 Setting of Recycling Targets

As shown earlier, the recycling rate for year 2005 in MBM can be calculated as:

$$\text{Recycling rate (\%)} = \frac{\text{3,899.8 t/year}}{\text{3,899.8 t/year + (150.0 t/day) x 365}} \times 100\%$$

$$= 6.7\%$$

Note: It should be noted that the recycling rate calculated is showing only part of the recycling activities in MBM.

This recycling rate is not total because many recyclables collected and recycled are not known by MBM especially the private collectors.

In general, the existing recycling activities in MBM can be categorised into 2 categories as shown in Figure 3.1 below. Only very limited information about the private recyclers are captured by MBM (overlapping areas):

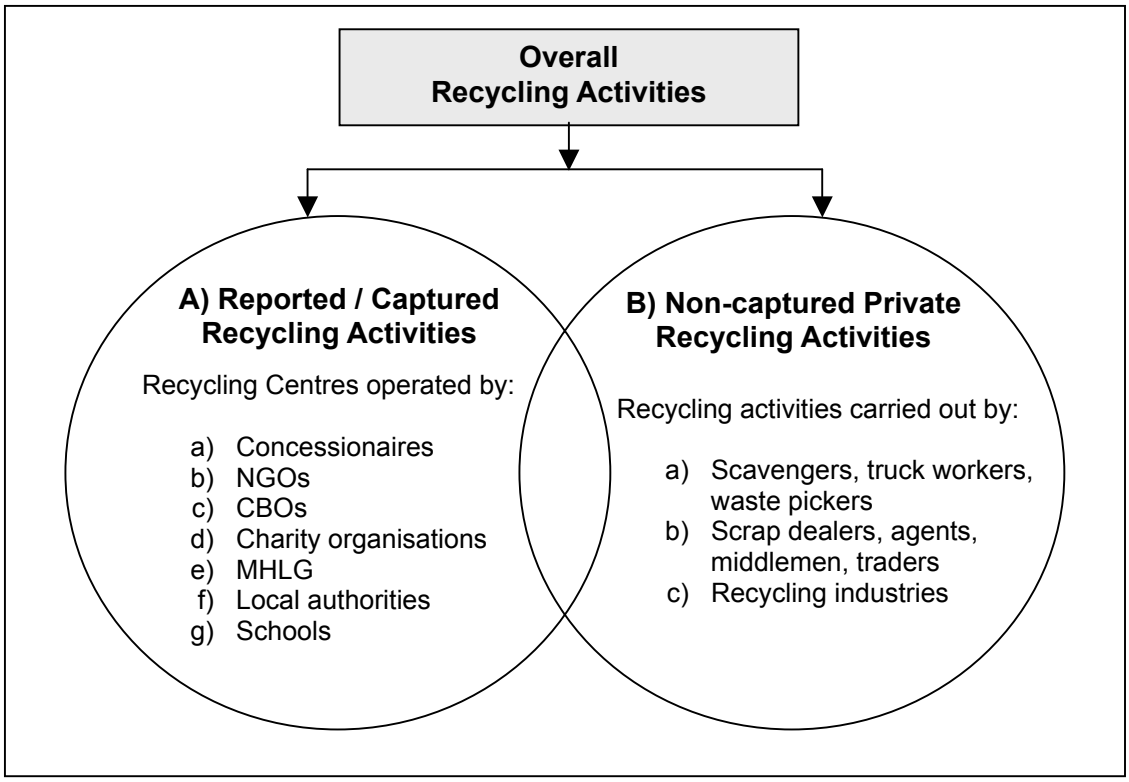

Figure 3.1 The Overall Recycling Activities

Based on the abovementioned, therefore the target for achieving a higher Recycling Rate should be established by capturing or registering more recycling players.

The target Recycling Rates for MBM from year 2006 to 2010 are shown in Table 3.5Table 3.5 below:

Table 3.5 Target Recycling Rate for MBM (2006 – 2010)

	Target Recycling Rate (%)				
2005	2006	2007	2008	2009	2010
6.7%	8.0%	10.0%	12.0%	14.0%	16.0%

3.3 Summary of Key Figures on SWM and Recycling in MBM

In summary, the key figures obtained on SWM and recycling in MBM are summarised in Table 3.6:

Table 3.6 Summary of Key Figures for MBM (Year 2005)

No	Parameters	Figures
1	Total waste generated (tons/day): Per capita waste generation rate (kg/cap/day):	235.1 0.87
2	Total un-accounted waste (incl. retained) (tons/day): Per capita un-accounted waste rate (kg/cap/day):	49.5 0.18
3	Total waste discharged (tons/day): Per capita waste discharged rate (kg/cap/day):	186.5 0.69
4	Waste Compositions (%): a) Food wastes b) Papers c) Plastics d) Glass e) Ferrous Metals f) Aluminium g) Others	 37.0 31.4 8.2 4.0 1.8 0.6 17.0
5	Generation of major recyclable materials (tons/year) a) Papers b) Metals c) Aluminium d) Plastics e) Glass	 27,081.7 1,706.4 591.8 7,130.5 4,080.6
6	Current Recycling Rate <u>Targets:</u> a) 2006 b) 2007 c) 2008 d) 2009 e) 2010	6.65% 8.0% 10.0% 12.0% 14.0% 16.0%
7	Other remarks: Besides creating awareness to increase participation in recycling and waste minimisation, one of the main targets is to register and capture more recycling players (especially private recyclers), which will subsequently increase the Recycling Rate with more captured data on recyclable collected.	

CHAPTER 4 ACTIONS TO ACHIEVE THE TARGETS

4.1 Main Approaches

In order to achieve the targets set in this LAP-WM, MBM has identified three (3) main approaches on the actions to be taken as shown below:

Approach 1: Institutional Setup at Management & Operation Levels

Approach 2: Registration of Existing Recycling Players

Approach 3: Increase Awareness and Recycling Practices

Specific activities or actions to be taken as proposed by MBM based on the local conditions and requirements for years 2006 to 2010 are described in the following sections.

4.2 Institutional Setup at Management and Operation Levels

4.2.1 Waste Minimisation Committee

MBM recognises the importance of institutional setup at two levels, namely the top management level and operation level.

The senior management of MBM will be involved in overseeing the entire implementation of this LAP-WM. At top management level, a Waste Minimisation Committee will be set up as a forum for consolidating the reporting of progress and issues at the council meeting of MBM.

Under the LAP implementation period, the following activities will be carried out:

- Setting up and endorsement of "Waste Minimisation Committee"
- Organise quarterly meetings to monitor and discuss the progress of the LAP implementation;
- Prepare utilisation of yearly budget and undertake budget preparation for 2006 to 2010.

The expected tasks or responsibilities of the members in the Waste Minimisation Committee are summarised in Table 4.1 below.

Table 4.1 Description of tasks and responsibilities at Management Level

Position	Task and responsibilities
Chairman of MBM	• Provide advice to the overall direction of waste minimisation
City Secretary of MBM	• Report and seek advice from chairman • Provide advice to the Waste Minimisation Committee • Endorsement of budget proposal
Waste Minimisation Committee (Senior Assistant Secretary)	• Chair Waste Minimisation Committee meeting every month • Liaison with other existing committees • Report and seek advice from Mayor/ City Secretary • Report to MBM full council meeting on major decision making related to waste minimisation
Assistant Secretary	• Report to chairman of Waste Minimisation Committee • Report to section heads meeting on waste minimisation related issues • Endorse budget proposed within section
City Services Officer	• Report to Assistant Secretary • Oversee and supervise the implementation of waste minimisation plan • Preparation of yearly budget with Head of Solid Waste Management and WMU

4.2.2 Waste Minimisation Unit (WMU)

On the operational side, the overall implementation of the LAP will be overseen by the Head of Solid Waste Management, supported by the Waste Minimisation Unit (WMU) which was established during the JICA Pilot Project in Miri. At initial stage in 2006, the WMU will be operated by 3 full time officers and few other supporting staff to take the lead in any programmes related to waste minimisation and recycling. Additional man-power will be secured to the unit from time to time including some contract staff.

The WMU will be spearheading the LAP implementation plan for MBM. A description of the tasks and responsibilities at operation level is outlined as follows:

Table 4.2 Detail description of tasks and responsibilities of WMU

Position	Task and responsibilities
Head of Waste Management Unit	• Report to Assistant Secretary and City Secretary • Review and finalise yearly action plan e.g. include types and schedule of activities, campaigns etc. • Prepare yearly budget with WMU • Implement, monitor and report on all 3Rs programme activities
Head of Waste Minimisation Sub-Unit (Planning, Overall Management)	• Report to City Secretary and Waste Management Unit Head • Prepare yearly action plan e.g. include types and schedule of activities, campaigns etc • Overall in charge in preparing yearly action plan • Overall in charge in implementing, monitoring and reporting of all 3Rs programme activities • Plan and organise regular 3Rs networking forums to promote collaboration of stakeholders • Participate in national forum or seminar • Preparation of monthly and ad-hoc reports to federal ministry or other request from State
Assistant 1 (Registration/Data management)	• Report to heads of WMU and WMU sub-unit • Maintain data management system following the standard format specified by the federal (include the regular updating of recycling stakeholder register, amount of recyclables collected etc.) • Prepare information for web-site updating or other information campaigns • Assist in preparing yearly implementation plan
Assistant 2 (Operational)	• Conduct regular survey and ensure all stakeholders (recycling agents, schools, NGOs) submit monthly reports • Plan and execute publicity programme include press release, talks, updating of EcoPack (consisting information related to 3Rs and recycling directory), newsletter etc. • Monitor and respond to enquiries of public on 3Rs matters via phone, email etc. • General liaison with all stakeholders recycling agents, NGOs, public etc.
Webmaster	• General maintenance of the Miri 3-R website including updating of new information and removal of old information • Liaise with WMU on regular information and news update on MBM 3-R website
Administration Clerk	• Assist in WMU on data management of WMU where necessary
Health Assistance & Mandors	• Report to WMU sub-unit head on operational issues • Execute promotional activities, campaigns, door to door collection at selected area according to this plan • Carry out activities on the ground, including physical organisation of activities, taking records of 3-R activities for compilation

In summary, WMU will act as secretariat to the WM Committee. The overall plan for future waste minimisation setup in MBM is shown as illustrated below:

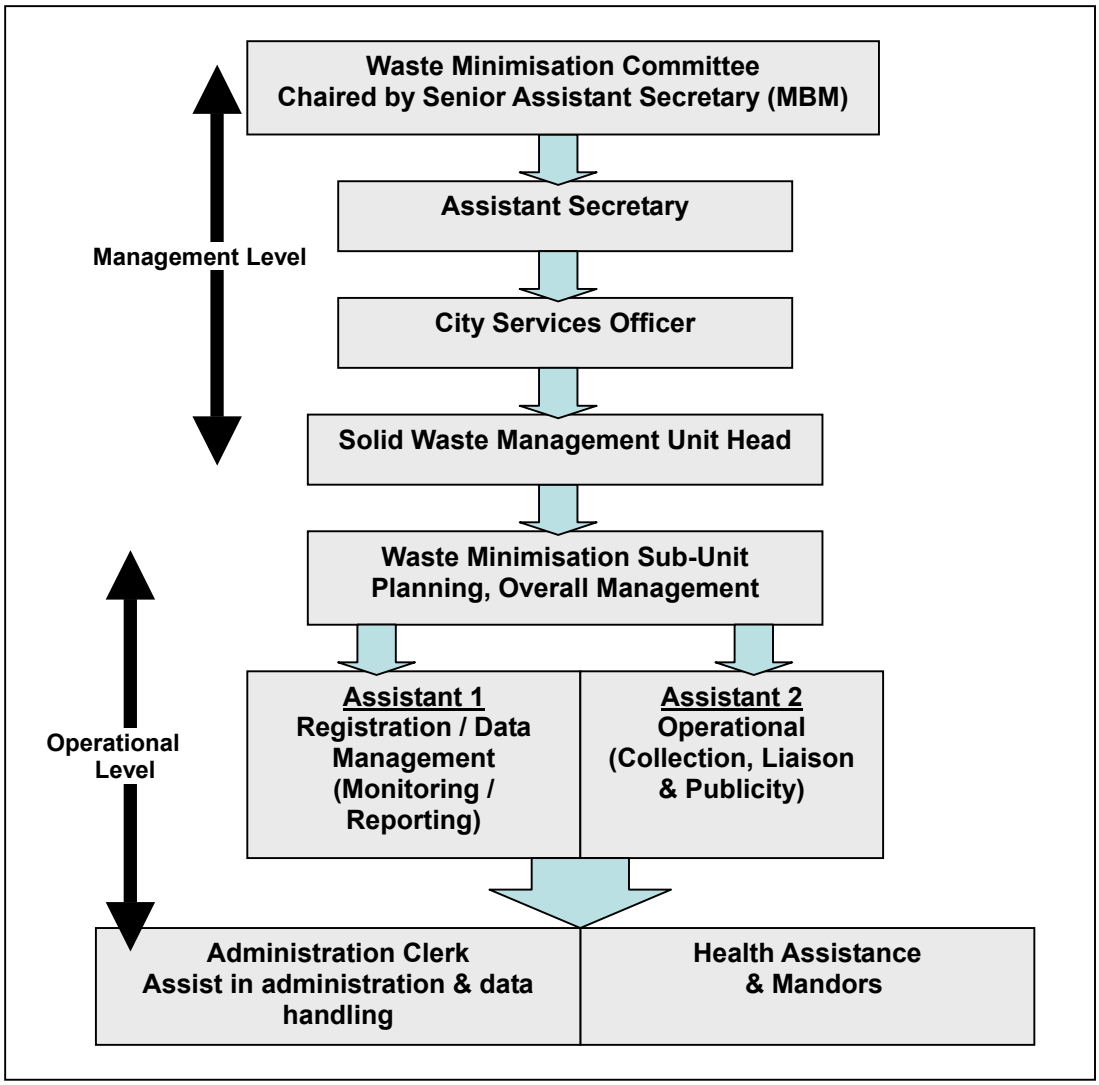

Figure 4.1 Future Waste Minimisation Organisation in MBM

4.3 Registration of Existing Recycling Players / Stakeholders

MBM recognises the importance of creating networking or partnership with the existing recycling players or stakeholders. Meetings at several levels of MBM will be organised to plan for possible effective strategies to register the existing recycling players within MBM areas.

At the top management level, WMU will assist the Waste Minimisation Committee to organise quarterly meetings and one of the important agendas to be discussed will be the strategies to carry out the registration.

4.3.1 Invitation to Stakeholder Workshop

The first stakeholder workshop will be proposed in 2006, targeting the involvement of various stakeholders related to 3Rs such as recycling agents, NGOs, schools, private sectors, resident associations etc. The importance of the roles of the stakeholders in such workshop will be emphasised so that the stakeholders appreciate the recognition by MBM and subsequently provide cooperation to register with the council. Information about formal registration of 3Rs stakeholders in Miri will be announced in the workshop and opinions from the stakeholders will be well taken.

4.3.2 Voluntary and Pro-active Registration

Upon approval by the top management with consideration of the opinions from stakeholders, a formal registration process of 3Rs stakeholders, particularly the 3rd level recycling players such as the recycling industries, middlemen or agents will be initiated by 2007. Under this registration system, the stakeholders are expected to register on voluntary basis. However, WMU will take initiative to also carry out pro-active registration of the stakeholders within the operational areas of MBM.

4.3.3 Mandatory Registration

As long term solution, amendment on the Local Authority (Cleanliness) By-laws 1999 will be necessary so that to empower the local authorities to register and license recycling stakeholders on mandatory basis, particularly the recycling businesses. MBM will take initiative to bring the issues to be discussed in the Waste Minimisation Committee at top management level, so that the request to amend the by-law is forwarded to the State Cabinet through the City Secretary to the ministry. In addition to the amendment of by-law, discussion on other legal and economic instruments will be discussed at top management level of the Waste Minimisation Committee.

4.4 Increase Awareness and Recycling Practices

4.4.1 Awareness and Publicity

a) Eco-Pack, Information Leaflets and Press Release

3Rs leaflets and newly printed Eco-Pack will be distributed by WMU to public and other relevant stakeholders throughout the year, especially at 3Rs campaigns or other suitable events.

Regular press release, seminar talks, updating of 3Rs brochures will be prepared and conducted. On the other hand, National Waste Minimisation Master Plan and Guidelines will be adopted where appropriate.

b) 3Rs Magnet Calendar with 3Rs Activities Schedules

A magnetic calendar with 3Rs activities schedules (e.g. 3Rs campaigns, door to door collection days etc.) will be prepared and distributed to the public as the publicity for the activities of each year.

c) 3Rs One-Stop Centre

The WMU will act as a one stop 3Rs centre open for public. Queries, comments and requests via MBM website will be well taken for immediate further action.

4.4.2 Source Separation Programmes

a) 3Rs Campaigns with Incentives

The WMU will plan and carry out 3Rs Campaigns quarterly (proposed in the end of January, April, July and October) based on the successful Pilot Project experiences in 2005. “Guideline for Source Separation” and “3Rs Action Guide” developed by JICA will be referred. Types of incentives will be decided at the WMU internal meeting and alternative incentives at different campaigns and locations will be recommended. Other than residential areas, alternative campaign locations such as shopping malls (Boulevard) or schools will be organised based on further discussion with these entities.

In conjunction with these campaigns, other awareness events will be jointly organised such as flea market, education talks by invited speakers on specific subject (source separation, composting etc.), launching of new source separation programme or facilities, lucky draw or quiz and so forth.

b) Door to Door Source Sorting Collection

MBM will continue the door to door source sorting at Krokop area (the Pilot Project area). The frequency of collection will be scheduled to once a month and the collection day will be coordinated to avoid coinciding with any other 3Rs campaigns in Miri.

Planning and expansion of door to door system to other areas such as Bumiko area will be reviewed and considered. The WMU will prepare source sorting equipment (recycling bags and carton boxes) to be distributed to target groups. The source sorting information and guides will be printed on these bags and boxes to reduce the need of separate leaflet distribution.

c) Source Sorting Programmes for Hotels and Shopping Malls

The 3Rs programme at Dynasty Hotel under the JICA Pilot Project will be followed up. Possible expansion of hotel programmes within the same and other hotels in Miri will be discussed and considered.

On the other hand, WMU will take pro-active approach to follow up on the cooperation with shopping malls such as Boulevard in Miri. The possible cooperation includes:

- Promotional events to be held in shopping malls
- Introduction of waste minimisation within the shopping premises, including the reduction of plastic bags usage, office 3Rs programme etc.
- Setting up permanent 3Rs exchange counters in shopping malls with involvement of incentives managed by the shopping management
- Setting up 3Rs collection centres within the premises of shopping malls
- Organise flea markets and shops selling 2nd hand items

The programmes itemised above will be planned and implemented in throughout the 5-year duration of the LAP from 2006 to 2010.

d) 3Rs Awards 2006 and Other School Programmes

WMU will collaborate with the Miri Local Agenda 21 Solid Waste Reduction Group to carry out the yearly 3Rs Awards in Miri. The WMU will support the implementation of the 3Rs award and provide necessary support to participating schools. These include the distribution of the 3Rs Resource Kit (produced under the JICA Waste Minimisation Study Pilot Project) or other relevant information material. The WMU will also support setting up 3Rs facilities in collaboration with the NREB PALS programme. The "Guideline for 3Rs in Schools" developed by JICA will be used as the main reference source for implementation of programmes in schools.

e) Other Actions to be taken

The WMU will collaborate with the LA 21 Solid Waste Reduction Group to carry out initiatives related to plastic reduction as well as composting.

4.5 Capacity Building

Capacity building programme for WMU will be intensified. The area of training will be identified and include the following possible areas:

- Organisation skills such as management of programmes, monitoring and reporting skills
- Promotional skills such as public relations and participation skills, public speaking.
- Technical training such as recycling technologies, systems.

The WMU will participate at national forums and workshops to ensure the 3Rs implementation in MBM is in line with national policies. Exchange of information with stakeholders or other LAs will be achieved through these events.

