PART 5

Local Action Plan in MD Kinta Selatan

Local Action Plan (2006 - 2010)

Waste Minimisation

for

Majlis Daerah Kinta Selatan (MDKS)

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Preface

The problem of solid waste is now a global issue, where the discussion on the problem becomes 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 of 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 guidance for 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 at the local level, and subsequently be extended to some other LAs in the country.

Majlis Daerah Kinta Selatan

April 2006

Kinta Selatan Fact Sheet

Area (square kilometres)		112.77
Total Population (1991)		70,410
Total Population (2004) estimates		90,449
Average annual population growth rate, 2000 - 2005 (%)		2.4%
Average annual population growth rate, 2006 - 2010 (%)		2.1%
Ethnic group composition of Malaysian citizens (%)	*Bumiputera*	26.0%
	Chinese	62.0%
	Indian	11.0%
	Others	1.0%
Age Structure	Population aged 0 – 14 years old (%)	35%
	Population aged 15 – 64 years old (%)	58%
	Population aged 65+ years old (%)	7%
Sex Ratio		1:1
Total Households		15,924
Total Living Quarters		23,951
Landuse (2002 Estimates)* :		
1) Housing (sub-urban)	- 1,935.44 hectares	1.22%
2) Villages	- 2,257.04 hectares	1.42%
3) Industries	- 775.74 hectares	0.49%
4) Commercial	- 84.65 hectares	0.05%
5) Recreational	- 1,493.82 hectares	0.94%
6) Tourism	- 237.57 hectares	0.15%
7) Vacant Land	- 3,682.58 hectares	2.32%
8) Institutions	- 653.03 hectares	0.41%
9) Agriculture	- 30,069.49 hectares	18.93%
10) Forest	- 82,948.19 hectares	52.23%
11) Water bodies	- 31,284.67 hectares	19.70%
12) Transportation / Infrastructures	- 3,391.55 hectares	2.14%

Note:

** Landuse estimates are showing total areas of Kinta areas, which cover Kinta Selatan (KS) and Kinta Barat (KB)*

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
LA21	Local Agenda 21
MDKS	Majlis Daerah Kinta Selatan (Kinta Selatan District Council)
MHLG	Ministry of Housing and Local Government
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 Background and Objectives

With the stable growth of the economy and active commercial and industrial activities, management of solid waste has become a central concern in Malaysia. Due to limited availability of land, minimising the amount of solid waste disposal at landfills is an acute issue to be addressed through partnership of all relevant stakeholders including federal/local government, recyclers, concessionaires, business entities, NGOs, and the 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 on National Waste Minimisation in Malaysia since June 2004. The Study includes identification on the status and issues of waste minimisation in Malaysia and formulation of the Waste Minimisation Master Plan and Action Plan (WM-M/P and A/P). To materialise 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 minimising 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 MANAGEMENT AND RECYCLING IN MDKS

2.1 Solid Waste Management in General

Municipal Solid Waste (MSW) is essentially household waste and also includes wastes generated 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 are such as 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

Majlis Daerah Kinta Selatan (MDKS) or Kinta Selatan District Council was instituted under the Local Government Act 1976 (Act 171). The overall institutional framework of MDKS is shown in Figure 2.1 below, where the solid waste management of the area falls under the administration of Department of Urban Services.

The main role of the Department is to carry out urban services including road sweeping, surface water drainage system (drain and detention pond) maintenance, grass cutting and solid waste collection and final disposal.

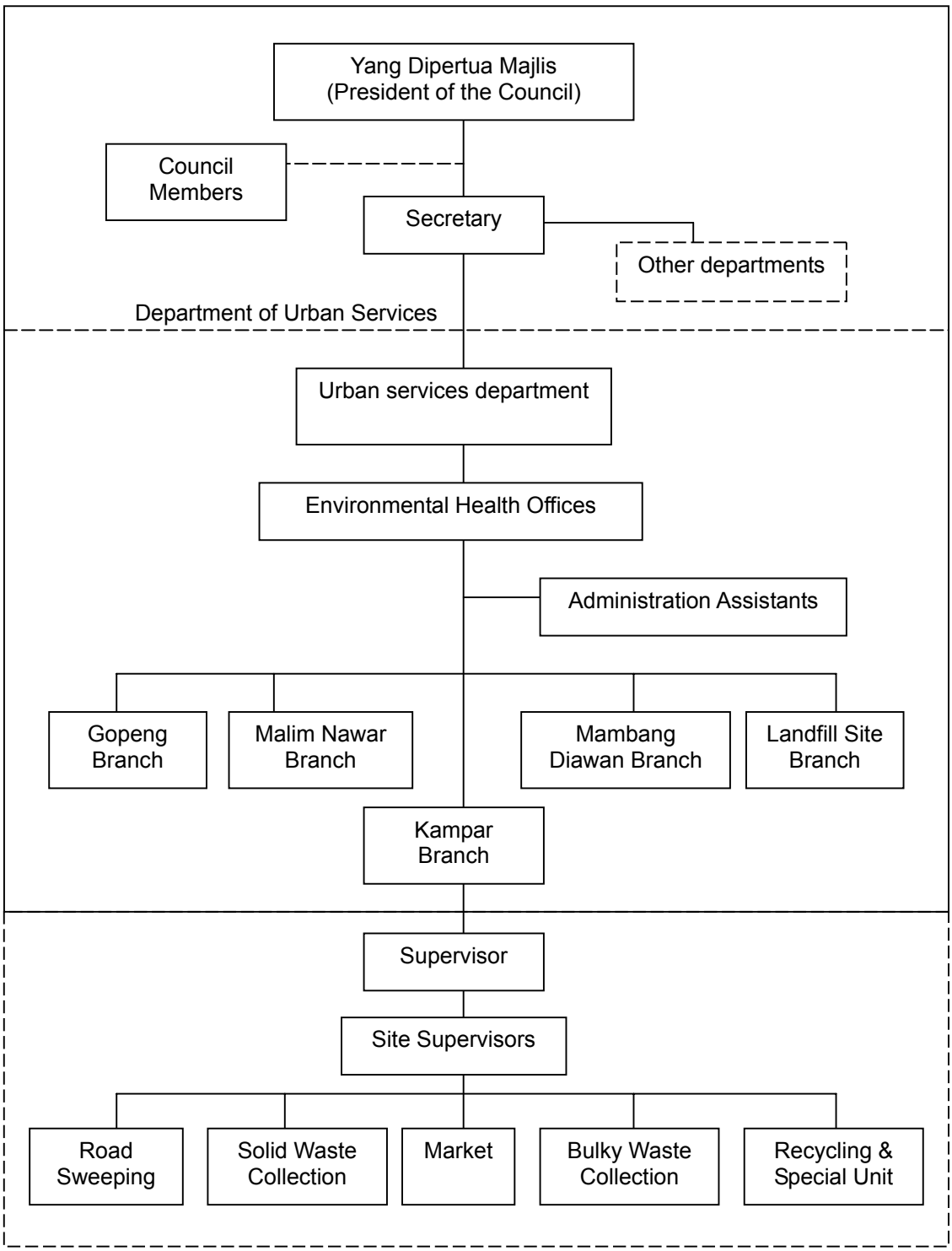

Figure 2.1 Institutional framework of MDKS

Some activities that were carried out under the Department are:

a) Community activities such as exhibitions, spring cleaning *(Gotong Royong)*
b) Recycling activities such as collection from house to house, from collection points and centres
c) Cleaning public amenities such as public toilets, culverts, children playground, open spaces, food courts, markets and play fields etc.