4.6 Cost Implication

The cost implication of the Action Plan depends on the implementation approach. No significant capital costs are involved in the implementation of Action Plan except some allocation of recycling bins, printing and distribution of pamphlets or flyers depending on the extent of implementation. Operating costs are more significant in terms of manpower involvements. Some relevant cost items and options in implementation of this Action Plan are listed in Table 4.3 below:

Table 4.3 Cost Items for the Implementation of Local Action Plan

No	Approaches	Cost Items
1	Institutional Setup at Management and Operational Level	▪ Establish new unit / Expand existing unit (established under the JICA Pilot Project) with new premise, facility, and manpower. ▪ Set up exhibition, information centre and drop off centre. ▪ Publicity on the WMU established <u>Optional:</u> ▪ Restructure or mobilise existing manpower internally, utilizing available premise and facilities.
2	Registration of Recycling Players	▪ Set up new facility and system for registration. ▪ Design and creation of registration forms, printing and distribution. ▪ Publicise information on the website to call for registration. ▪ Mobilise manpower to pro-actively register the players <u>Optional:</u> ▪ Publicise on existing MBM website. ▪ Pro-active registration using existing MBM team

No	Approaches	Cost Items
3	Increase Awareness and Recycling Practices	▪ Organizing stakeholder workshops ▪ Publishing eco-pack, leaflets and publicity ▪ Implement awareness campaigns etc (such as road-shows, demonstration and awareness talk in schools etc.) ▪ Continue previous Pilot Project on source separation at shopping malls, schools, hotels and residential areas ▪ Establish more recycling centres ▪ Provision of incentives (parking coupons etc) ▪ Capacity Building of WMU ▪ Other expenses (such as printing and distribution of pamphlets, flyers, booklets, magnetic calendar etc. <u>Optional:</u> ▪ Acquire supports or sponsorships from other sources for implementation of awareness and recycling campaigns.

Note: 1) Operational expenses include all expenses of implementing the registration system, data management, awareness campaigns, monitoring and evaluation etc.

2) Other possible costs not counted are such as incentives on tax reduction, subsidies on purchase of recycling related machinery and equipment etc.

Rough lump sump estimation on the budget required for each item of the implementation of A/P on 5 years basis is summarised as follows:

Table 4.4 Rough Budget Estimation for Implementation of Action Plan

No	Descriptions	Budget (RM)
1	Expansion of "Waste Minimisation Unit (WMU)" under Pilot Project - Computers with accessories, furniture and other consumables etc. (Capital costs)	50,000
2	Setting up of facilities for drop off and recycling information – Computers, furniture, exhibition boards, materials for distribution, recycling bins and other consumables etc. (Capital costs)	100,000
3	Establish additional recycling centres as necessary – estimation of 10 recycling centres with simple structure and set up (Capital Costs).	200,000
4	Operational Expenses – Publicity, manpower, utility costs, transportation, maintenance and other miscellaneous operational expenses (RM500,000/year x 5 years)	2,500,000
5	Implement awareness campaigns etc (assuming 4 campaigns per year at RM200,000/each x 5 years)	4,000,000
6	Organisation of workshops, meetings and capacity building programmes - Assuming RM100,000/year x 5 years	500,000
7	Other expenses (such as printing and distribution of flyers, pamphlets, magnetic calendar, booklets to schools, manufacturers, business entities etc.) – Assuming RM300,000/year x 5 years	1,500,000
TOTAL		8,850,000
AVERAGE PER YEAR		1,770,000

Note: 1) Actual budget required could be varied depending on many technical and financial factors
2) Capital costs shown are excluding building cost and rental etc.

In conclusion, the actions to be taken by MBM in this LAP can be summarised in Table 4.5 below, while Figure 4.2 shows the overall frameworks for the actions to be taken in LAP-WM of MBM:

Table 4.5 Summary of Actions to be taken for Waste Minimisation in MBM

Activities	Implementation Period	Tasks Allocation and Remarks
Organisation / Coordination Meetings		
Waste Minimisation Committee Meeting	Quarterly for each year from 2006 to 2010, proposed to set around # March, June, September and December	• To be chaired by Senior Assistant Secretary • Assistant Secretary to lead the preparation and organisation of the meeting together with City Services Officer, and head of WMU
WMU Internal Meeting	Monthly (last week of the month)	• To be chaired by City Services Officer, attended by SWM unit head and WMU • WMU to prepare and present in the meetings • Invitation of others to join based on needs
Stakeholder Networking Workshop	Planned for each year, first to be organised in 2006	• WMU to organise and prepare information for dissemination • Senior management to be invited to officiate and attend the meeting • WMU will follow up on updating of recycling stakeholder and data follow up • To discuss formal registration of recycling stakeholders
Ad-hoc meetings	Depending on needs and events	• Assistant Secretary to consult with City Services Officer to determine who should attend • To present experiences of MBM and exchange experiences
Registration and Licensing of Recycling Stakeholders	Target to be Initiated in 2007 after the Stakeholder workshop; mandatory registration by 2008	• Assistant Secretary and WMU to prepare details of registration, licensing and legal amendments required • To initiate legislative amendments
Economic Instruments	Depending on needs and events	• To brainstorm and shortlist economic instruments for encouraging the waste minimisation implementation
Awareness and Publicity		
Eco-Pack, Leaflets, 3Rs magnetic calendar and Press Release	Distributed throughout the whole duration of 2006-2010	• WMU to design, prepare and distribute • Press release to be drafted by WMU, vetted by Assistant Secretary, approved by City Secretary before handed to MBM • Champion Cr Bernice to be invited to assist in the promotion • WMU to review and adopt other national and state level master plans and guidelines
3Rs Website	Throughout the whole duration of 2006-2010	• Hosting of 3Rs website under MBM website by webmaster Thomas • Budget preparation for redirection of www.miri3r.net • Update the website every month

Activities	Implementation Period	Tasks Allocation and Remarks
3Rs One Stop Centre	Throughout the whole duration of 2006-2010	• Handle all kinds of queries, requests and comments received from public via website, email, telephone etc.
Source Separation Initiatives		
3Rs Campaigns	4 times per year: • Proposed areas are such as Tudan, Krokop, Bumiko and Taman Tunku	• Preparation led by the WMU team and supported by the WM Committee • City Services Officer to manage 3Rs fund • Publicity support by 3Rs champion • WMU to organise other side events such as flea markets, source sorting talks, lucky draws, quiz etc. in conjunction with the campaigns
Door to door source separation	4 times per year: • According to schedule provided • For expansion of new area, new implementation plan to be determined	• WMU to implement, monitor and report • WMU to collaborate with Buddhist Tze Chi on the collection schedule • WMU to re-design and print recycling bags and boxes for distribution to new area
3Rs Programme for Hotels and Shopping Malls	• Follow up with Dynasty hotel throughout the year • Introduction to other hotels • Programmes at shopping malls in July, in conjunction with 3Rs campaigns	• Waste Management Committee to discuss and select new hotels and shopping malls • WMU to plan, implement, monitor and report
3Rs Programme for Schools	• 3Rs Awards schedule to be determined by LA 21 • Other school activities to be carried out throughout the year	• WMU to coordinate and implement with collaboration of Miri LA 21
Composting initiatives (LA 21) & Waste minimisation initiatives on Plastics (LA 21)	• In accordance to the timing by Miri LA 21	• WMU to coordinate and implement with collaboration of Miri LA 21
Waste Composition Analysis and Data Management		
Waste Composition Analysis	Yearly update	• WMU in consultation with Assistant Secretary and City Services Officer to outsource and coordinate waste composition analysis • WMU to report findings and compile data for future information leaflets or other promotional material

Activities	Implementation Period	Tasks Allocation and Remarks
Data Management	Throughout the whole duration of 2006-2010	• WMU to collect and populate data according to MHLG format • WMU to report to MBM management and MHLG monthly • WMU to prepare and response to ad-hoc data / information request
Capacity Building Activities		
National forum, seminar and other trainings	Depending on schedule of National level Waste Minimisation and other seminars throughout the whole duration of 2006 - 2010	• Assistant Secretary to delegate officers to attend and present experience where appropriate • WMU to attend appropriate training courses related to organisation, promotional and technical skills
Work Attachment	Depending on needs	• Assistant Secretary to contact other LAs for the 1 week work attachment • WMU to attend the work attachment and report
Study Visit	October	• Programmes and preparation by WMU • To be approved by Waste Minimisation Committee • Attendance to be decided by Waste Minimisation Committee • WMU to act as secretariat and report from trips

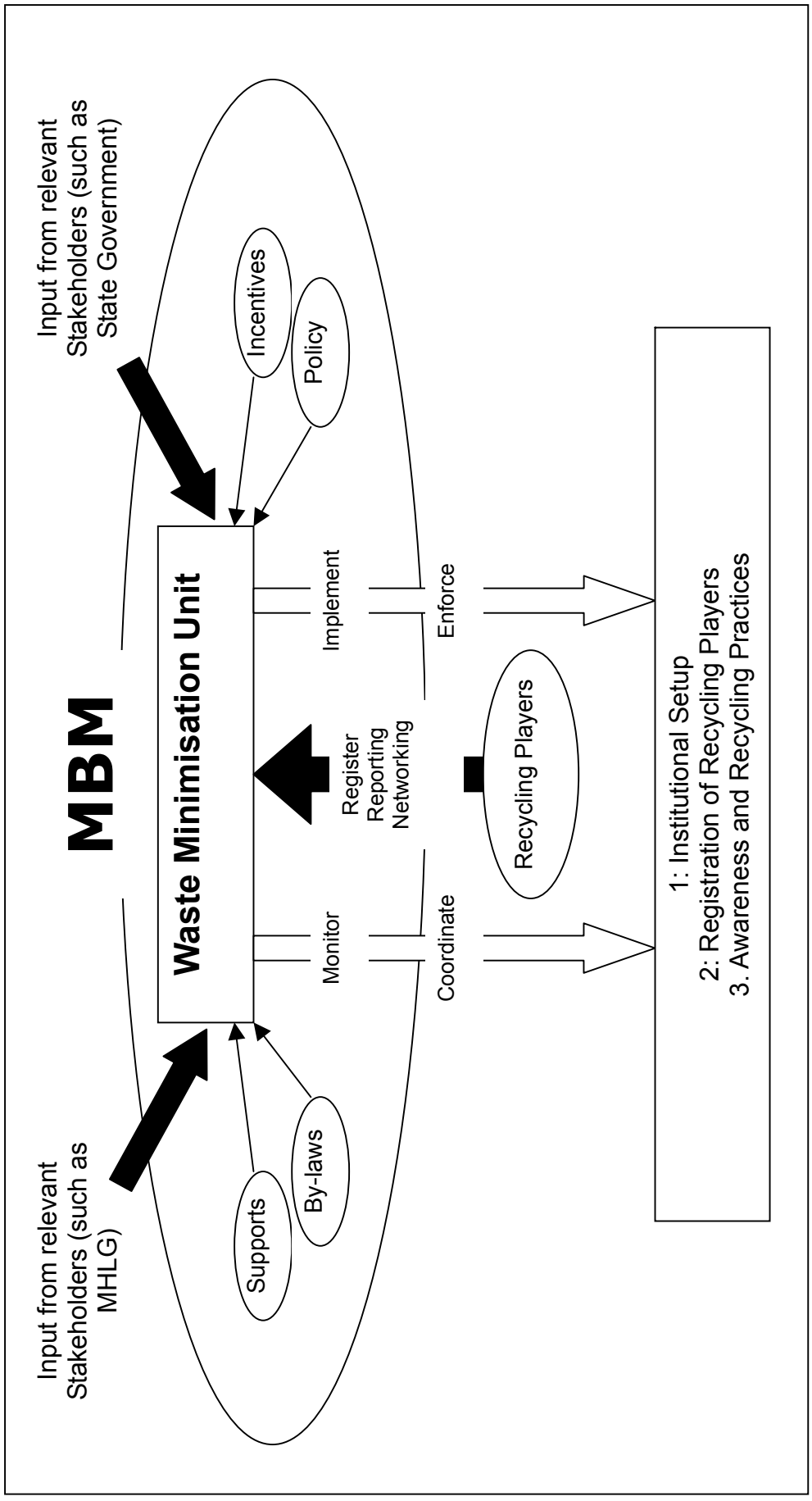

Figure 4.2 Overall Frameworks for the Actions to be taken in the Local Action Plan

CHAPTER 5 MONITORING AND IMPLEMENTATION SCHEDULE FOR THE ACTION PLAN

5.1 Monitoring and Evaluating the Performance

In order to monitor and evaluate the progress and performance of the recycling activities in MBM as targeted in this A/P, some indicators and measures shall be established, as shown in Table 5.1 below:

Table 5.1 Examples of Performance Indicators and Measures

No	Performance	
	Indicator	Measures
1	Quantity of wastes generated from sources (households, business entities, industries etc.)	Carry out questionnaire surveys, or primary data collection.
2	Quantity of disposed wastes to landfill site	Carry out data collection from the landfill site (weighbridge data).
3	Quality of waste retained at sources (households, business entities, industries etc.)	Observation on the waste separation efforts, as well as the waste handling methods
4	Number of recycling players registered	Establish a recycling unit or taskforce to carry out registration of the recycling players.
5	Quantity of recyclables collected by the registered recycling players	Establish a recycling unit or taskforce to collect reports and analyse the data reported by the recycling players.
6	Quantity of recyclables collected by using the public recycling bins / centres	Carry out inspection and recording on the quantity of recyclable materials collected in the public recycling bins / centres.
7	Quantity of specific recyclable materials collected (such as papers, glass, plastics etc.)	Carry out analysis on the data collected on each particular recyclable material.

5.2 Periodical Reporting

In order to obtain reliable performance measures, accurate, reliable and regular data collection is crucial. Some periodical reporting that is required to monitor and evaluate the progress and performance of the recycling activities in MBM is listed as follows:

Table 5.2 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	Quarterly
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 programmed	Yearly
6	Annual workshop with the registered recycling players	Yearly

All the reports in relation to waste minimisation and recycling in MBM should be directly under the responsibility of the "Recycling Unit" or "Recycling Taskforce". 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 etc. The suggested framework for entire reporting system is shown as follows:

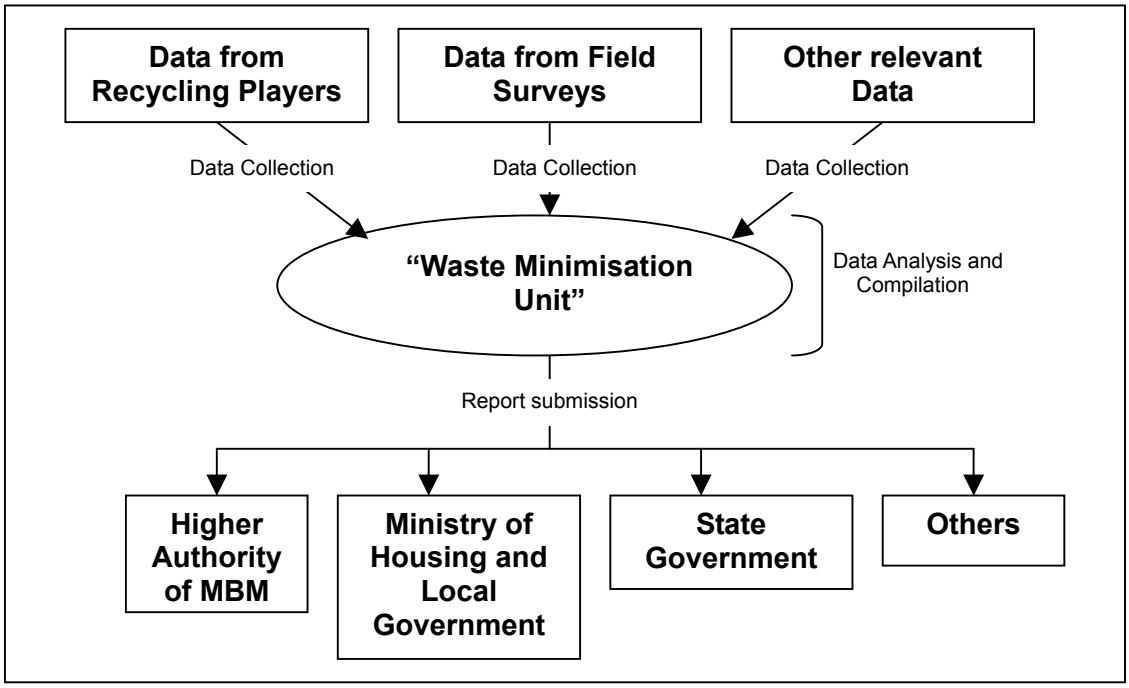

Figure 5.1 Suggested Framework for Entire Reporting System

5.3 Implementation Schedule of Action Plan

The entire A/P is made for the duration of 5 years from 2006 to 2010. The summary of the proposed schedule of the implementation of this A/P is:

Table 5.3 Proposed Schedule for Implementation of Action Plan

No	Action Plan	2006	2007	2008	2009	2010
1	Institutional set-up at management and operational levels					
2	Expansion of the existing "Waste Minimisation Unit (WMU)" within MBM					
3	Organise yearly stakeholder workshop, establish and announcement of formal registration system for recycling players in 2006					
4	Voluntary and pro-active registration of stakeholders					
5	Mandatory registration of stakeholders					
6	Establish a 3Rs one-stop centre					
7	Awareness and publicity through update of eco-pack, leaflets, magnetic calendar and press release					
8	Implement source separation programmes as continuation of Pilot Project as well as new programmes					
9	Education programmes in schools, 3Rs award programmes					
10	Provision of incentives (such as parking coupons, shopping vouchers etc.)					
11	Capacity building to WMU officers					
12	Monitoring and periodical reporting					

Appendices

APPENDIX A

REGISTRATION FORM FOR RECYCLING PLAYERS

Registration ID: _____

Name (Company / Individual)								
Category of Business	☐ Sendirian Berhad	☐ Enterprise	☐ Individual					
Type of Business	☐ Door to Door ☐ Agent / Middlemen / Trader ☐ Recycling Centre ☐ Recycling Industry ☐ Others (_____)	Year of Incorporation						
		Number of Employees						
		Annual Sales (Turnover)						
Address		Phone						
		Fax						
		E-mail						
Types of Recyclables Collected	☐ Aluminium	☐ Glass	☐ Others _____					
	☐ Cardboard	☐ Scrap Metal (Iron)	☐ Others _____					
	☐ Plastics	☐ E-wastes	☐ Others _____					
	☐ Papers	☐ Batteries	☐ Others _____					
Areas of Collection within MBM	1)	Mon	Tue	Wed	Thu	Fri	Sat	Sun
	2)	Mon	Tue	Wed	Thu	Fri	Sat	Sun
	3)	Mon	Tue	Wed	Thu	Fri	Sat	Sun
	4)	Mon	Tue	Wed	Thu	Fri	Sat	Sun
	5)	Mon	Tue	Wed	Thu	Fri	Sat	Sun
	6)	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Areas of Collection Outside MBM	1)	Mon	Tue	Wed	Thu	Fri	Sat	Sun
	2)	Mon	Tue	Wed	Thu	Fri	Sat	Sun
	3)	Mon	Tue	Wed	Thu	Fri	Sat	Sun
	4)	Mon	Tue	Wed	Thu	Fri	Sat	Sun
	5)	Mon	Tue	Wed	Thu	Fri	Sat	Sun
	6)	Mon	Tue	Wed	Thu	Fri	Sat	Sun

APPENDIX B

DATA RECORDING FORM FOR RECYCLING PLAYERS

Reporting Month: _____

Name (Company / Individual)					
Registration ID					
Amount of Recyclable Materials Collected:					
Within MBM Areas	**Types**	**Amount / month**	**Unit**	**Source (from)**	**Buyers (To)**
	☐ Aluminium				
	☐ Cardboard				
	☐ Plastics				
	☐ Papers				
	☐ Glass				
	☐ Scrap Metal (Iron)				
	☐ E-wastes				
	☐ Batteries				
	☐ Others _____				
	☐ Others _____				
	☐ Others _____				
	☐ Others _____				
Outside MBM Areas	**Types**	**Amount / month**	**Unit**	**Source (from)**	**Buyers (To)**
	☐ Aluminium				
	☐ Cardboard				
	☐ Plastics				
	☐ Papers				
	☐ Glass				
	☐ Scrap Metal (Iron)				
	☐ E-wastes				
	☐ Batteries				
	☐ Others _____				
	☐ Others _____				
	☐ Others _____				
	☐ Others _____				

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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

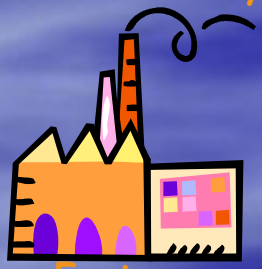
What are your responsibilities ?