There are basically 3 by-laws / local acts that are related to solid waste management in MDKS, namely:

a) Local Government Act 1976 (Act 171)
b) Street, Drainage and Building Act 1974 (Act 133)
c) Refuse Collection, Removal and Disposal (Majlis Daerah Kinta Selatan) By Laws, 1985

2.1.2 Service Areas

The total area of MDKS is 112.77 km^2, where 87.4 km^2 is operation areas (77.5%). The low percentage of operational areas is due to the fact that the residential and commercial areas are concentrated at certain towns, whereas most of the other areas of MDKS are agricultural or natural forests.

The residential and commercial areas are concentrated at several towns, namely:

a) Gopeng
b) Kopisan
c) Lawan Kuda
d) Sungai Siput Selatan
e) Kuala Dipang
f) Kampar
g) Kota Bahru
h) Jeram
i) Malim Mawar
j) Tronoh Mines
k) Mambang Diawan

The population within MDKS areas was recorded as 70,410 in 1991, and it has increased to 90,449 in 2004. In terms of housing and business types, the distributions in MDKS areas are shown in Tables 2.1 and 2.2 respectively:

Table 2.1 Distributions of Household Types

No	Household Types	Units
1	Terrace	10,141
2	Squatter	63
3	Bungalows	7,544
4	Flats / Highrise	918
5	Others	2,437
Total		23,951

Table 2.2 Distributions of Business Types

No	Business Types	Units
1	Manufacturers	548
2	Commercial	2,280
3	Offices	72
4	Institutional	92
Total		2,848

It was reported by MDKS that almost 100% of the household and business entities within their areas are covered with solid waste management services. The service area covers about 87% of the total areas of MDKS.

2.1.3 Waste Generation and Compositions

Waste Generation

There is no record on waste generation in MDKS, except some figures recorded at landfill site on the waste disposed. Based on the landfill data of 2004, MDKS recorded their average total waste disposed to be around 54.14 tons/day. Out of this figure, about 47.71 tons/day of waste was from household and 6.43 tons/day was from business entities. Based on this data, the per capita disposal rate in MDKS was calculated to be 0.68kg/cap/day.

Table 2.3 Waste Disposal Rates in MDKS (Landfill Data)

No	Generation Sources	Waste as Disposed (tons/day)	Percentage
1	Households	47.71	88.1%
2	business entities	6.43	11.9%
Total		54.14	100.0%
Per capital waste disposal rate (kg/cap/day)		0.68kg/cap/day	

Source: MDKS (2004)

By using the figures obtained from the JICA study for the waste recycling rate at source, the total waste generation rate for MDKS was estimated and summarised in Table 2.4 as follows:

Table 2.4 Total Waste Generation Rate in MDKS (2004)

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	0.60	0.092	0.69
2	Business entities	0.08	0.090	0.17
Total		0.68	0.183	0.86

Note: * Estimations from JICA Study, 2005

It is clearly shown that the actual amount of wastes generated in MDKS areas are higher than the 0.68 kg/cap/day as recorded at the disposal site, because there are some portions of recyclable materials that are retained at source to be recycled or sold to recycling agents directly without discarding from the households or business entities.

Therefore, based on the population of 90,449 in MDKS (2004), the estimated amounts of actual wastes generated, retained[1] and disposed are calculated as follows:

[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

a) Waste generation = 90,449 x 0.86 kg/cap/day
= 77.8 tons/day

b) Waste retained = 90,449 x 0.17 kg/cap/day
= 15.4 tons/day

c) Waste disposed = 90,449 x 0.69 kg/cap/day
= 62.4 tons/day
(Where 54.1 tons/day are covered by MSW service that dispose to landfill)

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

$$\frac{15.4 \text{ tons/day}}{77.8 \text{ tons/day}} \times 100\% = 19.80\%$$

Waste Compositions

There is also no specific study done before on waste compositions in MDKS. Therefore, the results of the detailed waste composition study done by JICA Study on households are referred, as shown in Table 2.5 below:

Table 2.5 Waste Compositions in Different Income Level

No	Categories	High income	Medium income	Low income	Average
		Unit in %			
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
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
	TOTAL	100	100	100	100

Note: JICA Study, 2005

Figures in Table 2.5 show that food waste accounts the highest portion of household waste in three income groups (40.47% for high income, 48.62% for medium income and 55.02% for low income) with an average amount of 48.04%. This is followed by waste papers (17.09%), waste plastics (9.08%), yard wastes (6.58%), diapers (5.06%) and the remaining are other wastes.

However, it should be noted that the abovementioned figures are compositions of the wastes discarded 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 in MDKS are shown in Table 2.6 as follows:

Table 2.6 Waste Compositions for Households and Business Entities

Composition	Households	Business Entities	Overall
	All Units in %		
Food waste	39.7	18.1	38.4
Papers	31.2	32.4	31.3
Plastics	8.1	8.8	8.1
Glass	3.5	7.7	3.8
Ferrous Metals	1.6	2.9	1.7
Aluminium	0.6	0.9	0.6
Others	15.3	29.2	16.1

Note: Ratio of Households to Business Entities in MDKS is 7.4 to 1

2.1.4 Waste Storage and Collection

Various types of waste storage bins are used in MDKS areas. Some common types of bins and total numbers in MDKS are:

a) Leach bin $2m^3$ = 75 units
b) 2 wheel bin 660 litter = 11 units
c) 2 wheel bin 240 litter = 63 units
d) RoRo bin $10m^3$ = 8 units
e) Other 80 litter household bins = unknown

The wastes generated in MDKS areas are collected by MDKS itself either door to door or at specific premises (for bigger communal bins). The collection frequency is:

a) Residential = 3 times/week
b) Commercial = Once daily
c) Markets = 2 times daily

In terms of expenditure, it was reported that MDKS uses about RM2.2 million/year for collection service of waste generated within MDKS areas.