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

PART 4

LOCAL ACTION PLAN IN MP Pulau Pinang

"KURANGKAN SISA PEPEJAL,

TINGKATKAN KUALITI HIDUP"

WASTE MINIMISATION

MPPP LOCAL ACTION PLAN

(2006- 2010)

First REDUCE, then REUSE, then RECYCLE

KPKT

Japan International Cooperation Agency

MPPP Municipal Council of Penang Island

Table of Contents

Preface

This "Local Action Plan for Waste Minimisation (LAP-WM) in Penang Island Municipal Council" or Majlis Perbandaran Pulau Pinang (MPPP) is a tool for guiding MPPP and its 3Rs Partners in planning, implementing and improving its Waste Minimisation plans. It is prepared in conjunction with the "Study on National Waste Minimisation", which was carried out for the Malaysian Government with the cooperation of the Japan International Cooperation Agency (JICA). Implementation of the LAP-WM will contribute towards efforts to create a *"Material Cycle Society"* by 2020. This LAP-WM is in line with the "National Strategic Plan for Solid Waste Management" approved by the Government of Malaysia in July 2005.

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

This LAP-WM contains information about the existing conditions regarding solid waste management and initiatives connected with the 3Rs. Based on consultation between the JICA Study group and the MPPP Task Force on waste management, this Action Plan recommends Targets for Waste Management for the period 2005 until 2010. These targets refer to the types of recyclables, generator groups, actions (including measurement & monitoring) and implementation schedules for achieving the recovery targets set for Penang Island. The LAP-WM also defines the responsibilities of MPPP and other key recycling partners and provides an indicative budget for infrastructure. The plan also includes a monitoring, and a review and reporting system.

Majlis Perbandaran Pulau Pinang

April 2006

Pulau Pinang Fact Sheet

Area (square kilometres)		161.8
Total Population (2000)		437,121
Total Population (2004) estimates		484,925
Average annual population growth rate, 2000 - 2005 (%) Average annual population growth rate, 2006 - 2010 (%)		2.4% 2.1%
Ethnic group composition of Malaysian citizens (%)	*Bumiputera*	38.9%
	Chinese	47.0%
	Indian	13.1%
	Others	1.0%
Age Structure	Population aged 0 – 14 years old (%)	28.1%
	Population aged 15 – 64 years old (%)	70%
	Population aged 65+ years old (%)	1.9%
	Dependency ratio (%)	43%
Sex Ratio		N /A
Total Households		100,867
Total Living Quarters		107,471
Economic (2004 Estimates): 1) Gross Domestic Product (1987 real prices) • Agriculture, livestock, forestry and fishing • Mining and quarrying • Manufacturing • Construction • Services 2) Labour Force (2004 estimates) • Labour Force • Labour Force Participation Rate • Unemployment 3) Employment by Sectors (2004 Estimates) • Agriculture, livestock, forestry and fishing • Mining and quarrying • Manufacturing • Construction • Services		N / A

Abbreviations

AFSB	Alam Flora Sdn Bhd
BEs	Business Entities
CBO	Community-based Organisation
ISO	International Standard Organisation
JICA	Japan International Cooperation Agency
JST	JICA Study Team
Kg/cap/day	Kilogram per capita per day
KL	Kuala Lumpur
LA	Local Authority
LAP-WM	Local Action Plan on Waste Minimisation
MHLG	Ministry of Housing and Local Government
MPPP	Majlis Perbandaran Pulau Pinang (Penang Municipal Council)
MSW	Municipal Solid Wastes
NGO	Non-governmental Organisation
PET	Polyethylene Terephthalate (plastic)
SRJK (C)	Sekolah Rendah Jenis Kebangsaan (C) [Chinese National Primary School]
SWM	Solid Waste Management
WMU	Waste Minimisation Unit

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 discharged regularly from households, commercial or business premises, institutions and industries (excluding the processed industrial wastes, sludge, household hazardous wastes, and 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) The 3Rs

- ***Reduction at source**, which is defined as to reduce the amount of waste that will enter into the waste stream through the changes of lifestyle and/or manner of consumption, improvement of manufacturing processes, green purchasing and so on,*
- ***Reuse**, which is defined as the multiple use of a product in its original form, for its original purpose or for an alternative, with or without re-conditioning, and*
- ***Material Recycling**, which is defined as to utilise a waste for other purposes by processing (including segregation, washing, melting, transforming, etc.) but most of the fractions of the waste shall be utilised for other purposes.*

C) Recycling Rate

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

where,

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 Service Area

1.1.1 Location

The island of Penang lies off the north western coast of Peninsular Malaysia and covers an area of about 299.65 km^2. The island is separated from mainland Seberang Perai by a channel. Penang Island is linked to Seberang Perai by the Penang Bridge and a ferry service (for passengers and vehicles). There is no train service on the island and Keretapi Tanah Melayu Bhd (KTMB) operates only from Butterworth in Seberang Perai. A funicular railway operates from the base station to Penang Hill on the island.

The local authority for Penang Island is commonly referred to as MPPP, which stands for Majlis Perbandaran Pulau Pinang. MPPP currently has a total staff of 3,874 headed by a President who is assisted by 24 Councilors, a Secretary, and 10 departments headed by a Department Head.

"LEADING WE SERVE"

(Berkhidmat Sambil Memimpin)

MPPP's Motto

1.1.2 MPPP Service Area

MPPP's administrative area covers about 299.65 km^2 (29,965 hectares).

MPPP's administrative area also covers a band of 1 nautical mile around the island. There are two administrative districts within MPPP, the larger being the less- urbanised southwest district (Table 1.1).

Table 1.1 Population & Area of Two Districts in MPPP

No.	District	Population ('000)		Area
		(2000)	(2004)*	(hectares)
1	North East	416.4	476.2	13,146
2	South West	159.1	191.3	16,819
Total		575.5	667.5	29,965

Source: Census, 2000
Note: *Projected

MPPP operates its services within seven (7) functional zones. Figure 1.1 shows these zones and it is noted that a large portion in the southwest is less developed compared to the north east.

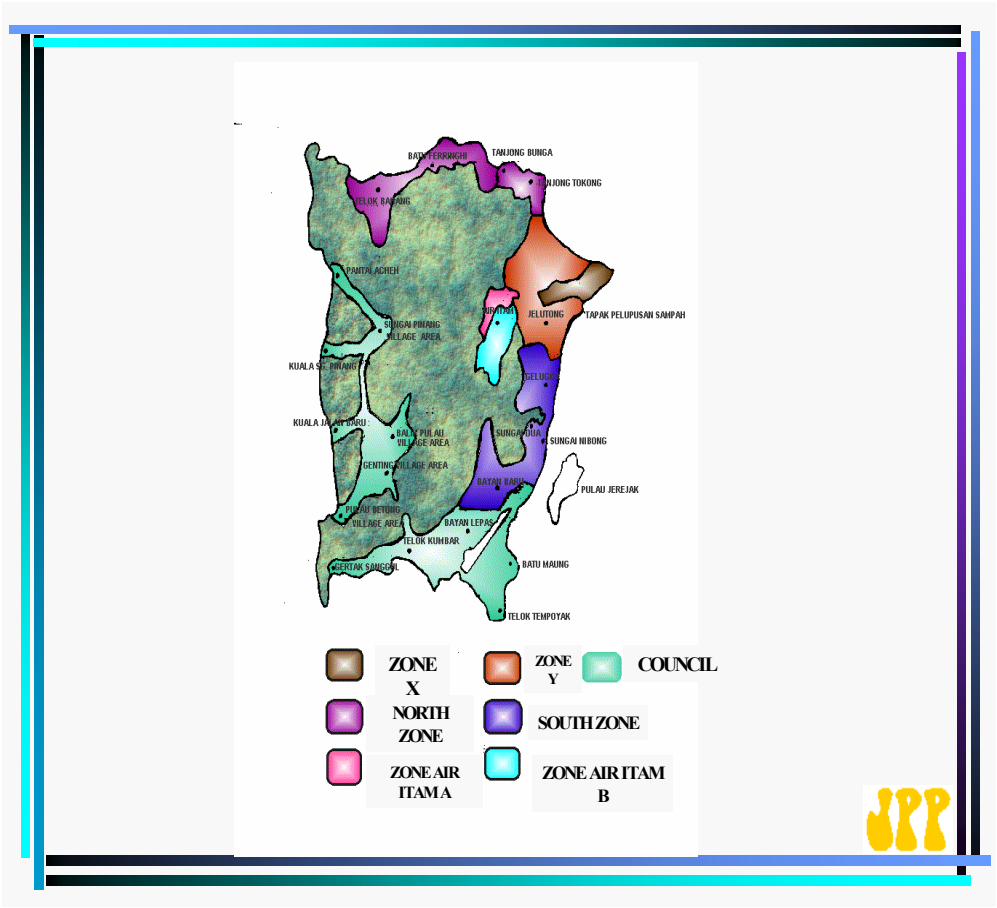


Figure 1.1 Map of MPPP's Area of Coverage

1.1.3 Population

The population of Penang Island in 2000 was 575,498 (Census, 2000). This is about 49 per cent of the total population of Penang, which stood at 1,231,200 in 2000. 71 per cent of the population live in the northeast district, of which almost 66 per cent is made up of Chinese ethnic group. The bumiputera group is mainly found in the southwest district, accounting for 62 per cent of its population. There were 137,272 households then, which is lower than the number of living quarters available indicating the probability of excess housing. The key statistics for the population within MPPP is summarised below.

Table 1.2 Key Population Statistics for MPPP, 2000

Description	LA		TOTAL
	North East District	South West District	
Population	416,369	159,129	575,498
Ethnic Group Composition (%)			
-Bumiputera	23.6	62.2	34.3
-Chinese	65.8	30.5	56
-Indian	9.9	6.9	9.1
-Others	0.6	0.3	0.6
Total Households	100,711	36,561	137,272
Total Living Quarters	131,568	45,081	176,649

Source: Census, 2000

For the period 2000-2010, population projections are made based on straight line increase at 2.5 per cent increase per annum. As such the population is estimated to grow from 651,123 in 2005 to 736,686 in 2010.

The population served by MPPP is estimated at about 90 per cent representing about 150,200 households (2004). MPPP provides services to more than 60 per cent of their area (including squatter areas) but the coverage for recovery of recyclables is difficult to estimate.

1.2 Solid Waste Management Institutional Framework in Penang

1.2.1 Penang State Government

In Penang, the State Government established the Penang Environment Working Group (PEWOG), to serve as a consultative forum for local government. PEWOG was established under the Penang Local Government Consultative Forum (PLGCF) and its members include Majlis Perbandaran Pulau Pinang (MPPP), Majlis Perbandaran Seberang Perai (MPSP), the Department of Environment (DOE), Environmental Activists, NGOs e.g. the Consumers Association of Penang (CAP), the Malaysian Nature Society (MNS), the National Poison Centre, recycling companies, and individuals. Through PEWOG, the state government is committed to:

"…to adopt recycling as a long term strategy for solid waste management" and "to transform the 'throw-away' culture to that of a conserving one".

They published a Recycling Guidebook to increase knowledge about recycling and to encourage the public to be involved in recycling activities. The items that are promoted for recycling are paper, plastic, metals, glass and old clothes. The guidebook also describes what items are not collected and these include waxed paper, foil, carbon paper, envelopes with plastic windows, Styrofoam and plastic bags and windowpanes. It is noted that the public is encouraged to donate items to charities (Penang Recycling Guide Book, first and second editions).

On 19 February 2005, PEWOG launched "The Recycling Wheel of Penang", a directory of recycling stakeholders in Penang. It is an attempt to list as many recycling communities, agents and buyers. Waste generators represent everyone who generates waste, and removes recyclables at the place of generation. The "Collectors" are groups of enthusiastic people in communities, businesses and institutions who run recycling collection activities on a regular basis. This group includes RT, JKKK, RAs, schools, hospitals, factories and government departments. Recycling agents take recyclables from collectors and sell or donate them. "Buyers" refer to those who buy recyclables from recycling agents (wholesale or specialists), sort and then sell or export them. "Processors" are plants that dismantle, crush, shred and bale recyclables but do not manufacture products from recyclables. "Converters" are factories that turn recyclables into new products, which are then bought by consumers (waste generators).

1.2.2 MPPP

MPPP's objectives that are relevant to waste minimisation are as follows:

- ✓ Maintenance and preservation of the environment and ecology
- ✓ Provision of good public health facilities
- ✓ Promotion and preparation of facilities for community development, and recreational and leisure activities

- ✓ Cooperating with other government agencies in achieving the objectives and aspiration of the government.

The Urban Services Department (USD) of MPPP administers waste management in Penang Island. The USD is located at a historical building at Padang Kota Lama (Esplanade)-Plate 1. The Department is headed by a Director who reports to MPPP's Secretary (Figure 1.2). The USD provides solid waste collection and disposal services as well as cleansing services similar to other LAs. In MPPP, cleansing services include sea and river cleansing; beach cleansing and cleansing of industrial zones. In 1990, the Special Tasks Unit was set up primarily for coordinating "gotong royong" and providing backup services for solid waste management e.g. supply of trucks for special events and emergency cases. In 2000, following MPPP's participation in the National Recycling programme (NRP), the STU's responsibilities included recycling activities, and these tasks are separate from the normal operational tasks of solid waste collection and disposal, which continue to be managed by the other technical unit.

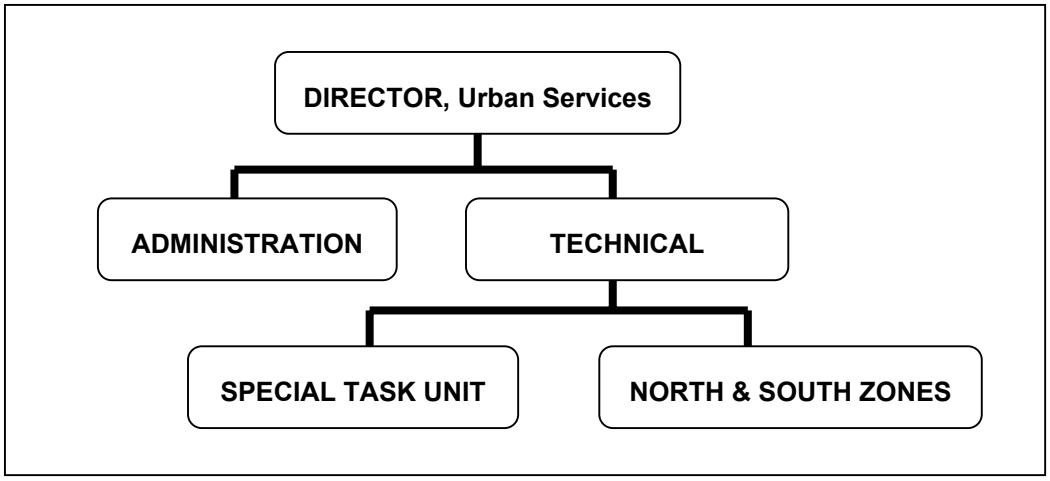


Figure 1.2 Organisation Chart of the Urban Services Department, MPPP

Special Tasks Unit, Urban Services Department

Activities related to waste minimisation in particular recycling initiatives are planned and organised by the Special Tasks Unit (STU). The team responsible for the 3Rs activities consists of only two personnel; an Assistant Environmental Health Officer (Grade U 32) and a Public Health Assistant (PHA). The post of the head of STU was upgraded to Grade U 36 in July 2005. The PHA retired in June 2005 and at the time of writing, the post is vacant. Based on a total staffing of 106 (excluding the IMG group, which consists of the labourers), the STU staff makes up less than 2 per cent of the staff of the Urban Services Department. The responsibilities of the STU personnel are described in Table 1.3.

Despite the constraint in manpower, the STU, which is the de facto 'Waste Minimisation unit' has organised and implemented a host of activities and programmes both on a continuous or ad hoc basis. This has been possible partly because such activities have been carried in close cooperation with PEWOG and stakeholders now known as the "Recycling Wheel". The success of the programmes is testimony of the importance of participation and partnership in planning and implementation of recycling activities.

The STU has also been monitoring recycling activities on the island. Information is collected not only in relation to MPPP's activities but the unit also receives reports of recyclables collection from contractors and recyclers on a monthly basis. The data on recovery of recyclables is elaborated in Chapter 3.

Table 1.3 Staff Functions of Special Tasks Unit (Waste Minimisation), 2005

Staff/Code	Functions & Responsibilities
Head (U32/U36)	1. Coordinator of the STU 2. Planning & implementation of Recycling Activities. 3. Coordination of "Gotong Royong". 4. Coordination of Environmental Cadets Programme 5. Organisation of Public/ Mobile Toilets 6. Organisation of Flying Squad 7. Data Collection & analysis 8. Monitoring of Activities 9. Reporting to relevant Authorities 10. Member of PEWOG.
Public Health Assistant (U14)	1. Assists Head, STU. 2. Assists in implementation of activities in North & South areas. • Recycling Programmes • Public Awareness & Education Programmes • Publicity & Promotion 3. Liaises with Partners in the north & south areas.

Source: MPPP, 2005

In July 2005, a Waste Minimisation Unit (WMU) was set up at the STU under the auspices of the "Study on National Waste Minimisation" (Plate 2). The WMU is the one-stop centre for information and coordination of waste minimisation activities for Penang Island. During the period July-November 2005, two personnel from the Socioeconomic and Environmental Research Institute (SERI), the consultant appointed to undertake the project, supported the WMU. WMU has carried out a Waste Flow Survey in MPPP's service area and carried out 3Rs awareness promotion activities. These awareness activities are an extension of the programmes carried out by the STU and are directed to a diverse range of waste generators i.e. households, manufacturing industry, service industry (e.g. hospital, hotels), commercial sources (e.g. supermarkets) and schools. Brochures on the 3Rs (In English, Malays & Chinese) were produced and circulated at awareness events held during that period.