2.1.5 Waste Treatment and Disposal

The wastes collected in MDKS areas are sent to MDKS Landfill Site located at Batu 23½ Jalan Kuala Dipang, Sungai Siput Selatan, Kampar. The landfill is managed by MDKS itself and currently it receives only wastes from MDKS areas with about 54.14 tons/day on average. The tipping fees charged at the landfill are summarised as follows:

a) Industry (< $2m^3$ lorry) = RM40/month
b) Industry (> $2m^3$ lorry) = RM50/month
c) Domestic bulky waste (< 2 tons lorry) = RM50/lorry
d) Function (2 tons lorry) = RM30/lorry
e) Tipping (2 tons lorry: own transport) = RM180/month

In terms of expenditure, it was reported that MDKS uses approximately RM186,600.00/year (about RM9.50/tonne of waste) for the management of the landfill site. This excludes the depreciation cost of facilities and equipment used for collection and final disposal.

2.2 Recycling of Municipal Solid Wastes in MDKS

Recycling of solid wastes in MDKS is being carried out in 2 ways:

a) Recycling business activities by the industries, collectors, middlemen etc.
b) Recycling programmes organised by MDKS such as campaigns in schools (3 colours bins), recycling competition within district levels, and household campaigns.

Through these 2 types of recycling, business activities for trading of recyclable materials are well established especially for materials such as papers, plastics, cardboard, aluminium cans and scrap irons. Whereas the recycling programmes in schools and other campaigns are more designed for the purpose of creating awareness.

In general, recycling activities in MDKS can be illustrated in the flow as shown in Figure 2.2 below:

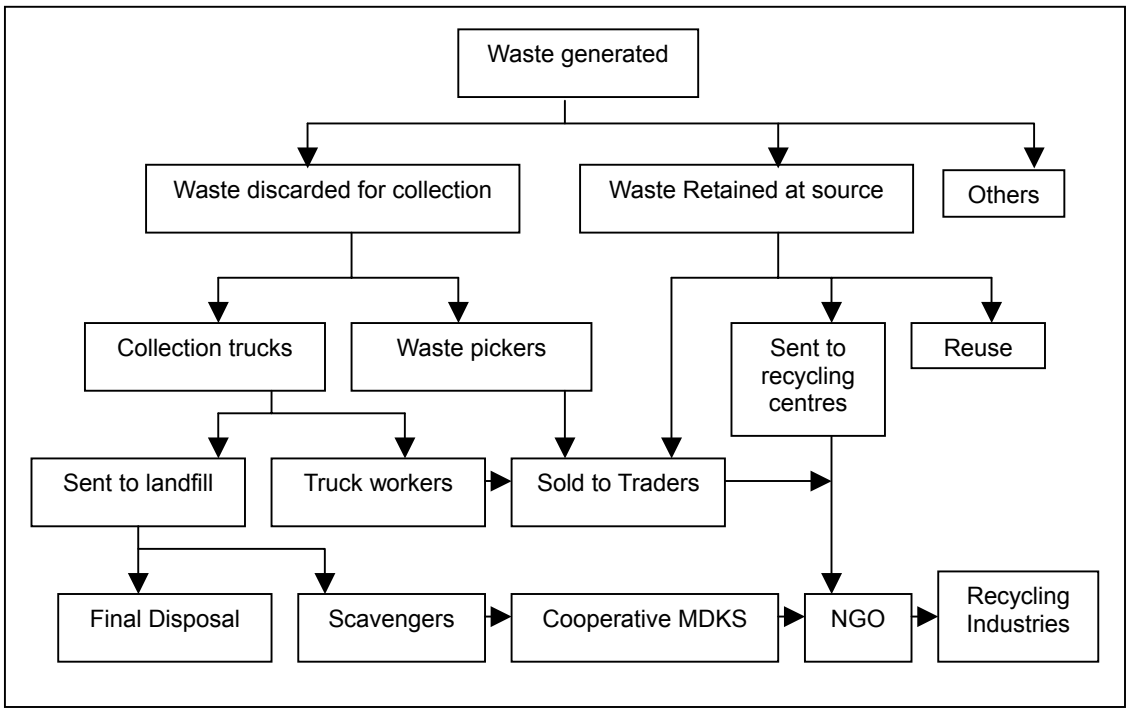

Figure 2.2 Flow of Recycling Activities in MDKS

2.2.1 Types and Amount of Recyclable Materials

As mentioned earlier that there is no data available for waste composition in MDKS, thus the composition data obtained for both households and business entities from JICA Study was referred to. The amount of recyclable materials expected from the waste stream in MDKS is calculated in Table 2.7:

Table 2.7 Amount of Recyclable Materials in MDKS (2004)

No	Composition	Households		Business Entities		Total Amount (tons/year)
		%	Amount (tons/year)	%	Amount (tons/year)	
1	Papers	31.2	7,107.23	32.40	1,818.40	8,925.63
2	Plastic	8.1	1,845.15	8.80	493.89	2,339.03
3	Glass	3.5	797.29	7.70	432.15	1,229.44
4	Ferrous metals	1.6	364.47	2.90	162.76	527.23
5	Aluminium	0.6	136.68	0.90	50.51	187.19
6	Others (Non recyclables)	55.0	12,528.77	47.3	2,654.65	15,183.42
Total		100.0	22,779.58	100.0	5,612.36	28,391.94
Total amount of recyclable materials available (tons/year) =						13,208.53
Total amount of recyclable materials available (%) =						46.5%

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 46.5% of the wastes discarded from the sources are recyclable materials (13,208.5 tons/year). Out of this figure, the main recyclable materials found are paper (8,925.6 tons/year), followed by plastics (2,339.0 tons/year) and the others.

2.2.2 Types of Recycling Players

Like most of the other places in the country, the recycling players in MDKS are generally the waste collectors/ pickers, middlemen, traders, agents, recycling centres and finally the recycling industries. There is no formal registration system in place for these recycling players and therefore a lot of information on these players remained unknown especially for small scale middlemen, collectors and traders. However, some recycling players in MDKS were identified as shown in Tables 2.8 to 2.11 below:

Table 2.8 List of Recycling Stations (3 Colors bins) in MDKS

No	Recycling Stations
1	Padang Taman Bandar Baru
2	Pasar Awam Kampar
3	Tandas Awam Mambang Diawan
4	Dewan Orang Ramai Malim Nawar
5	Taman Kinta Gopeng
6	Pejabat Pengawas Kampar
7	Pejabat Cawangan Gopeng
8	Sekolah Man Ming Gopeng
9	Sekolah Kebangsaan Gopeng
10	Kolej Matrikulasi Gopeng
11	Sekolah Menengah Seri Teja Gopeng
12	Sungai Siput (Selatan)
13	SRJK (C) Jeram
14	Padang Lawan Kuda Gopeng
15	Kompleks MDKS Kampar
16	Tapak Pelupusan Sungai Siput (S)

Table 2.9 List of Recycling Middlemen/Traders in MDKS

No	Name	Contacts	Type of Business
1	Chan Peng Fuatt	105, Taman Rose, 31900 Kampar Tel: 012-5763995	Trading of papers, iron, cardboard
2	Suhaida Ali	Kg Kuala Dipang 31850 Jeram Tel: 019-5684936	Trading of papers, iron, cardboard
3	Jayaletchumi a/p Supramaniam	125, Jalan Industri 3, Kawasan Industri M.D. 3 31950 Kampar Tel: 012-5227724	Trading of scrap irons
4	Halimi bin Laili	Pejabat Haiwan 31900 Kampar Tel: 012-5967616	Trading of plastic, glass, papers, steel cans, aluminium
5	Raju Company	2, Jalan 4, New Wah Loong 31900 Kampar Tel: 05-4663154	Trading of papers, iron and aluminium
6	Syarikat Chong	S36, Taman Kampar 31900 Kampar Tel: 012-5105376	Trading of papers and cardboard
7	Oswald Trading	522, Jalan Bomba, 36000 Teluk Intan Tel: 012-4853872	Trading of carton boxes
8	Paripornam a/p Anthony Ratnam	PT 2868, Jalan Sg Itek, 31600 Gopeng	Trading of aluminium and iron
9	Syarikat Chandran	5, Teja Lane, 31600 Gopeng	Trading of iron, can, glass, aluminium, battery and rubber
10	Gergasi Enterprise	1, Jalan Sungai Siput Selatan, Kuala Dipang 31850 Jeram Tel: 012-5120125	Various kinds of recyclables
11	Munishwar Enterprise	47, Per Sri Emas 3, Taman Sri Emas 31900 Kampar Tel: 012-4549265	Trading of scrap iron, aluminium and plastics
12	TG Metal Enterprise	PT 6770 Jalan Temoh 31900 Kampar Tel: 012-4686311	Trading of scrap iron, aluminium and plastics
13	Zhen Hua Recycle Centre	No. 18, Kawasan Industri M.D. 2, 31900 Kampar Tel: 05-2822923 Tel: 012-5165412	Trading of aluminium and plastics

Table 2.10 List of Recycling Industries in MDKS

No	Name	Contacts	Type of Business
1	LTM Trading	Lot 28, Jalan Industri 1/1 Gopeng Industrial Park 31600 Gopeng Tel: 016-5555055	Plastic Recycling Industry
2	Thye Keong Trading	44, Jalan Perusahaan 4, Mambang Diawan Light Industri 31900 Kampar Tel: 012-5231287	Recycling industry for PVC Plastic
3	Ah Chong Kain	73, Mambang Diawan 31950 Kampar Tel: 012-5129323	Recycling of cloth
4	Advance Recycle Resources (M) Sdn Bhd	PT 237, Jalan Kota Bharu, Taman Kinta Industrial Estate 31600 Gopeng Tel: 016-2623177	Recycling of plastic and papers

Table 2.11 List of Recycling Players (Collection Centres) in MDKS

No	Name	Contacts	Type of business
1	Persatuan Kebajikan Xim Phou Moon	1, Jalan Selayang 3, Taman Rasa Sayang 43200 Cheras Tel: 03-9048325	Collection of used cloths, used books and magazines, old newspaper, computer papers, aluminium cans etc.
2	Leksunder Recycle Point	62, Persiaran Sg. Pari Timur 16, Taman Mas, 30100 Ipoh Tel: 016-5349298	Various kinds of recyclables

2.2.3 Current Recycling Performance

Data obtained on recycling activities in MDKS was mainly derived from the campaigns at schools and various other activities organised by MDKS. Very limited information is available on the recycling activities carried out by the recycling players particularly in the private sectors. Based on data given by MDKS for recyclables collected in year 2004, the total amount of recyclable materials collected in MDKS is shown in Table 2.12:

Table 2.12 Amount of Recyclable Materials Collected in MDKS (2004)

Types	Amount (kg/year)	Price (RM/kg)
Old newspaper	0	0
Cardboard	3,565	0.18
Mixed paper	47,712	0.18
Glass	11,313	0.05
Aluminium	3,276	1.50
Scrap metals	20,222	0.30
Plastic	25,934	0.30
Rugs / others	8,101	0
Total	120,123	0

As shown in Table 2.12, there is no data available for old newspaper collection. This is due to the reason that the collection of old newspaper in MDKS is carried out actively

by some old newspaper collectors and not reported to MDKS. In addition, the figure shown for plastics collected was higher than scrap metals. This is also due to limited data available from the private sectors for scrap metals collection.

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

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

$$\text{Recycling rate (\%)} = \frac{120 \text{ t/year}}{120 \text{ t/year} + (54.14 \text{ t/day}) \times 365} \times 100\%$$

$$= 0.6\%$$

Note: It should be noted that the recycling rate calculated shows only part of the recycling activities in MDKS.

From this calculation, it is clear that the recycling rate calculated is much lower as compared to the figure calculated for waste retained, which is about 19.8% (see page13). This is because many of the wastes being retained and recycled are not known by MDKS, and therefore the data on recyclables collected is not captured and reported. (It should be noted that retained waste also contains waste illegally dumped).

2.2.4 Other issues on Recycling in MDKS

Issues identified in the implementation of recycling programmes in MDKS are:

- Recycling focuses only on certain valuable materials (such as metals and papers); some other recyclable materials are less collected (such as glass).
- Many recyclers are not known or not registered under MDKS.
- No proper networking between the recyclers, industries, MDKS and other recycling players.
- Some recyclers are operating in backyards or illegally without proper operating system (polluting the environment).
- No source separation, recyclable materials are normally mixed and dirty, which requires further sorting and cleaning.
- Recycling bins especially in schools are not appropriate in design (most of the recyclables generated are papers).
- Low awareness / Lack of information and education on recycling.
- Most of government departments /institutions show low interest in recycling programmes.
- Many of the 3-colour bins located at various locations are not being used or abundant.
- Recycling bins placed in public areas are frequently disturbed by illegal scavengers who leave behind only those non-recyclables.

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

Table 2. 13 Issues on Recycling in MDKS and the Countermeasures

No	Issues	Possible Countermeasures
1	Recycling focuses only on certain materials	Find possible markets for recyclables from outside MDKS
2	Many recyclers are not known	Create a registration system for recycling players within MDKS areas
3	No proper networking between the recycling players	Proper database management and registration system to create networking between the recycling players
4	Some recycling players are operating in backyard or illegally	Regular inspection, create registration system and enforcement to formalise the illegal recycling players
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 located at various locations are abundant	Remove the unused recycling bins and relocate the bins at more strategic locations
8	Most of government department / institutions show low interest in recycling programme	Government departments / institutions should be made compulsory to carry out recycling programmes (to show commitments)
9	Recycling bins especially in schools are not appropriate	Locate bigger recycling bins in schools especially for papers (not necessarily using the 3-colour bins)
10	Recycling bins frequently disturbed by illegal scavenger and left behind only those non-recyclables	More strict enforcement to register and monitor all scavengers

2.3 Improvement and Promotion of Waste Minimisation and Source Separation

There is no source separation and waste minimisation being carried out at households and business entities in MDKS (except some materials are sorted out to be sold to collectors especially old newspapers and aluminium cans). 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.