Plate 1: The MPPP Building at Padang Kota Lama, Penang

Plate 2: The WMU at the Urban Services Department, MPPP, Padang Kota Lama

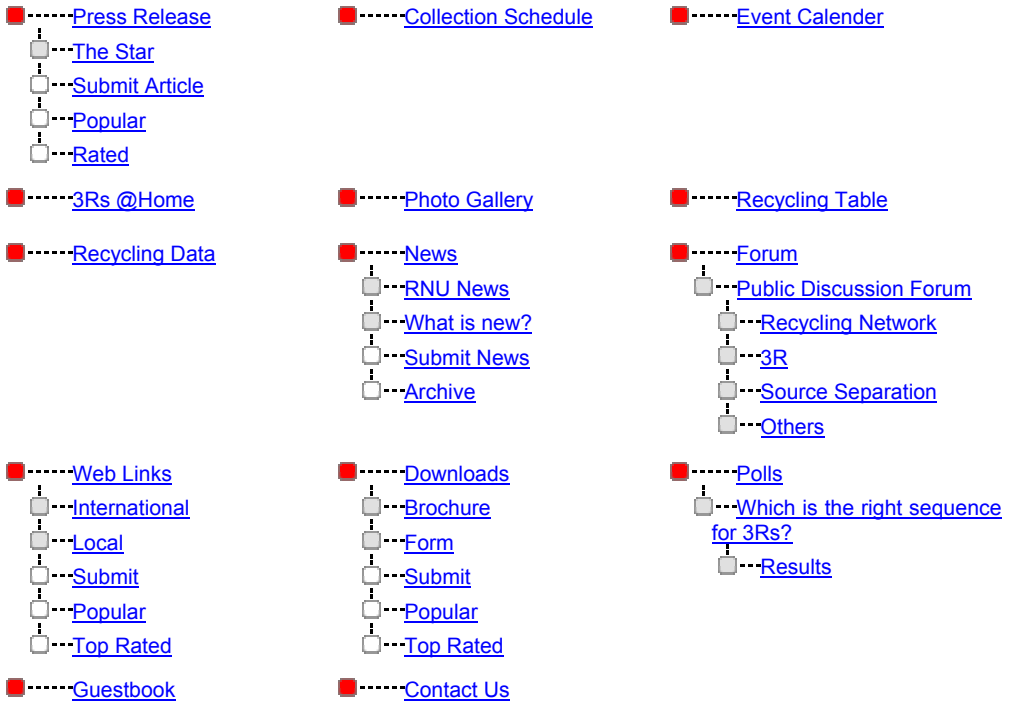
A website was developed for the promotion of the 3Rs. The URL is www.rnumppp.net

This website contains information on waste minimisation including data on recovery of recyclables. The web is linked to other relevant international and local sites. An interesting feature is that the website contains an interactive component whereby users may engage in a discussion forum and also participate in polling on the 3Rs. In connection with the development of an e-based Data collection & Reporting System to be linked with the system being designed for the MHLG (under the same study), a system has been established at the WMU, which comprises:

- ✓ Database of Stakeholders
- ✓ Database for Recyclable Recovery
- ✓ Database for Reporting

Following an exercise to update existing data, a "Penang Island Recycling Directory" was produced in September 2005. This directory contains names, addresses and contact numbers of recycling agents and recyclable buyers as well as communities that recycle on Penang Island. This directory, which will be updated periodically, is posted on the WMU website. Users may also download information materials e.g. the 3Rs brochures and recycling manuals.

The site map of www.rnumppp is shown below.



Budget

In 2003, the Urban Services Department had an operational budget of RM80.31 million (Table 1.4). With regard to waste minimisation activities specifically for recycling, the STU was given RM 200,000 in 2004 and RM150, 000 in 2005. These funds have been used for:

- ✓ Tri-colour bins
- ✓ Campaign souvenir items e.g. bag, pens, caps, note books

Table 1.4 Budget for Urban Services Department, 2003

A.	EMOLUMENTS		Persons	RM (Millions)
	Salaries and contributions:-			**31.03**
	Group A		3	
	Group B		8	
	Group C		20	
	Group D		75	
	IMG etc.		1,775	
	Total		1,881	
B.	MANAGEMENT			**47.99**
	Management cost include payment of contract services for waste			
	collection and disposal, cleansing and office expenses			
C.	MATERIALS			**0.54**
	Purchase of office equipment and materials			
D.	MAINTENANCE			**0.67**
	Maintenance cost equipment/machines/vehicles			
E.	SPECIAL EXPENDITURE			**0.03**
F.	CONTRIBUTION (Development Expenditure)			**0.05**
			Total	**80.31**

Note: 1USD = RM3.80

The activities of the STU are currently carried out under provisions of the Local Government Act, 1976. There is currently, no law that makes waste minimisation a mandatory activity, and for the control of collection and sale of recyclables.

1.3 Waste Minimisation Initiatives in Penang

In Penang, recycling activities on a formal basis began in 1993 (Briefing to JICA Study Team on 13 August 2004). The programme was launched by the Chief Minister of Penang as a pilot project involving two housing estates. Three main parties participated in the pilot; the residents in the housing estates, a recycling vendor, and the MPPP. The pilot project started well but soon encountered difficulties.

In 1993, the task of coordinating solid waste recycling programmes was given to the STU, MPPP. However at that time, work focused on delivery of sets of 4-waste bins for recyclables to all the schools in Penang Island. The 4-bins were also provided to hotels and one apartment complex (Lavinia Apartment, Taman Sri Nibong). Eventually the bins became normal waste bins and the programme was discontinued. One major factor for the failure of the programme was the absence of an awareness and educational programme to go with the handing over of the bins for recyclables to the communities and schools.

In 2000 MPPP joined the National Recycling Programme (NRP), re-launched by MHLG. The State Government re-launched the State's recycling programme in March 2001, and this time twenty (20) communities were initially involved in a Pilot Project for a Community Recycling Programme (Phase 1 of the Community Recycling

Programme or CRP).

After starting the pilot project, it was found that very little was known about recycling. So a Learning Programme was developed to learn more about recycling through several activities and events held in 2002 and 2003 (Phase 2 of the CRP). The Working Group is now better informed after several seminars, workshops and visits to recycling facilities (re: "Program Kitar Semula Komuniti, Negeri Pulau Pinang 2001-2005).

In March 2005, nine (9) communities are still actively recycling, showing that sustainability can be achieved.

Under the NRP, 3 colour bins were distributed to various groups; CBOs, NGOs, hospitals, hotels, private firms and government agencies. This time around, MPPP appointed a private organisation to handle an awareness programme. The approach was to disseminate information about the importance of recycling to local communities.

MPPP also initiated a Recycling Programme for Government Departments.

On 30 December 2003, the State's Community Recycling Taskforce was launched by the State Executive Councillor in charge of Local Government, Y.B. Dato Dr Teng Hock Nan at the State Recycling Convention. He also presented Appreciation Certificates to recycling activists and recycling agents in the State. The Convention was sponsored by MPPP as their activity to commemorate National Recycling Day (11 November). The 2nd Edition of the "Penang Recycling Guidebook" and the Hazardous Waste Bin Programme for wet markets in Penang Island were also launched at the event.

In 2004, MPPP began placing special collection receptacles (designed by college students) in wet markets for collection of fluorescent tubes. These bins are located at Balik Pulau, Bayan Baru, Jalan Anson, Pulau Tikus and Tanjung Bunga markets. For the time being, these wastes are stored at the MPPP depot at Kampung Jawa as there is currently no buyer.

In 2004, they began collecting computers together with Majlis Perbandaran Seberang Perai (MPSP). In cooperation with Dell, computers are collected and those found to be workable are donated while those beyond repair are cannibalised and useable materials salvaged for recycling. Prior to this, MPPP had launched the "Hazardous Waste Collection Programme" at supermarkets on 7 June 2003 at Sunshine Farlim Supermarket. This programme, which involves three supermarkets i.e. Makro, Gama Department Store and Sunshine Farlim and the Loh Guan Lye Specialist Centre is on-going and collection of wastes is carried out by MPPP.

Also in mid-2004, MPPP took possession of two 5-tonne trucks from MHLG. These are two of a total of 51 trucks acquired by MHLG and distributed to selected LAs. As at September 2005, both trucks remain in the possession of the Engineering Department, MPPP and have yet to be commissioned for use by STU for waste minimisation purposes.

In connection with initiatives to manage hazardous municipal solid waste, the State Government commissioned a study on the "Recycling and Safe Disposal of e-Waste", which was sponsored by MPPP. The report was completed at the end of 2004 and submitted to the Penang State Government in early 2005. The key findings showed high awareness of recycling and the need to carefully and safely recycle and dispose of e-waste among the industrial, commercial and institutional and the community sectors. There are many types of electronic and electrical equipment and replacement frequency

varies between 1-5 years.

Some of the problems raised by different generators include:

- the high cost of disposal (by Kualiti Alam Sdn. Bhd.),
- the lack of information on the recycling agents who collect e-waste and
- the lack of a proper place to dispose of e-waste,
- the tedious process of writing off obsolete equipment in the government sector.

Proposals for government intervention and help include:

(1) Increasing public awareness on the benefits of safe recycling and disposal of e-waste;
(2) Setting up an e-waste disposal system and e-waste collection depots;
(3) Increasing the number of approved recycling agents and waste disposal vendors;
(4) Reducing the cost of safe disposal of e-waste; and
(5) Introducing legislation and regulations to support recycling.

Overall, the study shows that there is an existing infrastructure for the safe recycling of e-waste in the state of Penang. However, it needs to be supported, publicised and made more accessible. Recyclable materials such as plastic, metal and precious metals are sent to local companies (Converters or re-processors) to be made into new materials and products. End-point companies for safe recycling and disposal of e-waste do exist in Penang, but most are located in Seberang Perai and not on the island e.g.:

(1) HMR Resources (Malaysia) Sdn. Bhd., Seberang Jaya - principal companies in Australia and Philippines to safely deal with e-waste residues (non-recyclables), and
(2) Asset and Material Management Sdn. Bhd., Perai - has the means to deal safely with e-waste residues.

Subsequently, the study recommends that:

(1) A viable price structure has to be established in the recycling industry between collectors, agents, buyers, processors and converters.
(2) More collection centres need to be established and publicised to collect e-waste.
(3) More recycling agents need to be involved in e-waste recycling to take away the e-waste collected.
(4) The manufacturing sector has to be encouraged and/ or instructed to practise “extended producer responsibility” and “take-back programmes” to take charge of the waste that they create, in their manufacturing process, in the packaging they use and in the “end of life” of their products.
(5) Legislation, compliance and enforcement have to be studied seriously so that environmental protection is not left as a voluntary process.

Under these projects, MPPP has succeeded in planning and implementing all the programmes specified under the terms of reference.

In early 2005, MPPP was selected as one of four Model LAs to participate in two projects under the “Study on National Waste Minimisation”. The first is the preparation of a “Local Action Plan for Waste Minimisation (LAP-WM) 2005-2010”, and the other is a “Pilot Project on Local Recycling Network and Source Separation of MSW in

MPPP (PP II)". Both these projects were carried out under Phase 2 of the study, June–December 2005. PP II is helmed by STU and is carried out in collaboration with Socio-economic and Research Institute (SERI), the JICA-appointed consultant.

- The establishment of a Waste Minimisation Unit at STU, MPPP
- Publication & dissemination of 3Rs brochures (in Malay, English & Chinese)
- Waste Flow Survey
- Publication of the "Penang Island Recycling Directory"
- Drafting of the "Penang Experience"
- Website on waste minimisation
- 3Rs Awareness and education programmes
- Improvement of Data Collection System on Waste Minimisation (& recycling)

For its efforts in raising awareness on recycling, MPPP was awarded special awards for two consecutive years; "Anugerah Penghargaan Di atas Sokongan Kepada Program Kitarsemula Kebangsaan" from MHLG in 2004 and Anugerah Bandar LESTARI: Anugerah Kategori Khas (Environmental Education & Awareness Initiatives) by the DOE in 2005.

1.4 Waste Minimisation Approaches

Based on experience since 1993, it was decided that a strategy involving the forging of a partnership among four key parties would address most of the problems faced earlier in sustaining recycling programmes. The key partners are Non-governmental organisations (NGOs), PEWOG, the private sector, and MPPP. This strategy comprises three approaches:

1. Direct Approach
2. Vendors Approach
3. Networking Approach

1. Direct Approach: (A package: Talks + Recycle Bin Supply)

MPPP conducts its own campaigns directly with the target groups through talks, briefings and exhibitions. Target groups are normally schools, higher learning institutions, kindergarten, factories, private firms, hospitals, government agencies, associations, NGOs etc. Target groups are taught the 'Dos and Don'ts" of recycling, and what material can be recycled and what cannot be recycled. The approach employs the principles of KAP (Knowledge, Attitude, Practice), 3 Ps (Passion, Patience, & Don't be A Patient), and the 3Rs (Reduce, Reuse, Recycle). Audio-visual aids (AVA) are widely used in this approach. Samples and displays are very essential tools used.

2. Vendors Approach:

The Vendor System was introduced to the community to ensure a sustainable and more systematic collection of recyclables. By harnessing the experience and interests of the vendors, MPPP is free to focus on planning and implementation of other environmental programmes. Currently, 24 companies are listed as recycling vendors. Vendors list is given to public / community normally after the talks. The public is given the freedom to choose whichever company (vendor) they feel comfortable to work with.

3. Networking Approach:

a) Vendors Networking – Vendors Networking concept was introduced to all the listed vendors through workshops or meetings. Vendors are required to collect all kind of recyclables with no exceptions. Vendors are introduced to each other during workshops or meetings. Vendors are required to state their preferences and specialty. Vendors are then able to either exchange their recyclables or trade with each other.

b) *Public - Private Networking* - Public-Private sector networking is implemented using a structure introduced by United Nations Development Programme (UNDP), which is known as PPPUE (Public Private Partnership for Urban Environment).

c) PEWOG Networking - Strategies are planned and implemented through this networking taking into consideration the comments and demands by the public

Programmes implemented through PEWOG include:

- Household Hazardous Waste Collection
- Voluntary Computer Recycling
- Community Composting
- Publishing of Recycling Guide Book 1st and 2nd editions
- Publishing of Composting Guide Book
- Training of Trainer Workshop (TOT)
- Recycling Workshop
- Waste Workshop
- Stakeholders Workshop and other useful workshops

The household hazardous waste collection and the computer recycling initiatives are on-going and have been described in the fore-going. The community composting programme (household waste) at Kampung Seronok is reported to be on-going.

Role of MPPP's Partners

MPPP's partners for the 3Rs have been defined as follows:

MPPP	-	Provide human resources and speakers to educate the public in recycling, waste minimisation, separation of waste at source and composting
	-	Provide vehicles, machineries, recycle bins and other logistics
PRIVATE	-	Aid in providing sponsorship in producing pamphlets, flyers, advertisement, posters, sites or building
COMMUNITY	-	Apply and practise recycling, waste minimisation, separation of waste at source and composting with help from the above partners

CHAPTER 2 STATE OF WASTE MANGEMENT AND RECYCLING ON MAJLIS PERBANDARAN PULAU PINANG (MPPP)

2.1 Solid Waste Management in Penang Island

2.1.1 Introduction

Waste generation for a particular area is usually estimated based on the population and the estimated per capita generation rate and this quantity is referred to as household waste. The total waste generation usually also includes waste generated from industrial, commercial, institutional, Construction & demolition and community sources. For purposes of this study,

Total Waste Generation Refers To The Quantity Of Waste Discarded Plus The Quantity Of Recyclables Retained Within The Premises

2.1.2 Generators of Solid Waste

At the time of writing, there are no known published reports of actual generation at source in Penang. Past studies indicate that waste from households account for high proportion of total waste generated. It is noted that household waste includes hazardous household waste e.g. batteries, fluorescent tubes, paints, & varnishes. They also include bulky waste e.g. old refrigerators, TV sets and furniture.

A paper (UKM, 2001) presented by MPPP in 2001, estimated that 99 percent of total waste generated in Penang is accounted for by household and commercial waste, and the remaining 1 percent by green waste. In contrast, a study in Kuala Lumpur for the same period revealed that households there account for 65 per cent followed by commercial (25 percent), institutional (3 percent), and green waste 7 percent.

Apart from households, the sources of MSW in MPPP include the following:

- Industrial (including non-process industrial waste (NPIW) and process industrial waste (PIW), and excluding scheduled wastes (EQA, 1989)
- Commercial (including service industry)
- Institutional (government centres, schools, hospitals excluding clinical waste)
- Community public places (e.g. parks, beaches, drain cleansing)
- Other sources (including construction & demolition waste)

It is noted that construction & demolition waste (CDW) is excluded from this study (JICA). CDW may be considered for inclusion at a later date i.e. when more information is available and in line with decisions at the Federal level.

At the Task Force meeting on 10th March 2005, the matter of percentage composition by source of total waste generated in Penang was debated and the statistics of waste generation and collection were examined. The meeting noted the following key matters:

- MSW collection in Penang is carried out by MPPP and its contractors;
- MPPP & its contractors collect from households, and commercial, community and institutional sources;
- MSW and non-scheduled process wastes from industrial sources are

collected by private contractors;

- MSW and non-scheduled process wastes from industrial sources collected by private contractors (separate or co-mingled) have recyclables removed before they arrive at the Transfer Station at Batu Maung, and prior to being barged to the Pulau Burung Landfill, in Seberang Perai.

It was agreed that for the purposes of this study, within MPPP service area it is currently not possible to differentiate the quantities collected from the different sources. However, from quantities of solid waste disposed at the Pulau Burung landfill, MPPP estimates that about 88 percent of the island's waste disposed is generated from non-industrial sources while 12 percent are from industrial sources (Task Force Meeting, 26 May 2005). Under the existing agreement, all trucks originating from industrial areas are charged a tipping fee of RM 32/tonne regardless if the wastes are process industrial waste (PIW) or non-process industrial waste (NPIW). Wastes from residential/commercial sources are charged RM 27/tonne tipping fee.

Table 2.1 summarises the main sources of waste generation in Penang Island.

Table 2.1 Summary of Types of Sources of Waste Generation in Penang Island

Type of Premises	Number
Housing	
• Landed	30,153 (2003)
• Non-landed	113,653 (2003)
Industrial Establishments (Number/area)	
• SMIs	1,190 (2003)
• Others (non-SMIs)	
Commercial Premises (area)-2003 [1]	
• Shopping complexes	53
• Shophouses	9,750
• Purpose Built Office	161
• Markets	24
Institutional Premises [2]	
• Primary Schools (Govt assisted)	89
• Secondary Schools (Govt assisted)	45
• Institute of Higher Learning	19
• Government Offices [3]	128
Hotels & Other Lodgings [4]	
• Number	78 (2002) 155 (2003)
• Occupancy Capacity	50%
• Estimated Total Tourist Arrivals	3,026,619/yr
Community [5]	
• Parks/Tourist spots	10/40
• Community halls/centres	100
• Places of worship-mosque	58
-Chinese temple	156
-Hindu temple	53
-Church	52
Construction Establishments	241 (2002)

Sources:
[1] NAPIC, 2003
[2] State/ District Data Bank, Malaysia 2004, Dept of Statistics December 2004.
[3] Includes Federal, State & District offices, corporations, institutes of higher learning, Buku Panduan Telefon Jabatan-jabatan Kerajaan Pulau Pinang, 2002 [4] NAPIC, 2003 [5] Penang Structure Plan 2005

2.1.3 Solid Waste Generation

Using 2000 as base year for population at 575,498 (Census 2000), the population of Penang Island was initially projected to be 635,242 in 2004. However MPPP estimates that the population had grown at a higher rate to 667,500 in 2004. Then based on waste generation of 178,548 tonnes in 2000, two scenarios are presented to demonstrate MSW generation in Penang Island. These two scenarios are presented in Table 2.2.

From the calculations, within Scenario 1 where household waste generation rate is taken to be 0.85 kg/capita/day, with an annual MSW increase of 1 per cent per annum, the quantity of waste generated in 2004 is estimated to be around 199,055 tonnes. Under Scenario 2 where household waste generation rate is taken to be 1.0 kg/capita/day, with an annual MSW increase of 1 per cent per annum, the quantity of waste generated in 2004 is estimated to be around 246,074 tonnes(a variation of 47,019 tonnes from Scenario 1). For comparison, MPPP reports that a survey carried out in 2003, revealed an average household generation rate of 0.995 kg/capita/day for Penang Island (MPPP, 2003).

Table 2.2 Estimated Household Solid Waste Generation in Penang Island, 2004

	Description	Generation Rate (kg/capita/day)	
		Scenario 1	Scenario 2
		0.85[b]	1.0
1	Population[a]	667,500	667,500
2	Solid Waste Generation-household(ton/day)	567.38	667.50
3	Solid Waste Generation-Household(ton/day)	207,092	243,638
4	Solid Waste Generation increase @ 1%/ yr[c]	199,055	246,074

Note: [a] Population growth at 2.5%/yr (Source: MHLG, JKT Jadual 4.7 PBT 010904)
[b] Waste generation from household @ 0.85 kg/cap/d for 2000-2010 (Source: MHLG, JKT Jadual 4.7 PBT 010904)
[c] Solid waste increase @ 1%/yr (Source: MHLG, JKT Jadual 4.7 PBT 010904)

2.1.4 Waste Composition

At the time of writing, there are no known published reports of MSW waste characteristics at source for Penang Island. Various studies carried out by government and universities give some indication of waste composition. A survey carried out in the State of Penang in 2003 revealed the following findings:

Table 2.3 Waste Composition of MSW at Source (MPPP 2003)

Composition	Percentage (%)
Food Waste	36.83
Paper	23.61
Plastic	15.13
Diapers	5.91
Textile	1.69
Rubber	0.77
Wood	1.88
Yard	6.85
Glass	2.97
Aluminum	0.62
Metal	2.02
Other Combustibles	1.75

Source: MPPP Unpublished, 2003

From the above, it is observed that the organic content of MSW in Penang Island is about 37 per cent, while mixed paper accounts for more than 23 per cent and plastics about 15 per cent of waste composition.

In contrast, the composition of waste at the Pulau Burung landfill is a little different as wastes from Penang Island are co-mingled with wastes from Seberang Perai. Table 2.4 shows the composition at the landfill.

Table 2.4 Waste Composition of MSW at Pulau Burung Landfill (MPPP 2003)

Composition	Percentage (%)
Food Waste	42.94
Paper	18.40
Plastic	15.85
Diapers	5.80
Textile	2.43
Rubber	1.38
Wood	1.03
Yard	4.49
Glass	2.95
Aluminium	0.39
Metal	1.63
Other Combustibles	2.65

Source: MPPP Unpublished, 2003

Food content is higher at the landfill. With regard to the main recyclables, the composition of plastic and glass is similar while there is lower paper content (5 percent) at the landfill compared to its composition at source.

Waste composition at three LAs; MPPP, Majlis Bandaraya Miri (MBM), and Majlis Perbandaran Petaling Jaya (MPSJ) are compared with the findings of the survey carried out by the JICA Study team at the end of 2004 for samples taken from different locations throughout the country. Table 2.5 summarises the findings and the results are interesting:

- the food content in MPPP is the lowest,
- the paper content is higher than in MBM and MPSJ,
- the plastic content is double that of MBM but lower than in MPSJ
- the Al content is about the same as in MPSJ and the national average.
- the glass content is lower than in MBM and MPSJ.

Table 2.5 Comparison of Waste Composition of MSW at Different LAs

Major Waste Components/Recyclables	Percentage Composition (%)			
	MPPP [1]	MBM [2]	MPSJ [3]	JICA STUDY [4]
Food Wastes	36.8	50	42.0	39.6
Paper	23.6	21	18.2	31.2
Plastics	15.1	8	18.7	8.1
Polystyrene	-	-	1.1	
Metals	2.0	6	-	
-Ferrous	-	-	3.4	1.7
-Non-ferrous (Al)	0.6	-	0.5	0.7
Wood	1.9	5	-	
Glass	2.9	4	4.3	3.5
Textiles	7.8(+diapers)	3	-	-
Miscellaneous	12.2	3	11.8	15.2

Sources:

[1] Waste Composition at Source, MPPP, 2003Umpublished
[2] Miri's Ecopack, Jan. 2003
[3] Waste Composition at Source (Households), Agamuthu, 2003
[4] Waste Composition at Source (Households), 2004

2.1.5 Collection of MSW

(1) Waste Collection Levels

As agreed by the Task Force, for the purposes of this study, almost all MSW generated in Penang Island is considered collected. As at February 2005, MPPP is the primary MSW collector. Depending on the source, waste is also collected by other parties:

- Households : MPPP & private Contractors
- Commercial : MPPP & private Contractors
- Institutional : MPPP & private Contractors
- Industrial : Private Contractors
- Other sources : MPPP & private Contractors

Technically, only contractors registered with MPPP (an administrative exercise) are supposed to provide collection services to industries and the hotels. For industrial sources in Penang Island, MPPP reported that most factories have no problem with disposal of wastes, be they PIW and NPIW. Private contractors collect both PIW and NPIW and some may even collect free of charge. This is so because of the economic returns from the salvaging of recyclables from the industrial waste streams. In Penang, PIW includes packaging materials (Task Force Meeting, 26 May 2005).

MPPP's records show that about 239,242 tonnes of MSW was collected in 2004 from household, commercial, industrial and institutional sources. The average tonnage (including from industry) collected daily is about 655 tonnes/day. Table 2.6 below shows waste collection quantities between 1992 - 2005. It is observed that for the 10-year period between 1995 and 2004, there was a 24% increase in the amount of waste collected by MPPP (and contractors).

In 2005, 179,322 tonnes of waste were collected in the first 8 months. This means that the daily average is now 738 tonnes. This represents a 12% increase from the daily quantity collected in 2004.

Table 2.6 Waste Collection Quantities in Penang Island, 1992-2004

Year	Waste (tonnes per year)	Waste (tonnes per day)
1992	184,812	505
1993	205,973	564
1994	232,625	637
1995	192,016	526
1996	187,921	515
1997	184,776	506
1998	174,686	479
1999	178,073	487
2000	199,185	545
2001	199,878	547
2002	237,983	652
2003	252,215	691
2004	239,242	655
2005*	179,322	738

Source: MPPP, March 2005 Note:*Until August 2005

(2) Waste Storage

Within MPPP service areas, wastes are required to be stored in a variety of storage receptacles.

2.1.6 Disposal of Solid Wastes

(1) Landfill

MPPP currently does not operate any landfill for MSW on Penang Island. Its MSW is transported to a Transfer Station at Batu Maung, and then taken by barge across the channel to the Pulau Burung Landfill in Seberang Perai. Its former dumping ground at Jelutong ceased receiving MSW in 2001 and now only accepts inert waste (green waste and construction & demolition wastes). The Jelutong landill is reported to receive a total of about 400 tonnes (MPPP, September 2005) of waste per day comprising construction & demolition waste (CDW) and green waste from parks, households and bulky waste (furniture, refrigerators and washing machines).

MPPP estimates that industrial wastes account for 11.8 percent of the total waste from Penang Island disposed at the Pulau Burung landfill (Task Force Meeting, 26 May 2005). It is noted that this percentage refers to both PIW and NPIW.

Under the "Study for Safe Closure and Rehabilitation of Landfill Sites in Malaysia" carried out by JICA on behalf of the Japanese Government for the Ministry of Housing and Local Government (2003-2004), the site has been classified as having an environmental risk of 0.53 on a scale of 0 - 1, where risk rate 0 indicates low environmental risk and rate 1 indicates potentially high risk. The site has been assigned a closure level C3, which is the second highest closure level requiring leachate collection and recirculation, the construction of dykes, controlled slope and gas ventilation system. The study also identified the site as having medium post-closure land use potential i.e. for high density development purposes.

(2) Illegal Dumping

It is known that incidents of illegal dumping of MSW still occurs in Penang Island, mainly at road reserves, remote hill areas and on vacant private land. Types of waste dumped include household, industrial and C&D waste. There are no records of quantities of illegally dumped waste.

However, MPPP provides services to clean-up illegal dumps and lorries and a crew are despatched to affected areas in particular the 'protocol roads'. Two lorries operate everyday, except Sundays and the quantity of wastes collected is estimated to be about 104 tonnes/month.

2.2 Recycling of MSW and Other Wastes

2.2.1 Introduction

In examining the status of recycling in Penang Island, a number of assumptions are used:

- MPPP & Contractors provide services to almost 99 per cent of Penang Island (including squatters and excluding remote hill stations).
- MPPP's MSW collection data (at weighbridge at Batu Maung Transfer Station) is taken as representative of waste after recyclables have been removed.

- MPPP's MSW collection data refers to wastes from households, commercial, institutional and industrial sources.
- Contractors' reports of recyclables collection refer to only 4 Main items (paper, plastics, metals & glass).
- Non-scheduled process industrial wastes (PIW) are excluded (well managed by recyclers for reprocessing or export).

Note:
Scheduled wastes are controlled under the Environmental Quality (Scheduled Wastes) Regulations 1989.

2.2.2 Partners in Recycling

The list of recycling communities, agents and buyers is summarised below (Table 2.7).

The full list of recycling communities, agents and buyers can be obtained from the "Penang Island Recycling Directory" (Penang Island Recycling Directory, September 2005).

Table 2.7 Recycling Communities, Agents and Buyers in Penang Island, 2005

Recycling Communities	Number
Schools	29
Factories	27
Government Offices	18
Churches	11
NGOs	10
Rukun Tetangga	9
Hotels	9
Hospitals	7
Supermarkets	4
Residents Associations	3
JKKK	1
Sub-Total	***70***
Recyclable Agents & Buyers	
General	38
Scrap/Metals	23
E-waste	19
Paper	8
Plastics	8
Gunny sacks	2
Rubber	1
Wood	1
Sub-Total	***100***
GRAND TOTAL	***170***

Source: MPPP, September 2005

By September 2005, 70 groups are participating in recycling programmes of which 41% are schools. The number of participating schools represents 13% of the total number of schools in Penang Island (216). So far 27 factories have been recorded as implementing waste recycling programmes. 100 recyclable agents and buyers have registered with WMU MPPP as those engaged in the collection buying and selling of recyclables and/or reusable items. 38% handle all types of recyclables while the others handle only specific types. 23% handle metal items and this may indicate the growth in demand for metal

recyclables.

2.2.3 Methods of Recyclables Collection in MPPP

In Penang Island, recyclables are collected via a number of methods:

- From sources (households, ICI, Service industry)
- From collection crews
- From drop-off centres run by Government, concessionaires and NGOs

The normal mode for collecting recyclables from households is via kerbside collection by house-to-house collectors and middlemen buyers. Recyclables from industrial or commercial sources are normally collected directly by recycling agents for transfer to recycling plants/ re-processors.

MPPP has set up drop-off centres at strategic locations around the island:

- Kawasan Rukun Tetangga (KRT) Kulit Lembu
- KRT Taman Guan Joo Seng
- KRT Mt. Erskine

2.2.4 Quantities of Recyclables Collected in Penang Island

MPPP has collected data on the quantities of recyclables collected since 1993. Since 2001, the Waste Minimisation Unit has ensured that as much information is captured by getting the recycling agents or vendors' cooperation to report monthly to them. The waste and recyclables collection data for the period 1993-2004 have been tabulated (Table 2.8). It is obvious that there was a dramatic increase in recyclable collection in 2003 (four-fold increase from 2002) and in 2004 (doubled from 2003). In 2004, 44,093.1 tonnes of recyclables were collected based on information MPPP collected from its recycling vendors and collection centres. According to MPPP, the actual figure is likely to be higher because of two main reasons:

- There are recyclers who do not report to MPPP
- There are recycling players who are not registered as 'recyclers' and engage in backyard recycling business activities

From the above data, the total waste generation rate and recycling rate can be calculated.

For the year 2004, waste generation in Penang Island is calculated to be 283,335 tonnes.

From the above generation, the Waste Generation Rate for Penang Island is calculated as follows:

$$\text{Waste Generation Rate (kg/capita)} = \frac{\text{(Quantity of Waste Generated)}}{\text{Population}}$$

This works out to about 1.16 kg/capita/day total waste generation rate in the island.

Table 2.8 Summary of Recyclables Collection & Recycling Rates in Penang Island, 1993-2004

Year	Quantity (tonnes)				
	Waste Collected Per Year (a)	Waste Collected Per Day (b)	Recycling Weights Per Year (c)	Total Waste Generated Per Year (d)	Recycling Rates (%) (c/d)
1993	205,973	564	40.83	206,013.83	0.02
1994	232,625	637	91.89	232,716.89	0.04
1995	192,016	526	126.74	192,142.74	0.07
1996	187,921	515	300.41	188,221.41	0.16
1997	184,776	506	85.25	184,861.25	0.05
1998	174,686	479	74.60	174,760.60	0.04
1999	178,073	488	75.20	178,148.20	0.04
2000	199,185	546	57.54	199,242.54	0.03
2001	199,878	548	319.63	200,197.63	0.16
2002	237,983	652	3,844.74	241,827.74	1.59
2003	252,215	691	22,669.29	274,884.29	8.25
2004	239,242	655	44,093.17	283,335.17	15.56
2005*	179,322	738	18,232.54	197,554.54	9.2

Source: MPPP Statistic, 2005
Note: *Until August 2005, MPPP considers its recyclables collection data to be under-reported as not all recyclers are registered with and report to MPPP.

Based on the waste generation and collection data, the level of efficiency of waste collection can be calculated. In 2004, the level of collection service is calculated to be about 84.4 percent.

At the time of writing it is not possible to assign the percentage contribution to the total waste generation by the different sources mentioned above. However based on estimates (Table 2.1 & Table 2.6), the percentage contributed by household waste is likely to be within the range of 70 – 87% of total waste generated.

2.2.5 Recycling Rates in Penang Island

(1) MPPP Recycling Rates 1993-2004

Recycling rates have been calculated based on various formulae; and most of the time it is calculated based on collection or recovery at landfills. Currently, there is a lack of information about recovery and retention at source (waste separation at source). In Table 2.8, the recycling rates (based on collection of recyclables) in Penang from 1993 until 2004 have been presented. The following formula was used:

$$\text{Recycling Rate (\%)} = \frac{\text{(Quantity of Recyclables Collected)} \times 100\%}{\text{(Waste Amount Generated)}}$$

From a rate of 0.02 per cent in 1993, the rate has grown to be 1.59% in 2002, increasing to 8.25% in 2003 (including data received from contractors). In 2004 the recycling or recovery rate topped at 15.56%. MPPP is of the opinion that the rate may be higher if activities by all other contractors & agents could be captured.

For the first 8 months of 2005, based on reports that the STU have received, the recycling rate recorded is only 9.2%. This situation is due to the fact that private recyclable agents and buyers do not send reports regularly to the STU. As this is an administrative exercise, the information is forwarded to the STU on a voluntary basis

and many companies are fearful about revealing information about their business in particular when it has financial implications.

In 2004, 44,093.1 tonnes of recyclables were collected based on information MPPP collected from its recycling vendors and collection centres. This works out to 3,674 tonnes/month or 121 tonnes/day. This implies that for a population of 667,500, the recovery rate is about 181 g/ capita/day.

In comparison, a pilot project (Paper by MPPP, UKM 2001) carried out in 1998 involving 233 houses in Hillside, Tanjung Bunga, a total of 46.3 tonnes of recyclables (paper, glass bottles, Al cans & plastic) were collected which translates to about 3.8 tonnes/month or 0.5 kg/household/day, which works out to 100g /capita/day (@5 pax/household).

(2) MPPP Recycling Rates 2005

Based on additional feedback from recyclable agents, the latest figures from MPPP indicate that by the end of October 2005, the total quantity of recyclables collected has risen to about 26, 788 tonnes (Table 2.9). The recycling rate is calculated to be about 10.6%, which is lower than that for 2004.

Table 2.9 Total Quantity of Recyclables Collected in Penang Island, 2005

No	Month	Quantity (kg)
1	January	2,708,525.80
2	February	2,430,652.15
3	March	2,481,292.70
4	April	2,460,769.81
5	May	2,345,511.33
6	June	2,585,285.50
7	July	2,728,359.00
8	August	2,568,781.19
9	September	2,469,239.35
10	October	4,009,452.50
TOTAL		26, 787,866.33

This situation is due to the fact that private recyclable agents and buyers do not send reports regularly to the STU. As this is an administrative exercise, the information is forwarded to the STU on a voluntary basis and many companies are fearful about revealing information about their business in particular when it has financial implications. To address this matter, in November 2005, the STU invited the recyclable agents to a meeting to explain the need to report their monthly collections, and to publicise the new reporting formats issued by MHLG. At the time of writing, the STU is in the process of collecting more data from the agents and the final recycling rate is expected to be higher.

2.2.6 Type of Recyclables Collected in Penang Island

(1) Conventional Recyclables

MPPP has monitored the types of recyclables collected within its area. Table 2.10 shows the types of recyclables and quantities collected for three years (2002-2004). The main recyclable items collected are paper/box/cardboard, plastic, glass and metals. Since 2003, MPPP has been monitoring the quantities of old clothing/textiles collected.

Table 2.10 Types of Recyclables Collected in Penang Island, 2002-2004

No	Recyclable	Quantity (tonnes)			
	Year	2002	2003	2004	2005*
1	Paper	2,439.7	8,187.9	11,683.1	
2	Box/cardboard	1,190.5	12,327.6	26,662.1	
3	Plastic	127.4	1,252.7	3,000.5	
4	Glass	16.5	701.9	1,739.4	
5	Metal	49.6	116.4	187.5	
6	Aluminium cans	21.2	63.3	778.8	
7	Old clothing	-	19.3	41.7	
TOTAL		3,844.7	22,669.3	44,093.1	

Source: MPPP, 2004 (JST Seminar, 2004)
Note:Until August 2005

In 2004, Paper & cardboard accounts for 87% of the total recyclables collected (Table 2.11). Plastics account for 6.8% and glass 3.9%. Ferrous and non-ferrous metals account for only 2.1% of recyclables collected.

Table 2.11 Percentage Composition of Recyclables Collected in Penang Island, 2004

No	Recyclable	Tonnes	Percentage (%)
1	Paper/cardboard	38,345.2	87
2	Plastic	3,000.1	6.8
3	Glass	1,739.4	4
4	Aluminium cans	778.8	1.7
5	Metal	187.5	0.4
6	Old clothing	41.7	0.1
TOTAL		44,093.1	100

Source: MPPP, 2004 (JST Seminar, 2004)

At a Task Force meeting on 26 May 2005, the following points were noted in connection with the main recyclable items:

Glass

It was agreed that more attention should be given to recovery of glass bottles. At the moment the registered recyclers are collecting both intact and broken bottles. The meeting noted that beer bottles from commercial/shops are returned. Hotels have low percentage of beer bottles as they sell draught beer. They usually generate wine bottles. Registered recyclers have collected such bottles free of charge in the past. Fibreglass and items e.g. windowpanes are not saleable. There are other players also collecting and selling glass (traditional role of collecting glass bottles).

Plastics

The demand for plastics is now good and most types are now collected (PVC, PET)

Metals

There are other players collecting metal items i.e. not 3Rs agents because of the attractive price of metals.

(2) Other Recyclables

In addition to the above recyclables, there are also programmes to collect e-waste

(electronic & electrical waste) such as computer & peripherals, household appliances, communication equipment and office equipment. The list of e-waste collected is as follows:

Buy-back Items

1. Computers: Computer CPU and Computer monitor (whole set)

Items that are collected free-of –charge at community recycling centres.

1. Big floor & wall-based items: Refrigerators, washing machines, air conditioners etc.
2. Small table-top household items: Fans, stoves, grinders, blenders etc.
3. Entertainment equipment: Radios, TVs, CD & DVD players, etc.
4. Office Items: Telephones, fax machines, computer parts, electronic cash registers.

E-waste Collection Centres (Collects for Free)

a) Penang Island

Dell (Phase 4), Bayan lepas and MPPP Store at Kampong Jawa Lama
Toll Free Number: 1-800-88-0640

b) Seberang Perai

Dell (Bukit Tengah) and MPSP Stores in Jawi and Mak Mandin

In addition to the e-waste collection programme, household hazardous waste such as fluorescent lamps and batteries are also collected (since 24th February 2004) at some supermarkets and 5 wet markets on the Island (Table 2.12).

Table 2.12 Amount of e-waste and Household Hazardous Waste Collected in 2004

Type	Amount
e-waste	94,734 kg
Fluorescent lamps	7,746 pcs
Batteries	676 kg

Source: MPPP, 2005-06-27

At the Task Force meeting on 26 May 2005, the players in Penang Island noted that the demand for e-waste is so good that any waste left outside premises would be removed within the hour. MPPP is working out a plan with FREPENCA (association of factories) for removal of fluorescent tubes and batteries from their waste stream before removal by contractor for disposal at landfill. MPPP reported that hospitals and hotels are currently contributing to disposal of Fluorescent tubes and batteries at landfill.

2.2.7 Recyclers Performance

Initially, MPPP's newly-introduced 'Vendor System' attracted only six (6) vendors; four (4) from Penang and two others from Kuala Lumpur. By the end of 2004, 24 companies had registered with MPPP. Those from outside Penang include MNI, SPM and KL Glass.

2.2.8 Re-Processing Activities in Penang Island

MPPP's records indicate that most of the re-processing activities are done on the mainland. However, there are a few processors of recyclables that perform some kind of

material segregation on the island such as sorting of plastics, aluminium cans, paper etc. One particular company in Batu Maung recycles/ reprocesses used cardboard cartons into new ones for packaging purposes.