MDKS sometimes gives talks and seminars to schools on recycling and waste minimisation issues mainly to create awareness. There is no by-law, act and guideline on waste minimisation and source separation.

2.3.1 Key Issues in Waste Minimisation and Source Separation

Some issues were identified in the implementation of waste minimisation and source separation programmes in MDKS:

- 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

Some possible countermeasures for these issues are summarised in Table 2.14 as follows:

Table 2.14 Issues on Waste Minimisation and Source Separation in MDKS 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 recyclable; provision of incentive for private collectors etc.
5	Volumes of recyclable materials separated at source are too low	Educate the public to proper handle and store the recyclables at source; Encourage active participation in community recycling bins / centre by incentives etc; Provision of incentive for private collectors to collect recyclables at lower quantity from sources

CHAPTER 3 TARGETS OF WASTE MINIMISATION AND RECYCLING

3.1 Projection of Future Waste Generation

The projection of future waste generation in MDKS for households from years 2006 to 2010 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	9,215.32	9,578.22	9,955.41	10,347.45	10,754.94	11,178.47
2	Waste papers	7,242.27	7,527.47	7,823.90	8,132.00	8,452.24	8,785.09
3	Plastics	1,880.20	1,954.25	2,031.20	2,111.19	2,194.33	2,280.74
4	Glass	812.43	844.43	877.68	912.24	948.17	985.51
5	Ferrous Metals	371.40	386.02	401.23	417.03	433.45	450.52
6	Aluminium	139.27	144.76	150.46	156.38	162.54	168.94
7	Others	3,551.50	3,691.35	3,836.72	3,987.81	4,144.85	4,308.07
TOTAL		23,212.39	24,126.50	25,076.60	26,064.11	27,090.52	28,157.34

Note: 1) Annual waste growth rate for household used = 2%
2) Population growth rate = 1.9% per year
3) Waste composition assumed to be no change

On the other hand, projection was also done for future waste generation in MDKS for business entities from years 2006 to 2010 as shown in Table 3.2. It was again assumed that there is 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	1,076.54	1,140.88	1,209.06	1,281.31	1,357.88	1,439.03
2	Waste papers	1,927.07	2,042.23	2,164.28	2,293.62	2,430.68	2,575.94
3	Plastics	523.40	554.68	587.83	622.96	660.19	699.64
4	Glass	457.98	485.35	514.35	545.09	577.66	612.18
5	Ferrous Metals	172.48	182.79	193.72	205.29	217.56	230.56
6	Aluminium	53.53	56.73	60.12	63.71	67.52	71.55
7	Others	1,736.74	1,840.53	1,950.52	2,067.09	2,190.61	2,321.53
TOTAL		5,947.76	6,303.19	6,679.87	7,079.06	7,502.11	7,950.43

Note: 1) Annual waste growth rate for business entities used = 4%
2) Population growth rate = 1.9% 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 in MDKS from year 2006 – 2010 are shown in Table 3.3 below:

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

Categories		2005	2006	2007	2008	2009	2010
		(tons/year)					
1	Households	23,212.39	24,126.50	25,076.60	26,064.11	27,090.52	28,157.34
2	Business Entities	5,947.76	6,303.19	6,679.87	7,079.06	7,502.11	7,950.43
3	TOTAL	29,160.15	30,429.69	31,756.47	33,143.18	34,592.62	36,107.78

In terms of recyclable materials, the projection of the total main targeted recyclable materials generated in MDKS from both households and business entities for years 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	9,169.34	9,569.70	9,988.18	10,425.62	10,882.92	11,361.03
2	Plastics	2,403.61	2,508.93	2,619.03	2,734.15	2,854.52	2,980.38
3	Glass	1,270.41	1,329.77	1,392.03	1,457.33	1,525.83	1,597.69
4	Ferrous Metals	543.88	568.82	594.94	622.32	651.01	681.08
5	Aluminium	192.80	201.49	210.58	220.10	230.06	240.50
Total		13,580.04	14,178.71	14,804.76	15,459.52	16,144.34	16,860.68

Note: 1) Annual waste growth rate for household used = 2%, business entities = 4%
2) Population growth rate = 1.9% 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 Waste Minimisation and Recycling Targets

As shown earlier, the recycling rate in MDKS can be calculated as:

$$\text{Recycling rate (\%)} = \frac{120 \text{ t/year}}{120 \text{ t/year} + (54.14 \text{ t/day}) \times 365} \times 100\%$$

$$= 0.6\%$$

Note: It should be noted that the recycling rate calculated are showing only parts of the recycling activities in MDKS.

This recycling rate calculated is low because many recyclables collected, especially by the private collectors and recycled, are not known by MDKS.

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

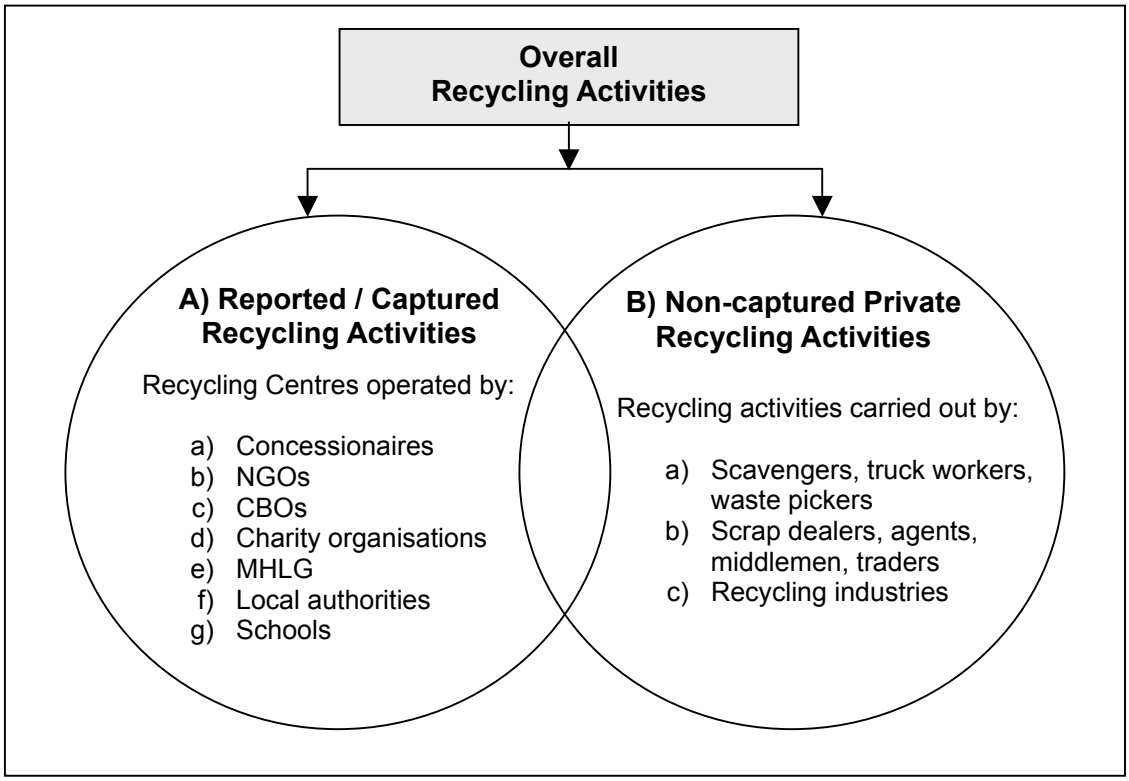

Figure 3.1 The Overall Recycling Activities

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

In this LAP, the target Recycling Rates set for MDKS from year 2006 to 2010 are shown in Table 3.5 below:

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

2005	Target Recycling Rate (%)				
	2006	2007	2008	2009	2010
0.6%	5.0%	7.0%	9.0%	11.0%	13.0%

3.3 Summary of Key Figures on SWM and Recycling in MDKS

In summary, the key figures obtained on SWM and recycling in MDKS are summarised in Table 3.7:

Table 3.7 Summary of Key Figures for MDKS

No	Parameters	Figures
1	Total waste generated (tons/day): Per capita waste generation rate (kg/cap/day):	77.8 0.86
2	Total waste retained at source (tons/day): Per capita waste retained rate (kg/cap/day):	15.4 0.17
3	Total waste discarded (tons/day): Per capita waste discarded rate (kg/cap/day):	62.4 0.69
4	Waste Compositions (%): a) Food wastes b) Papers c) Plastics d) Glass e) Ferrous Metals f) Aluminium g) Others	 38.4% 31.3% 8.1% 3.8% 1.7% 0.6% 16.1%
5	Generation of major recyclable materials (tons/year) a) Papers b) Metals c) Aluminium d) Plastics e) Glass	 3,895.5 360.8 93.1 1,940.3 864.9
6	Current Recycling Rate <u>Targets:</u> a) 2006 b) 2007 c) 2008 d) 2009 e) 2010	0.6% 5.0% 7.0% 9.0% 11.0% 13.0%
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, MDKS has identified three (3) main approaches on the actions to be taken as shown below:

Approach 1:	Establish Recycling Network Unit (WMU) in MDKS
Approach 2:	Register Existing Recycling Players
Approach 3:	Increase Awareness and Recycling Practices

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

4.2 Establishment of Waste Minimisation Unit (WMU)

The first action to be carried out by MDKS is to establish a special Waste Minimisation Unit (WMU) under the Urban Services Department (Jabatan Perkhidmatan dan Perbandaran) of MDKS. The WMU is targeted to be established in year 2006 in consultation with various stakeholders in MDKS, mainly to oversee all matters related to waste minimisation and recycling within the areas of MDKS. Some detailed descriptions of the set up of WMU are summarised as follows:

4.2.1 Physical Set-up

The WMU will be attached to a "Recycling Centre" constructed within MDKS building, ideally at the ground floor of the main building so that it is easy accessible to the general public.

The Recycling Centre will be equipped with necessary accessories for operation of WMU including computers and printers etc. In addition, some simple display of posters and exhibitions of recyclable products will be arranged in the Recycling Centre for education purposes. The centre will also serve as a drop off point for recyclable materials that are brought in by the general public.

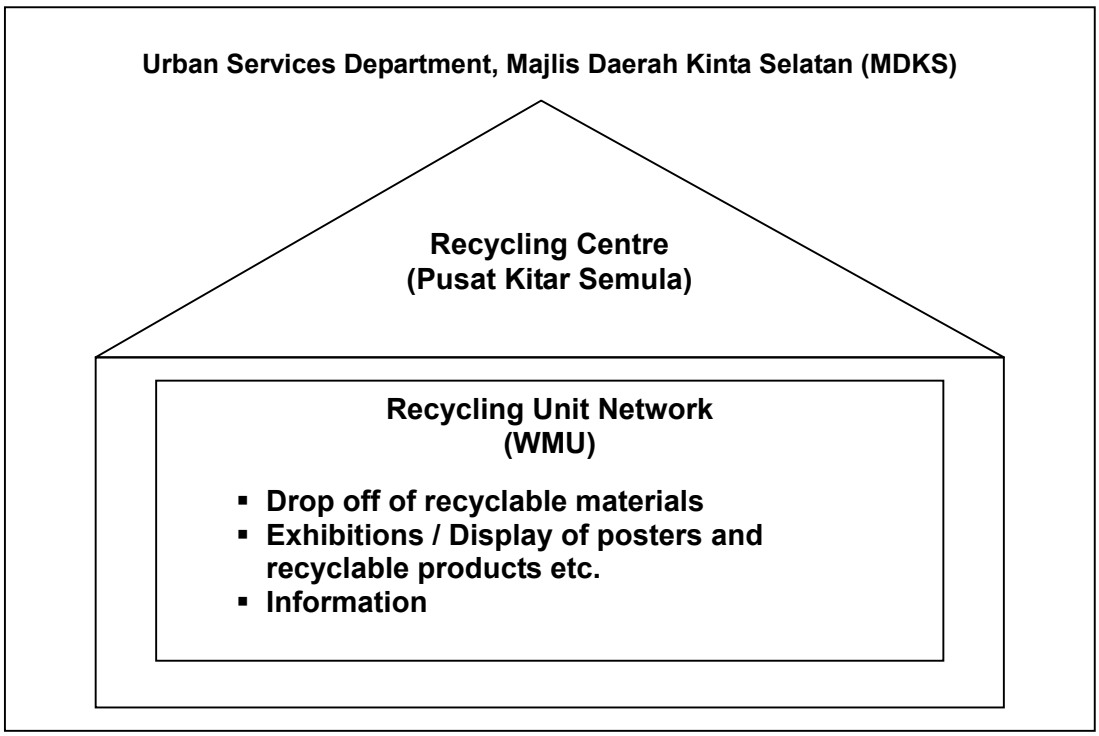

Figure 4.1 Concept of Waste Minimisation Unit (WMU) in MDKS

For publicity purpose, the Recycling Centre will be launched on a special occasion day, such as "Hari Bersama Pelanggan" of MDKS so that the Recycling Centre and WMU are known to the public of MDKS. The launching of the WMU will also be announced through local newspapers and media.

4.2.2 Mobilization of Manpower

At initial stage of set-up in 2006, MDKS will mobilise internally the manpower to allocate two (2) officers to be fully responsible for the operation of the WMU. From years 2007 to 2010, MDKS will increase the manpower stage by stage and targeting to have 10 officers working on full time basis in year 2010. It is important that the officers of WMU should be focused only on the matters related to waste minimisation and recycling; no other overlapping of tasks should be given so that the WMU officers can concentrate and focus on their responsibilities.