2.2.9 Voluntary Activities

Voluntary initiatives in recycling in Penang are comparatively very active. Such organisations include NGOs and CBOs, schools, manufacturing industries government agencies and private enterprise. This is especially so since 2002.

According to the latest reports, there are 70 voluntary recycling communities on Penang Island (Table 2.7).

2.2.10 Price of Recyclables

Price of recyclables varies according to market demand. In Penang Island, the contractors and recycling agents set the price of recyclable items and the relatively good demand and pricing have stimulated the growth of this sector. MPPP's observations indicate that most of the valuable recyclables would have been recovered by the time the wastes (from different sources) are weighed at the transfer station. A sample of prices set by a recyclable collector in Penang is shown below:

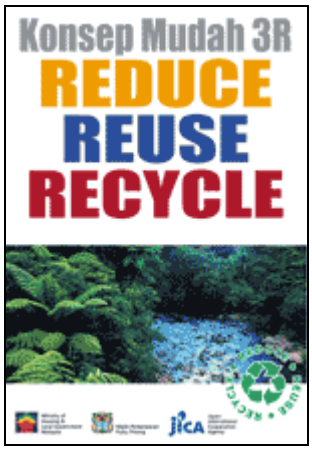
Table 2.13 Typical Price List of Recyclables in Penang Island, March 2005

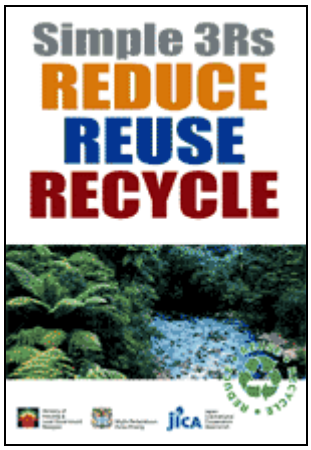
No	Recyclable	Price (RM/kg)
1	Paper	0.22
2	Box/cardboard	0.22
3	White paper	0.18
4	Plastic/PET	0.30-0.40
5	Glass bottles (per bottle)	0.06
6	Steel Cans	3.80
7	Aluminium cans	3.00

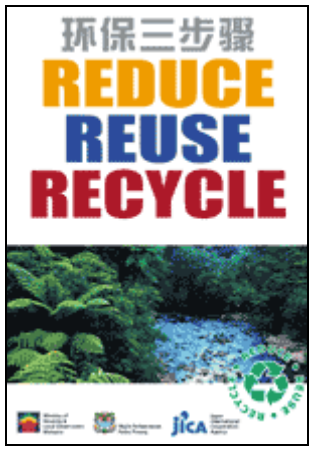
Source: Recyclable Collector, March 2005

2.2.11 Awareness on Waste Minimisation

As part of the 3Rs awareness campaign during the Pilot Project on Recycling Network & Source Separation in MPPP, a brochure was designed and published in English, Malay and Chinese, as shown above. 4000 copies were printed for distribution at events during the project period.







Other awareness programmes were also held for communities/ residents/ business entities etc. The Campaigns were carried out at the Hillside target area, and other strategic locations. MPPP also participated in a host of events and co-organised activities with other organisations.

In connection with the Pilot Project on Source Separation, YAB Chief Minister of Penang launched the Pilot Project on 3 September 2005.

Plates 3 & 4: Launch of Separation at Source Pilot Project for Residents of Hillside, Tanjung Bunga

2.3 Issues of Waste Minimisation

2.3.1 Identification of Issues

Based on a Project Cycle Management Roundtable held at MPPP on 22 February 2005, the Task Force on Action Plan for MPPP identified nine (9) core problems as follows (not in any order of importance):

1. Poor Attitude/ Behaviour
2. MPPP's Low Capacity
3. Lack of Infrastructure/ Networking
4. Political Interference
5. Lack of Laws & Enforcement
6. Low Willingness to Pay
7. Lack of Knowledge
8. Landfill Land Issues
9. Unpredictable Market Forces

The task force agreed that core problems 1, 2 and 3 are the main problems faced in Penang Island. The roundtable discussion then identified the cause & effects of each of the three main problems. The problems trees of the three main problems are presented in ATTACHMENTS 1, 2 3 and 4.

Based on the three main problems, the task force turned the problems into positive expressions referred to as their 'Objectives'. These are:

1. Improved Attitude/Behaviour
2. MPPP Has Adequate Capacity
3. Improved Infrastructure & Networking

The objectives trees of the three main problems are presented in ATTACHMENTS 5, 6 and 7.

The PCM roundtable also took note that there are risks associated with the formulation of the Action Plan. These are mainly connected with the Federal Government's decision regarding federalisation of solid waste management, and subsequent privatisation of services and passing of the Solid Waste Management Bill by Parliament.

The following matters were also raised by the task force as requiring consideration by MHLG and other relevant agencies: -

a) Human Resources

Adequate human resources are required for purposes of waste minimisation. In the past, MPPP had difficulty applying to the Public Services Department (PSD) for new posts, and when posts are approved PSD/Public Services Commission (PSC)'s recruitment process took a relatively long time. It was suggested that PSD officers be made more aware about the needs of waste management in line with government policies and expectations, and time required for recruitment exercise be improved. This may be enhanced by improving communication with MHLG.

b) Organisational Framework for Waste Management at MHLG

The task force noted that the organisational level responsible for waste management at MHLG is not commensurate with current needs and demands. While matters such as town & country planning, sewerage have their own department with a Director General, waste management is only attended to by a Division, and this division is manned by personnel seconded from the Ministry of Health. It was suggested that the Federal Government review the organisational framework to ensure that waste management can progress as envisaged.

c) Communication

In the past, breakdown in communication was observed on a number of occasions. This happened at different levels e.g. between MHLG and MPPP, and intra-departmental communications within MPPP. Such incidents have resulted in information not reaching intended recipients in a timely manner, or not at all. It was suggested that communication be improved in order to avoid unnecessary delays and inefficiencies.

d) Collection Centres

Design of selection centres as currently specified by MHLG consists of permanent concrete structures to be built in selected residential or commercial areas. MPPP's experience shows that such structures are neither suitable nor effective. This is because of the scarcity of land and its high land prices. In addition, the NIMBY syndrome has contributed to such structures not being fully utilised e.g. Island Park centre. For LAs like MPPP, mobile collection facilities may be the answer that addresses both the land and attitude issues.

e) Market-based Approach

The task force pointed out that recyclable price fluctuation have both positive and negative impacts in recyclable market. When prices decline, there is a problem in accepting recyclables from consumers unless there is adequate storage capacity. Subsidies have been proposed as one of the ways to address this matter but it was

generally agreed that market-based or economic instruments are required in order for this to work.

2.3.2 Solutions for Issues

The proposed actions for addressing and resolving the waste management issues identified are described in the next chapter.

CHAPTER 3 TARGETS OF WASTE MINIMISATION

3.1 Scope of Targets

At a meeting held at MPPP on 10 March 2005, the Task Force on Action Plan for MPPP set the following targets for Penang Island.

The scope of the Action Plan for Waste Minimisation in terms of area coverage and time frame is as follows:

TARGET AREA: PENANG ISLAND

TARGET YEAR: 2010

3.2 Target Recyclables

3.2.1 Main Items

For Penang Island, the main items targeted for recycling are:

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

3.2.2 Additional Items

The additional items targeted for recycling are e-wastes comprising the following:

Bateries
Fluorescent Tubes
Computers & Peripherals
Electrical Home Appliances

3.3 Target Sources

The sources of waste that would be included in the Action Plan are:

Households
Institutional Sources
Commercial Sources
Industrial Sources

3.4 Recycling Rate Targets

Based on the waste generation rates and quantities, and recyclable collection statistics, the MPPP Task Force formulated a provisional set of recycling rate targets for all wastes.

Table 3.1 Proposed Recycling Rate Targets for MPPP, 2005-2010

Year	2005 (%)	2006 (%)	2007 (%)	2008 (%)	2009 (%)	2010 (%)
Without Food Composting (including e-waste)	20	22	24	26	28	30
Without Food Composting (excluding e-waste)	20	21	22	23	24	25
With Food Composting (+RRC)	*****	****	*****	*****	*****	40

Note:
1. RRC: Recyclable Recovery Centre
2. Assumption: That all 3 Key Problems identified at PCM Roundtable are addressed.

At a meeting of the Task Force on 26 May 2005, the above targets were reviewed and it was agreed that MPPP should focus on the following recycling rate targets:

Table 3.2 Recommended Recycling Rate Targets for MPPP, 2005-2010

Year	2005 (%)	2006 (%)	2007 (%)	2008 (%)	2009 (%)	2010 (%)
Without Food Composting (including e-waste)	20	21	22	23	24	25

Note:1. Assumption: That all 3 Key Problems identified at PCM Roundtable are addressed.

3.5 Summary of Action Plan

A summary of MPPP's Local Action Plan for Waste Minimisation (LAP-WM) 2006-2010 has been produced in the form of leaflet and this is attached as ATTACHMENT 8. This leaflet is to be reproduced and circulated to all government agencies and departments to ensure that the set targets are acknowledged and that their plans and programmes include activities to participate in the waste minimisation efforts for the island. It is also beneficial if the leaflet is circulated to the recycling agents and recyclable processing businesses, other major sources in the retail and service industries, as well as CBOs and NGOs.

CHAPTER 4 ACTIONS TO ACHIEVE TARGETS

4.1 Strategy

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

- Continual public awareness and education programmes
- Improving Networking & Partnership among Waste Minimisation Partners.
- Employing a Balance of Incentives and Disincentives (dependent upon new SWM Act).

This is in line with the strategies adopted in the "Action Plan for Waste Minimisation" prepared for the Federal Government.

4.2 Approaches to Achieve Targets

In using the above strategic elements, MPPP plans to employ the following approaches:

1) Collection of Recyclables from Households will be increased via the use of BBCs and Drop-off Centres.
2) Kerbside collection at Pilot Project II Target Area Hillside, Tanjung Bungah will be expanded to include about 400 additional households in the area.
3) Champions who are able to assist in Awareness & Educational Outreach Events for communities will be identified and trained.
4) Raising of awareness of communities will be aided by community leaders who are trained by qualified organisations (Training of Trainers).
5) The WMU will be a one-stop agency for all Waste Minimisation matters.
6) The website www.rnumppp.net will be a major vehicle for disseminating information on waste minimisation.
7) Economic incentives shall be in place for low value recyclables (Federal).
8) MPPP will continue promoting collection of e-waste (electronic & electrical wastes) for channelling to buyers/recyclers until MHLG issues directives/laws on their disposal.
9) MPPP will continue expanding collection of HHW and storing them until MHLG issues directives/laws on their disposal.
10) For household organic waste, composting of kitchen and garden waste will be encouraged.
11) Garden waste should be diverted to MPPP's Parks & Garden Dept, Youth Park to be treated for production of soil conditioner.
12) Certain tasks of the WMU may be outsourced to qualified private contractors e.g. management of website on waste minimisation and data processing and analysis.

4.3 Pre-Conditions to Achieve Targets

In order for MPPP to succeed in its plans and programmes, the three key elements mentioned below must be in place.

- The SWM Act is passed by Parliament and regulations /byelaws are formulated for local level.
- The WMU is established at MPPP and adequate resources: human, financial & equipment are allocated.

- The necessary infrastructure and mechanisms for waste minimisation are in place e.g. recyclable collection centres, award schemes, and incentives.

4.4 Selected Recyclable Sub-Categories

As mentioned previously, the key recyclables comprise four categories:

- PAPER
- PLASTICS
- METALS
- GLASS

For the first five years, MPPP will focus on the following sub-categories of recyclables under each of the above categories:

a. PAPER	**b. PLASTIC**
a.1 Old Newspapers	b.1 Drink Bottles - Clear
a.2 Cardboard	- Colour
a.3 Others	b.2 Food Containers
	b.3 Other Containers
	b.4 Mixed plastic (excluding shopping bags)

c. METALS	**d. GLASS**
c.1 Aluminium cans	d.1 Clear glass bottles
c.2 Other metal containers	d.2 Coloured glass bottles
c.3 Mixed metal items	

4.5 Local Authority (MPPP)

In Chapter 4, Volume II the PCM Roundtable identified the following as the Key Objectives for MPPP:

a. Improved Attitude/ Behaviour
b. MPPP Has Adequate Capacity
c. Improved Infrastructure & Networking

Based on the targets set in Chapter 3, the Task Force proposes the following actions for MPPP to achieve the three key objectives. They are summarised in Table 4.1.

Table 4.1 Summary of Key Actions to Achieve Objectives (for MPPP)

Key Objectives	Actions
IMPROVED ATTITUDE/BEHAVIOUR	1. Public Awareness & Public Education Programmes are carried out on a Continual Basis. 2. Legislative tools are in place and power vested in MPPP to enforce laws on waste minimisation. 3. MPPP is allowed to Inform & Report on the benefits of waste minimisation (using various modes including the website).
MPPP HAS ADEQUATE CAPACITY	4. MPPP shall set up a Waste Minimisation Unit. 5. MPPP shall have adequate and suitably qualified personnel to implement the waste minimisation programmes and plans. 6. MPPP shall be allocated adequate Budget for operational and development purposes 7. MPPP shall acquire the relevant tools for implementing the waste minimisation programmes and plans. 8. MPPP personnel for waste minimisation shall be provided with relevant training on a periodic basis.
MPPP IMPROVES INFRASTRUCTURE & NETWORKING	9. The Directory of Stakeholders for Waste Minimisation shall be publicised and regularly updated. 10. Adequate resources shall be provided for expansion of the source separation in households and other generator groups.

a) Improved Attitude/Behaviour

In connection with improving the awareness and behaviour of Penang Island's residents with regard to waste minimisation, awareness programmes have to be carried out regularly. For this the actions described for achieving the second objective have to be addressed. It was agreed that MPPP needs to demonstrate the benefits of waste minimisation. This is critical in creating and enhancing confidence in MPPP's waste minimisation programmes. Success stories of waste minimisation programmes for different generator groups (household, manufacturing industry, hotels. hospitals, schools, office and shops/supermarkets) should be showcased. Benefits in terms of monetary returns not necessarily direct to participants but benefits for charitable causes have in the past encouraged participation in programmes e.g. at Hospital Lam Wah Ee when revenue from recyclables collection had been channeled to employee welfare fund and to donations for disaster funds e.g. for the Tsunami Fund. Benefits to improving environmental quality and to healthy living conditions also need to be publicised. For this, MPPP would need to select relevant Performance Indicators, carry out monitoring of specific parameters, work closely with its partners e.g. the Department of Environment, Health Services Department and of course it's recycling partners. MPPP needs to engage such partners and keep channels open for dialogue and feedback. To balance the "carrot & the stick" approach, the new Federal law on solid waste management and related regulations at Federal and State levels e.g. for the 3Rs need to be in place as soon as possible.

b) MPPP Has Adequate Capacity

The issue of human resources is critical. With only two personnel currently allocated for the 3Rs, MPPP is unable to plan and implement programmes necessary to achieve the targets set. Under the 'Study on National Waste Minimisation' a Waste Minimisation

Unit (WMU) was set up in June 2005. This WMU acts as a one-stop centre for information on waste minimisation and is the custodian of the website www.rnumppp.net has been designed and posted on the INTERNET. A dedicated e-mail address has also been designated for the WMU rnumppp@gmail.com. Adequate resources must be allocated to the WMU so that there are personnel to manage it and to update and maintain the website. It is proposed that MHLG provides a link to MPPP's website once its website is upgraded and becomes operational again.

c) Waste Minimisation Unit (WMU)

It is recommended that the STU, Urban Services Unit at MPPP be upgraded to a Waste Minimisation Unit (WMU). The organisational structure recommended is shown in Figure 3. Such organisation is recommended for gradual implementation during the Ninth Malaysia Plan period (2006-2010). It is proposed that the WMU that was established during the JICA Pilot Project II be incorporated into the new WMU.

The proposed staffing of the proposed Waste Minimisation Unit (WMU), to be located at the Urban Services Department is summarised below. It is recommended that the new WMU be allocated 13 staff (increased from existing 2) to enable MPPP to achieve its objectives.

Table 4.2 Summary of Proposed Staffing of New Waste minimisation Unit, MPPP

Staff/Code	Existing		Number of New staff
	Existing	Proposed	
Head (U32)	1	1	0
Deputy.Head (U29)	0	1	1
Area Supervisor (U14)	0	1	1
PKA (U11)	1	4	3
PRA (R 1)	0	4	4
Driver (R3)	0	2	2
TOTAL	2	13	11

The functions of the WMU staff are described below.

Table 4.3 Summary of Responsibilities of Staff of the New Waste Minimisation Unit, MPPP

Staff/Grade	Functions & Responsibilities
Head (U36)	1. Coordinator of the WMU. 2. Planning & implementation of WMU Activities: • 3Rs Programmes (Including expansion of Waste Separation communities) • Public Awareness & Education Programmes • Publicity & Promotion 3. Reviewing Reports of Performance of Waste Minimisation Activities. 4. Taking corrective actions or making recommendations to Director USD & to Task Force on Waste Minimisation. 5. Reporting to relevant Authorities. 6. Management of SW Information System. 7. Maintenance of the Recycling Network in Penang Island. 8. Perform Secretariat duties of the MPPP Task Force on Waste Minimisation.

Staff/Grade	Functions & Responsibilities
	9. Custodian & management of 3Rs Website. 10. Liaison between MHLG and MPPP on waste minimisation matters. 11. Reports to the Director, Urban Services.
Deputy Head (U29)	1. Assist Coordinator of the WMU 2. Responsible for carrying out WMU Activities: • 3Rs Programmes (Including Waste Separation) • Public Awareness & Education Programmes • Publicity & Promotion 3. Monitor waste minimisation activities in north & south zones. 4. Analyse Data/Information from north & south zone Area Supervisors. 5. Assist Head WMU in secretariat functions of Waste Minimisation Task Force. 6. Drafting Reports to relevant Authorities. 7. Collecting Information for Updates of Information. 8. Maintaining functions of the WMU. 9. Reports to Head, WMU.
Area Supervisor (U14)	1. Coordinator of the North & South zones of Penang Island 2. Responsible for supervising & monitoring activities in North & South areas. 3. 3Rs Programmes (Including Waste Separation) 4. Public Awareness & Education Programmes 5. Publicity & Promotion 6. Liaises with Partners in the north & south zones. 7. Collect & compile recyclable recovery data from relevant organisations in north/south zone. 8. Compile recyclable recovery data for Deputy Head, WMU. 9. Reports to Deputy Head, WMU.
PKA (U11)	1. Carry out WMU Activities: • 3Rs Programmes (Including Waste Separation) • Public Awareness & Education Programmes • Publicity & Promotion 2. Assist in campaigns/special Events organisation. 3. Assist in monitoring activities in North/South zones. 4. Liaise with local Partners North/South zones. 5. Reports to the Area Supervisor North/South zones.
PRA (R 1)	1. Assist in carrying out WMU Activities: • 3Rs Programmes (Including Waste Separation) • Public Awareness & Education Programmes • Publicity & Promotion 1. Monitor Activities in North/South zones. 2. Reports to the Area Supervisor North/South zones.
Driver (PR3)	Driving vehicle in North/South zones.

d) Task Force on Waste Minimisation Unit

It is recommended that the Action Plan Task Force established in early 2005 for the purpose of formulating an "Action Plan for Waste Minimisation for MPPP" be maintained and continues to function in an advisory capacity. MPPP may review the membership of this Task Force and appoint advisors as deemed necessary. It is recommended that the Director of Urban Services, MPPP continues to chair this Task Force. The functions of the Task Force are summarised below.

Table 4.4 Summary of Functions of Task Force on Waste Minimisation, MPPP

No.	Designation	Functions
1	Chairperson (Director Urban Services, MPPP)	• Chair Task Force • Liaison with MHLG (Performance & Review of Action Plan) • Coordinate review & Update of *Action Plan on Waste Minimisation.*
2	Secretariat (Head WMU)	• Perform secretariat functions to Task Force • Organise meetings/events for Task Force. • Report on Performance of Waste Minimisation Programmes & Progress of Source Separation to Task Force. • Organise review & Update of *Action Plan on Waste Minimisation* by Task Force and for consideration by President, MPPP.
3	Members	• Attend Task Force Meetings & events. • Contribute to review of performance of waste minimisation programmes. • Provide inputs and recommendations for Review & update of *Action Plan on Waste Minimisation.*

e) Equipment & Cost

Based on the organisational structure proposed, the WMU Team needs adequate tools to implement its programmes and they are listed in Table 4.5 below. The total capital or development cost is estimated to be RM1.840,000. The largest expenditure involves the construction of the depot for household hazardous wastes (RM 1.5 million), which is scheduled for construction in 2007. This depot is important in order to divert potentially hazardous substances from further contaminating the soil, and groundwater and surface water resources.

Table 4.5 Equipment for Implementation of 3Rs Plan in Penang Island

No.	Items	Number	Estimated Capital Cost (RM)
1	Vehicles (4 x 4): North & South Areas @ RM 100,000/vehicle	Two (2)	200,000
2	Audio-visual Equipment • Notebook Computer • Screen • LCD Projector	 Two (2) Two (2) One (1)	 14,000 1,000 5,000
3	Buy-back Centres for Recyclables @RM 20,000/centre	Eight (8)	160,000
4	Hazardous Household Wastes Depot	One (1)	1,500,000
Total			1,840,000

f) Capacity Building

Capacity building of the staff of WMU is important to improve their knowledge and skills. For this JICA's assistance is sought for organising training in Japan or in Malaysia. Such training may involve short courses or longer term (1-3 months) in the following subject areas:

- Public Awareness & Education
- Waste Reduction
- Waste Recycling

Management of Hazardous Household Wastes

g) Buy-back Centres (BBCs)

To complement the kerbside services provided for collecting recyclables from households, it is recommended that buy back centres be established. The BBCs are proposed to be incorporated into the existing MPPP Roll-call centres. Such centres are proposed to be simple structures for receiving and storing recyclables before collection by recyclables agents. These BBCs may be operated by MPPP or 'adopted' by NGOs or residents associations, or recycling agents.

h) Hazardous Household Wastes Depot

As mentioned in the foregoing, MPPP has been collecting and storing Hazardous Household Wastes at its depot in Kampung Jawa. It is anticipated that the volume of such waste e.g. fluorescent bulbs, batteries and e-wastes will increase in the future. Some e-wastes are bulky e.g. refrigerators and washing machines. A proper storage area with the necessary safety and security features needs to be established while a suitable programme on the best environmentally and economically sound method to handle them is planned and implemented.

i) Improved Infrastructure & Networking

Under Pilot Project II undertaken by MPPP for the establishment of Recycling Network and Source Separation, a Directory of Stakeholders for Waste Minimisation has been prepared. This directory contains information on all recycling partners registered with MPPP. A booklet on Penang Island's Experience in establishing its waste minimisation programme and creating its recycling network has also been prepared. Adequate resources should be provided so that these documents can be publicised and updated as MPPP receives more registered recyclable collectors and agents and more recycling communities are established. Adequate resources shall be provided for expansion of the Source Separation in households and other generator groups.

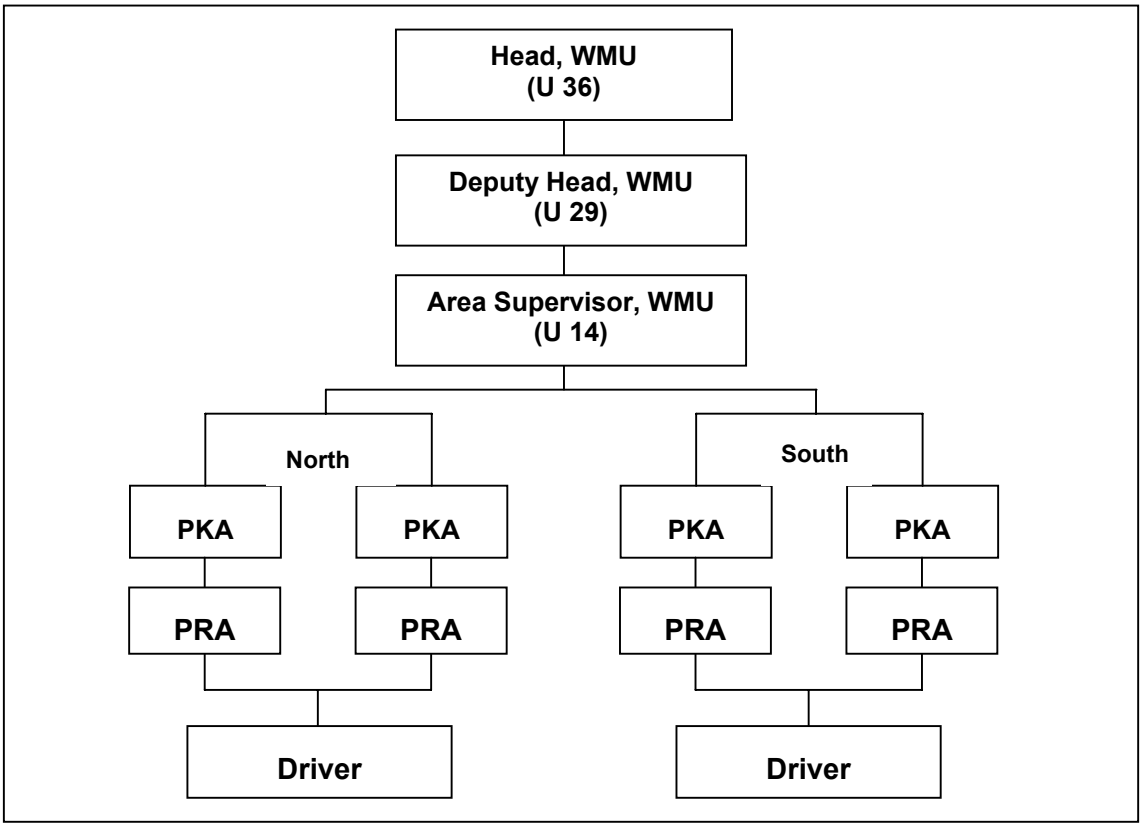


Figure 4.1 Proposed Organisation Structure of the Waste Minimisation Unit (WMU), Urban Services Department, MPPP

4.6 Action Plan for Waste Minimisation Partners, 2006-2010

Further to the actions described for addressing the key problems/issues in MPPP in the previous section, MPPP will work closely with its key partners. It is noted that MPPP's plans and programmes will be geared towards encouraging the 3Rs: Reduce, Reuse and Recycle and MPPP will facilitate actions by various stakeholders and partners to increase awareness and implement waste management programmes that suit the relevant groups. Activities to raise awareness on waste minimisation will be carried out on a continual basis, while networking will be improved. Strengthening of the Recycling Network will involve encouraging more recycling players to register and to encourage more dialogue and interaction among them.

The Action Plan for MPPP and the key partners are tabulated below (Table 4.6 & 4.7).

Table4.6 Summary of Actions by Key Players for Each Type of Recyclable

Recyclables	MSW Generators				
	Households	Institutional	Commercial	Industrial	Recyclable Collectors/ Agents
a. Paper a.1 Old Newspaper a.2 Cardboard a.3 Others	⇐⇐⇐⇐⇐	Public &	Awareness Education	⇒⇒⇒⇒	⇒⇒⇒⇒⇒
b. Plastics b.1 Drink bottles - Color - Clear b.2 Food container b.3 Other container b.4 Mixed plastics (excluding shopping bags)	⇐⇐⇐⇐⇐	Public &	Awareness Education	⇒⇒⇒⇒	⇒⇒⇒⇒⇒
c. Metals c.1 Aluminium cans c.2 Other metal container c.3 mixed metal items	⇐⇐⇐⇐	Public &	Awareness Education	⇒⇒⇒⇒	⇒⇒⇒⇒⇒
d. Glass d.1 Clear bottles d.2 Color bottles	⇐⇐⇐⇐	Public &	Awareness Education	⇒⇒⇒⇒	⇒⇒⇒⇒⇒

Table4.7 Action Plan for Waste Minimisation, 2006-2010

Partner	2006	2007	2008	2009	2010
MPPP	Set up WMU. Acquire Human resources and equipment for WMU.	Continue staffing of WMU. Acquire equipment.	Continue staffing of WMU. Acquire equipment.	Complete staffing of WMU. Acquire equipment.	Review staffing & equipment needs of WMU.
	Capacity building of WMU staff.	Capacity building of WMU staff.	Capacity building of WMU staff.	Capacity building of WMU staff.	Capacity building of WMU staff.
	Outsource management of WMU website & Data processing for website update.	Outsource management of WMU website & Data processing for website update.	Outsource management of WMU website & Data processing for website update.	Outsource management of WMU website & Data processing for website update.	Outsource management of WMU website & Data processing for website update.
	Ensure release of 2 5-tonne MHLG trucks & make necessary modifications.	Use the 2 MHLG trucks.	Maintain trucks and optimise their use.	Maintain trucks and optimise their use.	Maintain trucks and optimise their use.
	Set up 4 BBCs.	Set up 4 more BBCs.	Maintain 8 BBCs.	Maintain 8 BBCs.	Maintain 8 BBCs.
	Set up Drive through Drop-off Centre at Sunshine Farlim.	Maintain Drop-off Centre.	Maintain Drop-off Centre.	Maintain Drop-off Centre.	Maintain Drop-off Centre.
	Extend Kerbside Recyclable collection to Bandar Bayan Baru. Extend Recyclable collection to high-rise residential buildings upon demand.	Maintain kerbside collection & expand where appropriate.	Maintain kerbside collection & expand where appropriate.	Maintain kerbside collection & expand where appropriate.	Maintain kerbside collection & expand where appropriate.
	Apply for Budget for HHW Depot.	Set up HHW Depot	Maintain HHW Depot.	Maintain HHW Depot.	Maintain HHW Depot.
	Implement New Recyclable Recovery Reporting format (MHLG).	Implement New Recyclable Recovery Reporting format (MHLG).	Implement New Recyclable Recovery Reporting format (MHLG).	Implement New Recyclable Recovery Reporting format (MHLG).	Implement New Recyclable Recovery Reporting format (MHLG).

Partner	2006	2007	2008	2009	2010
	Implement new MPPP on-line Reporting System for Recyclable Agents/buyers.	Improve MPPP on-line Reporting System for Recyclable Agents/buyers.	Improve MPPP on-line Reporting System for Recyclable Agents/buyers.	Improve MPPP on-line Reporting System for Recyclable Agents/buyers.	Improve MPPP on-line Reporting System for Recyclable Agents/buyers.
	Update Recycling Directory Update website. Publish new information materials.	Update Recycling Directory Update website. Publish new information materials.	Update Recycling Directory Update website. Publish new information materials.	Update Recycling Directory Update website. Publish new information materials.	Update Recycling Directory Update website. Publish new information materials.
	Extend Schools 3Rs Programme to 10 more schools. Extend Factories 3Rs Programme to 5 more factories. Training of Trainers (community)-#2/year.	Extend Schools 3Rs Programme to 10 more schools. Extend Factories 3Rs Programme to 5 more factories. Training of Trainers (community)-#2/year.	Extend Schools 3Rs Programme to 10 more schools. Extend Factories 3Rs Programme to 5 more factories. Training of Trainers (community)-#2/year.	Extend Schools 3Rs Programme to 10 more schools. Extend Factories 3Rs Programme to 5 more factories. Training of Trainers (community)-#2/year.	Extend Schools 3Rs Programme to 10 more schools. Extend Factories 3Rs Programme to 5 more factories. Training of Trainers (community)-#2/year.
		Draft Bye-laws on 3Rs. Gazette Bye-laws.	Begin Enforcing Bye-laws on 3Rs.	Enforce Bye-laws on 3Rs.	Enforce Bye-laws on 3Rs.
Schools	Register with WMU for participation in 3Rs programme. Use "Guidelines for Enhancement of 3Rs in Schools" (Prepared under JST, 2005).	Register with WMU for participation in 3Rs programme. Use "Guidelines for Enhancement of 3Rs in Schools".	Register with WMU for participation in 3Rs programme. Use "Guidelines for Enhancement of 3Rs in Schools".	Register with WMU for participation in 3Rs programme. Use "Guidelines for Enhancement of 3Rs in Schools".	Register with WMU for participation in 3Rs programme. Use "Guidelines for Enhancement of 3Rs in Schools".
Factories	Register with WMU for participation in 3Rs programme. Practise good consumption & manufacturing practices and reduce waste.	Register with WMU for participation in 3Rs programme. Practise good consumption & manufacturing practices and reduce waste.	Register with WMU for participation in 3Rs programme. Practise good consumption & manufacturing practices and reduce waste.	Register with WMU for participation in 3Rs programme. Practise good consumption & manufacturing practices and reduce waste.	Register with WMU for participation in 3Rs programme. Practise good consumption & manufacturing practices and reduce waste.
Recycling Agents/ Buyers	Register with WMU. Workshop on Waste Minimisation for Recycling Agents/Buyers.	Register with WMU. Workshop on Waste Minimisation for Recycling Agents/Buyers.	Register with WMU. Workshop on Waste Minimisation for Recycling Agents/Buyers.	Register with WMU. Workshop on Waste Minimisation for Recycling Agents/Buyers.	Register with WMU. Workshop on Waste Minimisation for Recycling Agents/Buyers.

Partner	2006	2007	2008	2009	2010
	Report to WMU data on recyclable collection.	Report to WMU data on recyclable collection.	Report to WMU data on recyclable collection.	Report to WMU data on recyclable collection.	Report to WMU data on recyclable collection.
CBOs/ NGOs	Identify candidates for Training of Trainers (Community)-#2. Campaign for waste separation at source. Operate recyclable collection centres.	Identify candidates for Training of Trainers (Community)-#2. Campaign for waste separation at source. Operate recyclable collection centres.	Identify candidates for Training of Trainers (Community)-#2. Campaign for waste separation at source. Operate recyclable collection centres.	Identify candidates for Training of Trainers (Community)-#2. Campaign for waste separation at source. Operate recyclable collection centres.	Identify candidates for Training of Trainers (Community)-#2. Campaign for waste separation at source. Operate recyclable collection centres.
General Public	Carry out waste separation at source. Practise good consumption practices and reduce waste.	Carry out waste separation at source. Practise good consumption practices and reduce waste.	Carry out waste separation at source. Practise good consumption practices and reduce waste.	Carry out waste separation at source. Practise good consumption practices and reduce waste.	Carry out waste separation at source. Practise good consumption practices and reduce waste.

CHAPTER 5 MONITORING AND IMPROVEMENT

5.1 Monitoring and Evaluating the Performance of LAP-WM

5.1.1 Continual Improvement

MPPP's *Local Action Plan for Waste Minimisation (LAP-WM) 2006-2010* may be modelled on the PDCA Cycle.

1. PLAN-Establish Objectives & Targets, and Prepare *LAP-WM*
2. DO-Implement *LAP-WM*
3. CHECK-Monitor the implementation of *LAP-WM* & Measure Results
4. ACT-Improve *LAP-WM* and results.

The PDCA Cycle is based on the concept of Continual Improvement. MPPP proposes to undertake the programmes and activities phase-by-phase, and incorporate monitoring of performance. The Waste Minimisation Unit (WMU) is responsible for monitoring performance, evaluating, taking corrective measures, and eventually reporting. The Waste Minimisation Task Force will provide guidance and advice to the WMU throughout the cycle.

5.1.2 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. KPIs that are proposed for the initial stage are:

Operational Indicators

- Waste Generation per capita
- Overall Recycling Rates
- Recycling Rates of Specific Recyclable
- Percentage of Recyclables on Landfill
- Savings in Waste Disposal Costs/year
- Level of Public Awareness on Waste Minimisation

Other KPIs that will be considered as MPPP's capacity improves include:

Environmental Indicators

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

5.1.3 What is to be monitored?

Based on the selected KPIs, the WMU and Task Force will consider the following factors in deciding what to monitor and measure:

- What are the significant waste minimisation issues?
- What are their characteristics?
- How can they be measured?
- How is data & information collected?

- How is data recorded?
- Can MPPP collect data on its own or need assistance?

The parameters to be measured are shown in Table 5.1.

Table 5.1 Parameters to be Measured

No.	KPI	Monitoring Parameters
1	Waste Generation per capita	1. Population growth 2. Quantity of Waste Generated or Quantity of Waste Collected 3. Quantity of recyclables collected
2	Annual Recycling Rates/ Rate of Recovery of Recyclables	4. Quantity of Waste Generated or Quantity of Waste Collected 5. Quantity of recyclables collected (per day/month/year)
3	Savings in Waste Disposal Costs/year	1. Quantity of Waste Disposed on Landfill 2. Cost of Disposal at Landfill (tipping fees) (per day/month/year)

MPPP will also monitor specific parameters for reporting to the MHLG. The parameters for these monthly reports include:

- Quantities of SW collected within LA
- Quantities of Recyclables collected within the LA (including by contractors)
- Quantity of SW disposed at landfills/ transported from Batu Maung Transfer Station

MPPP will use standard formats for recyclable collectors/agents to report on their recycling activities.

5.1.4 Evaluation of Monitoring Results & Improvement

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 will 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, the Task Force will recommend to MPPP top management on the need to make changes to improve waste minimisation. Improvement measures may involve changes to:

- LAP-WM Objectives & Targets
- Key Performance Indicators
- Any other component of the LAP-WM e.g. expand source separation programme, mode of recyclable collection etc.

5.2 Reporting

It is noted that MPPP needs to prepare and send periodic reports to:

- MPPP Top Management (after endorsement by the Task Force)
- The MHLG

Pro-forma Reports will be used (e.g. those issued by MHLG) and where facilities are

available, reports will be made and transmitted in Electronic form (it saves paper).

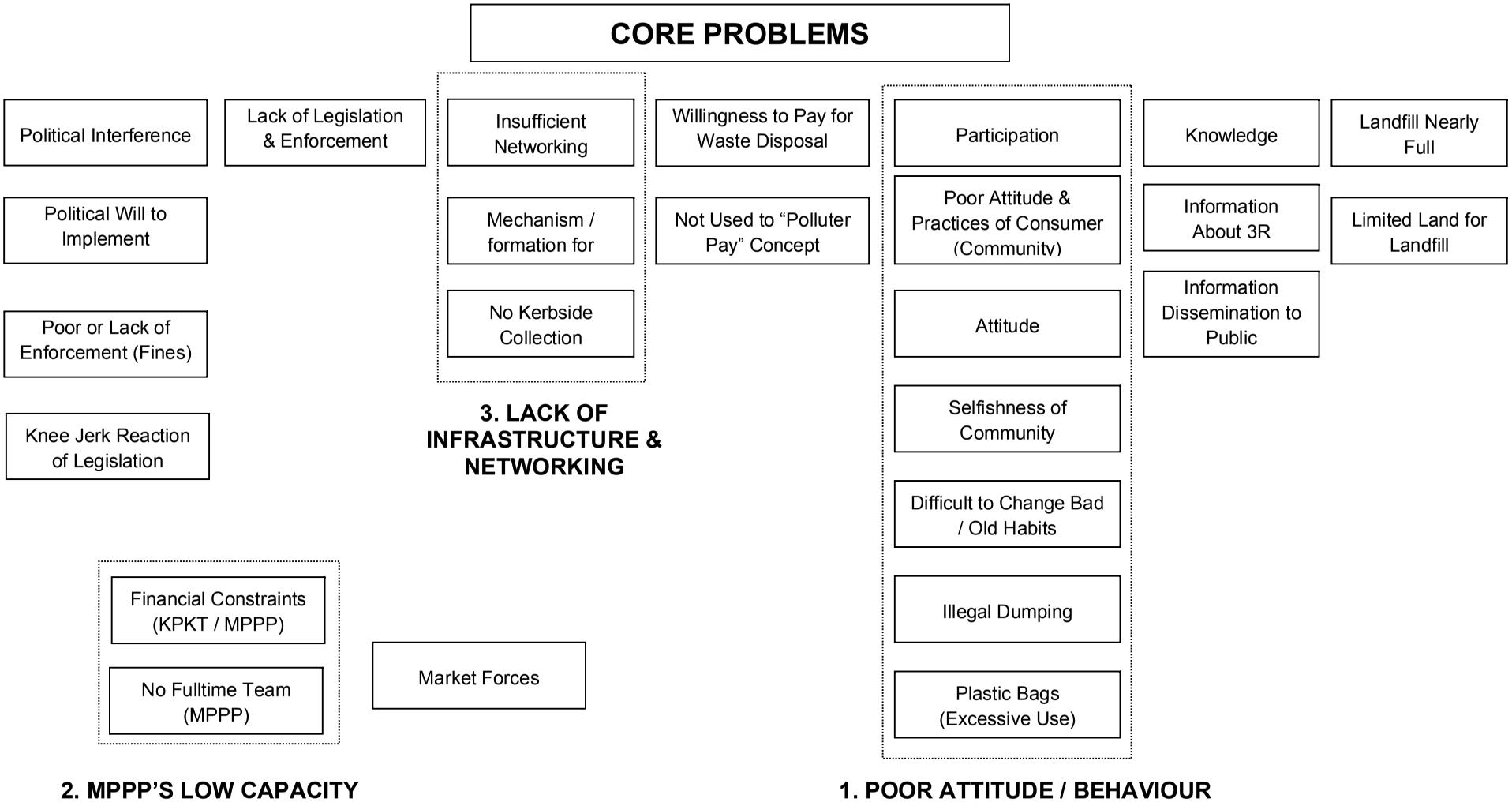
Reports or progress of WM efforts may be disseminated to the public (subject to MPPP top management approval), and to its waste minimisation partners. The modes for publicizing include the website, meetings, seminars and the printed media including Penang State Government's bulletin. The frequency for reporting is shown in Table 5.2.