4.2.3 Main Responsibilities

The officers of WMU will take full responsibilities of any matters related to waste minimisation and recycling in MDKS. Some expected main tasks of the officers in WMU are summarised as follows:

- Coordinate the networks between MDKS and other stakeholders of recycling and waste minimisation including the industries and recyclers.
- Coordinate internally within MDKS (such as with the enforcement teams and top management) on various activities of waste minimisation and recycling.
- Plan, organise and implement recycling programmes and other waste minimisation activities
- Design forms, collect and compile information or database on waste minimisation and recycling that are submitted by various stakeholders to MDKS.

- Periodically analyse, compile and report the information or data collected for submission to relevant authorities.
- Design and prepare a booklet or directory on all available information of "solid waste management" and "recycling" in MDKS.
- Carry out public relation works to ensure close relationship between MDKS and the public including the industries and other recycling players.

4.3 Registration of Existing Recycling Players

Upon establishment of the WMU, various strategies will be carried out to register the existing recycling players (Samples of registration forms are attached in Appendices A & B). Registration of existing recycling players is an important task to be carried out so that MDKS can obtain sufficient information from the recycling players to ensure better understanding on the activities of these players. Some strategies or actions to be taken by MDKS are summarised as follows:

4.3.1 Publicity / Call for Registration

MDKS will publicise in their website to call the recycling players within MDKS areas to register under the WMU. This registration approach will be on a voluntary basis and therefore it is important to ensure clear understanding of the registration purpose by the players, particularly on the benefits of creating a network among the recycling players.

4.3.2 Pro-active Registration

There are many cases of "cross boundary" recycling players in MDKS. Therefore, in addition to the voluntary registration of the recycling players, pro-active approach of registration will also be carried out in parallel with the voluntary registration. WMU will take initiative to coordinate with the enforcement unit of MDKS to register any recycling players within MDKS areas along with the routine working schedules of the enforcement teams. The enforcement team will be given the task to register the players by using registration form prepared by the WMU. This pro-active registration of players is expected to be more effective because the recycling players should be more cooperative to the enforcement team who are playing the role of "Council Police" in MDKS.

The pro-active approach of registration will be aimed mainly to identify the players and collect the general contact information. Detailed surveys on these players such as the recyclable prices, quantity and types of recyclables collected as well as other information will be subject to further follow-up by the WMU.

4.3.3 Certification of Recycling Players

Upon completion of the registration, certificate of registration authorised by MDKS will be given to the registered players. The certificate brings no legal obligation to these players; however it serves as identification or recognition of their recycling activities in MDKS areas.

4.3.4 Invitation to Participate in MDKS's Programmes

Recycling players within MDKS areas will be identified and invited to participate at various programmes organised by MDKS, particularly the programmes or campaigns related to waste minimisation and recycling. The importance of the roles of the recycling players in such programmes will be emphasised so that the players appreciate

the recognition by MDKS and willing to participate in the programmes.

Some possible roles of the players in MDKS's programmes are:

- Providing awareness talks and demonstrate hand-on experience of recycling to the public or school students
- Exhibiting education materials on recycling and waste minimisation
- Sponsoring / Co-organising recycling campaigns

In addition, it is also important to ensure that the players clearly understand the benefits of participating in the programmes, particularly the benefits of creating a network or partnership between MDKS, the recycling players and other stakeholders.

4.3.5 Awarding the Active Players

MDKS will take the initiative to award the recycling players that register and participate actively in the programmes organised by MDKS. The awards show MDKS's recognition and appreciations to these players on their contributions in MDKS and attract more involvements of other players in the recycling network of MDKS.

4.4 Increase Awareness and Recycling Practices

MDKS recognises that increasing the public awareness and recycling practices are crucial in order to achieve the recycling target of the LAP. Many actions are planned to be taken from 2006 to 2010 by using the economic or legal instruments. Some main actions to be taken are summarised as follows.

4.4.1 Cooperation with Stakeholders

a) Non-governmental Organisations (NGOs)

Experience in MDKS shows that collection of recyclable materials are more effective with the involvements of NGOs or charity organisations as compared to campaigns organised by MDKS itself. In order to carry out effective recycling campaigns such as source separation, MDKS will coordinate and work together with active NGOs, such as Xim Phou Moon Charity Organisation and Leksunder Recycle Point to carry out various recycling programmes in MDKS areas.

MDKS will communicate closely with these NGOs and provide necessary supports to ensure the successful of any recycling campaigns. MDKS will cooperate with the NGOs to design and plan for appropriate programmes depending on the target groups of the campaigns whether it is on schools, communities, industries or others. "Guideline for Source Separation" and "3Rs Action Guide" developed by JICA will be referred.

Some activities that will be carried out are such as:

- Distributions of pamphlets and flyers on recycling activities
- Road-show on recycling and waste minimisation
- Awareness talk to schools students, teachers and the public
- Demonstration of recycling and waste minimisation practices

Other than regular recycling campaigns, specific programmes such as exchange of household items will be carried out under cooperation with the NGOs.

b) Recycling Middlemen and Industries

MDKS recognises the important role of recycling middlemen and industries in the entire recycling system in MDKS. In order to increase the recycling practices, MDKS will communicate closely with the middlemen and industry (only plastic industry in MDKS) to monitor the activities and performance of recycling in MDKS, including monitoring of the recyclable prices etc. In the case when some problems occurred in the recycling system, MDKS will take initiatives to communicate with the middlemen and industries to seek for possible solutions.

c) Schools

Schools in MDKS are important targets for creation of awareness in recycling and waste minimisation. MDKS will introduce Programme "Sekolah Angkat (Adopting Schools)" in selected primary and secondary schools in MDKS. The adoption of schools will be carried out initially by MDKS in year 2006 to assist, advice and support the schools in any matters related to recycling and waste minimisation. From 2007 to 2010, the idea of adopting schools will be extended to other stakeholders or recycling players such as the industries and NGOs etc.

In addition, MDKS will set up mini drop-off centres in schools that are actively practicing in recycling and waste minimisation. The activities on creation of awareness for promoting recycling in schools will be implemented by MDKS with the cooperation of other stakeholders such as NGOs as described above. This includes hands-on training on source separation, recyclable handlings and some other waste minimisation approaches. The "Guideline for 3Rs in Schools" developed by JICA will be used as main reference source for implementation of programmes in schools.

d) Other Stakeholders

MDKS will take initiative to identify, communicate and liaise with other recycling stakeholders in MDKS to seek for possible cooperation on matters related to recycling and waste minimisation.

4.4.2 Waiver of Annual License Renewal Fees

On the long term basis, MDKS will review and evaluate the possibility of waiving the annual license renewal fees for recycling players or companies who are actively involved in, and contribute in recycling programmes of MDKS. By year 2008, MDKS will materialise this incentive to waive the annual licence renewal fees of such companies in order to further promote active participation of such companies in recycling and waste minimisation activities in MDKS.