Table 5.2 Reporting of Data Required for Monitoring of Performance

No	Regular Data Collection & Reporting	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	Quarterly/ Twice/year
4	Questionnaires to selected numbers of waste generation sources (households, businesses 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	MPPP Annual reports on the development and implementation of the overall Waste Minimisation and Recycling Programme	Yearly
6	MPPP Annual workshop with recycling players/ network	Yearly

ATTACHMENTS

ATTACHMENT 1



ATTACHMENT 2

PROBLEM TREE OF POOR ATTITUDE & BEHAVIOUR

<EFFECTS >

- Dirty Penang
- Quality
- Image of Penang Down
- Tourism Industry
- More Expenses

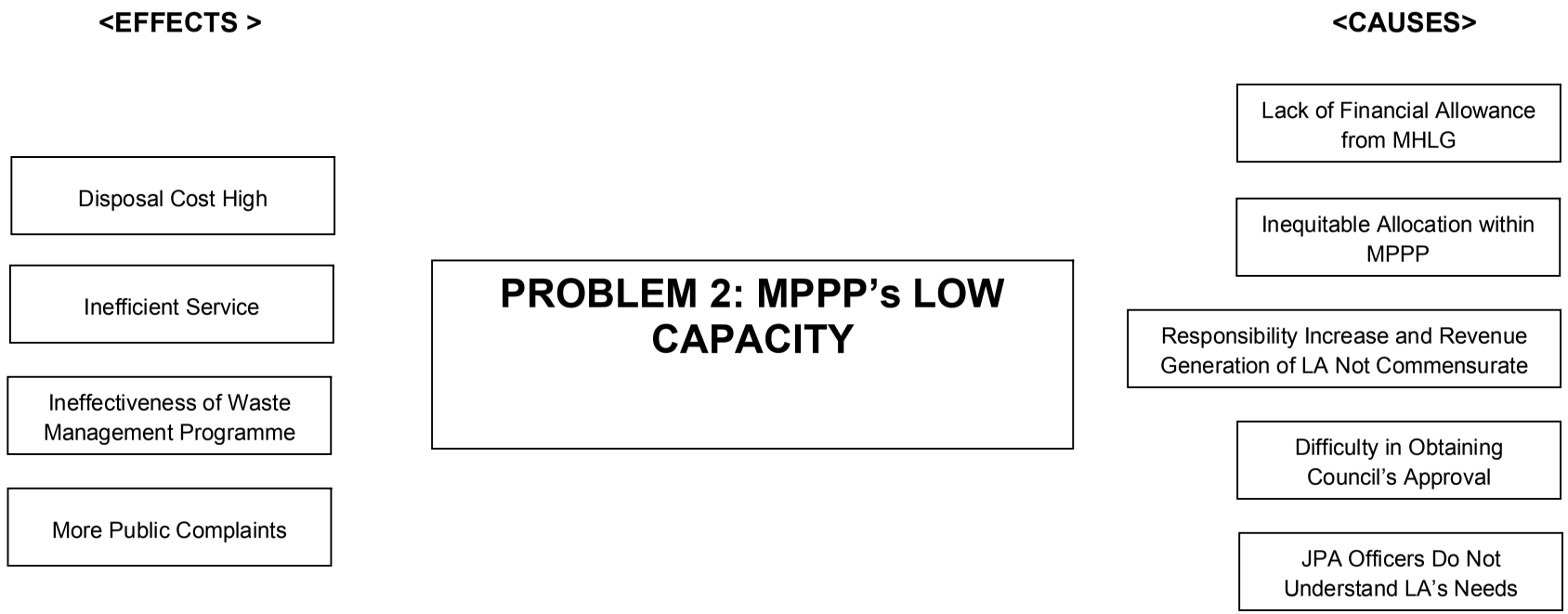
PROBLEM 1: POOR ATTITUDE & BEHAVIOUR

<CAUSES>

- Inefficient Publicity
- Too Pampered
- Lack of Knowledge
- Stubbornness
- "NIMBY" Syndrome
- Lack of Enforcement
- "Government Responsible for All" Mentality
- Not Aware of Serious Impact of Environment
- Lack of Civic Mindedness

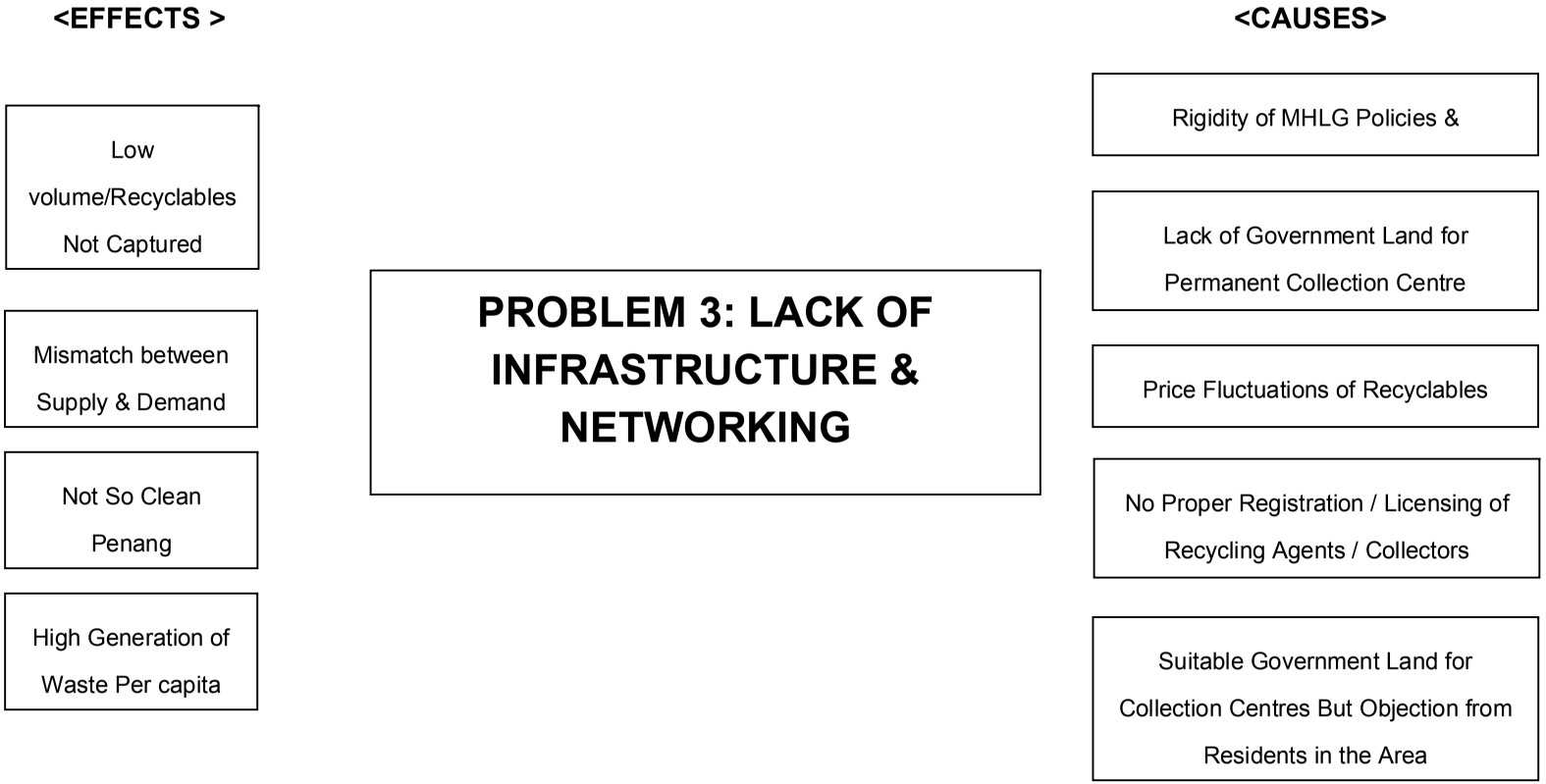
ATTACHMENT 3

PROBLEM TREE OF MPPP's LOW CAPACITY



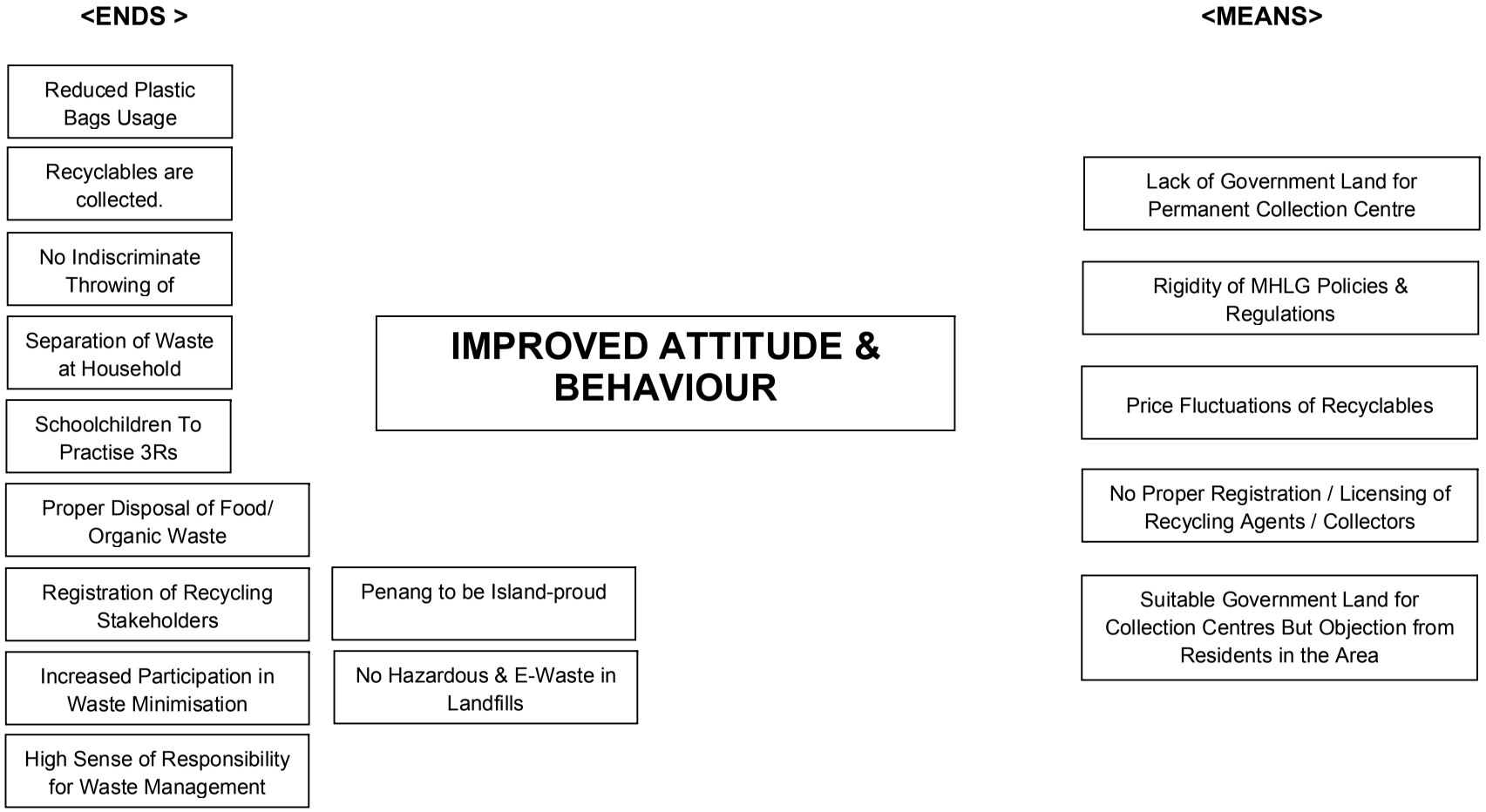
ATTACHMENT 4

PROBLEM TREE OF LACK OF INFRASTRUCTURE & NETWORKING



ATTACHMENT 5

OBJECTIVES TREE OF PROBLEM 1



ATTACHMENT 6

OBJECTIVES TREE OF PROBLEM 2

<ENDS >

- Dedicated Officers
- Enough HR for the Unit
- Efficient & Sustainable Minimisation Programmes
- Knowledgeable Team for Training & Conducting Programmes
- Environmentally Conscious Citizens
- Cleaner & Better Environment for “Anak Cucu Kita”
- Model LA in Malaysia
- Shinning & Polished “Pearl”

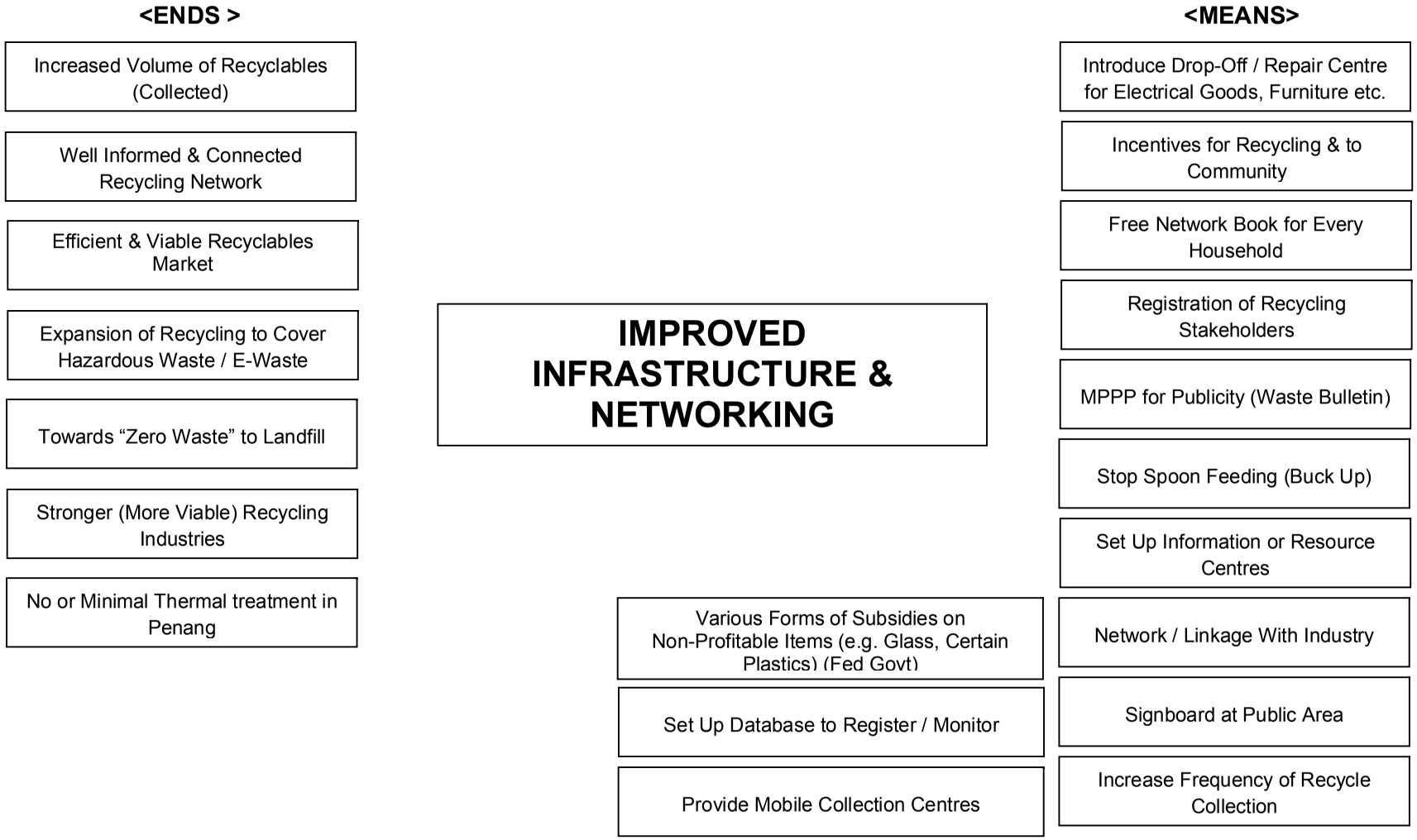
MPPP HAS ADEQUATE CAPACITY

<MEANS>

- Adequate Training for Trainers
- Enough Audio Visual Aid Units & Logistics
- Increase Financial Allocation
- Increase Federal Grants
- Enough RM for the Unit
- Fulltime Unit
- Good Linkage with NGO’s & CBO’s to Carry Out Programmes

ATTACHMENT 7

OBJECTIVES TREE OF PROBLEM 3



"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

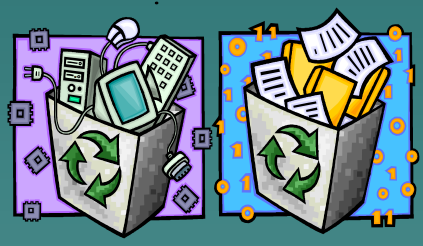
JICA Japan International Cooperation Agency

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:

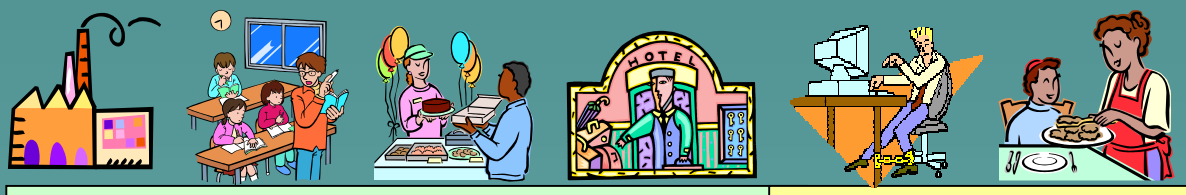
- Provide Infrastructure e.g. recyclables collection centre & bins
- Coordinate action among partners
- Provide Information & Guidance
- Enforce laws & guidelines
- Monitor waste minimisation performance
- Liaise & coordinate with Ministry of Housing & Local Government in planning and implementing waste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

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Contact Persons:
Haji Zulkifli bin Zakaria
Syed Alwi Syed Omar

KITAR SEMULA
FIKIR DULU SEBELUM BUANG