4.4.3 Amendment of By-laws

MDKS will start reviewing and evaluating the existing by-law related to solid waste management in MDKS and make necessary suggestions to update and amend the clauses in the by-law so that the recycling and waste minimisation activities in MDKS are further supported by legal obligations. This includes mandatory registration of recycling players by year 2008.

4.4.4 Provision of Other Incentives

Other than mini drop-off centres in schools, MDKS will provide some other incentives

from time to time in order to increase participation in recycling. Among the possible incentive that will be provided by MDKS is to provide free parking coupons as buy back system for the recyclable materials.

In summary, Figure 4.2 illustrates the overall frameworks for the actions to be taken in this Action Plan for MDKS.

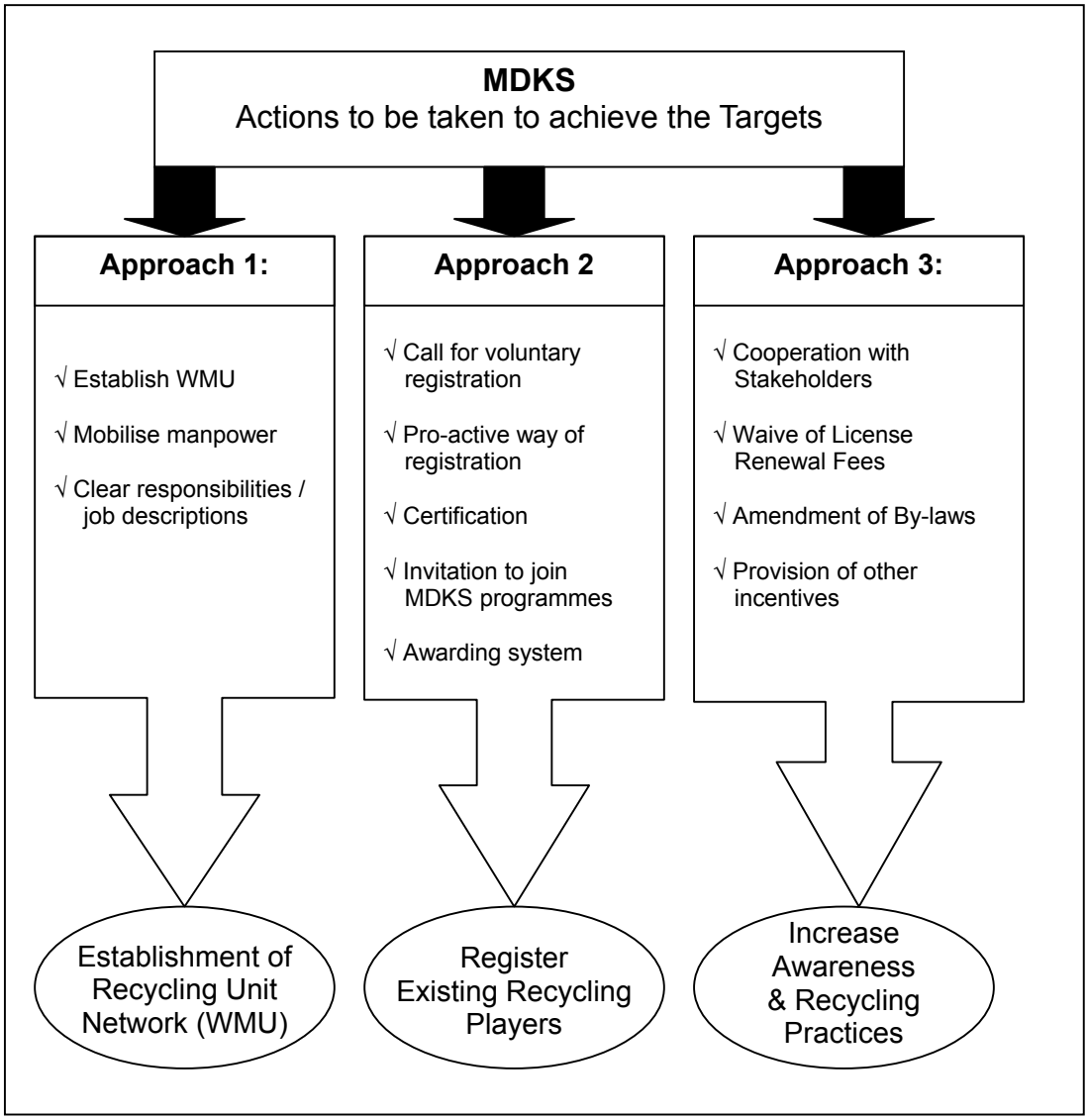

Figure 4.2 Overall Frameworks for the Actions to be taken for MDKS

4.5 Cost Implication

The cost implication of the Action Plan is depending on the implementation approach. No significant capital costs are involved in the implementation of Action Plan except some allocation for setting up the WMU, printing and distribution of guidelines or booklets etc. 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 4.1 below:

Table 4.1 Cost Items for the Implementation of Local Action Plan

No	Approaches	Cost Items
1	Establishment of Waste Minimisation Unit (WMU)	▪ Establish new unit with new premise, facility, and manpower. ▪ Set up exhibition, information centre and drop off centre. ▪ Publicity on the WMU established Optional: ▪ 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 distributions. ▪ Publicise information on the website to call for registration. ▪ Mobilise manpower to pro-actively register the players Optional: ▪ Publicise on existing MDKS website. ▪ Pro-active registration using existing MDKS enforcement team
3	Increase Awareness and Recycling Practices	▪ Implement awareness campaigns etc (such as source separation campaigns, road-shows, demonstration and awareness talk etc.) ▪ Establish more recycling centres ▪ Providing mini drop off centres in schools ▪ Provision of incentives (parking coupons etc) ▪ Other expenses (such as printing and distribution of pamphlets, flyers and booklets etc. Optional: ▪ 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.

In the case where new budget is necessary for the implementation of the LAP-WM, the amount of allocation required is very much dependant on the scale of implementation. Rough lump sump estimation on the budget required for each item of the implementation of Action Plan on 5 years basis is summarised as follows:

Table 4.2 Rough Budget Estimation for Implementation of Action Plan

No	Descriptions	Budget (RM)
1	Establishment of "Waste Minimisation Unit" – 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 mini drop-off centres in schools and additional recycling centres as necessary – estimation of 20 mini drop- off centres and 5 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 (RM300,000/year x 5 years)	1,500,000
5	Implement awareness campaigns etc (assuming 2 campaigns per year at RM150,000/each x 5 years)	1,500,000
6	Other expenses (such as printing and distribution of flyers, pamphlets, booklets to schools, manufacturers, business entities etc.) – Assuming RM250,000/year x 5 years	1,250,000
	TOTAL	4,600,000
	AVERAGE PER YEAR	920,000

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

In summary, the overall frameworks for the actions to be taken in the LAP-WM of MDKS can be summarised as shown in Figure 4.3.

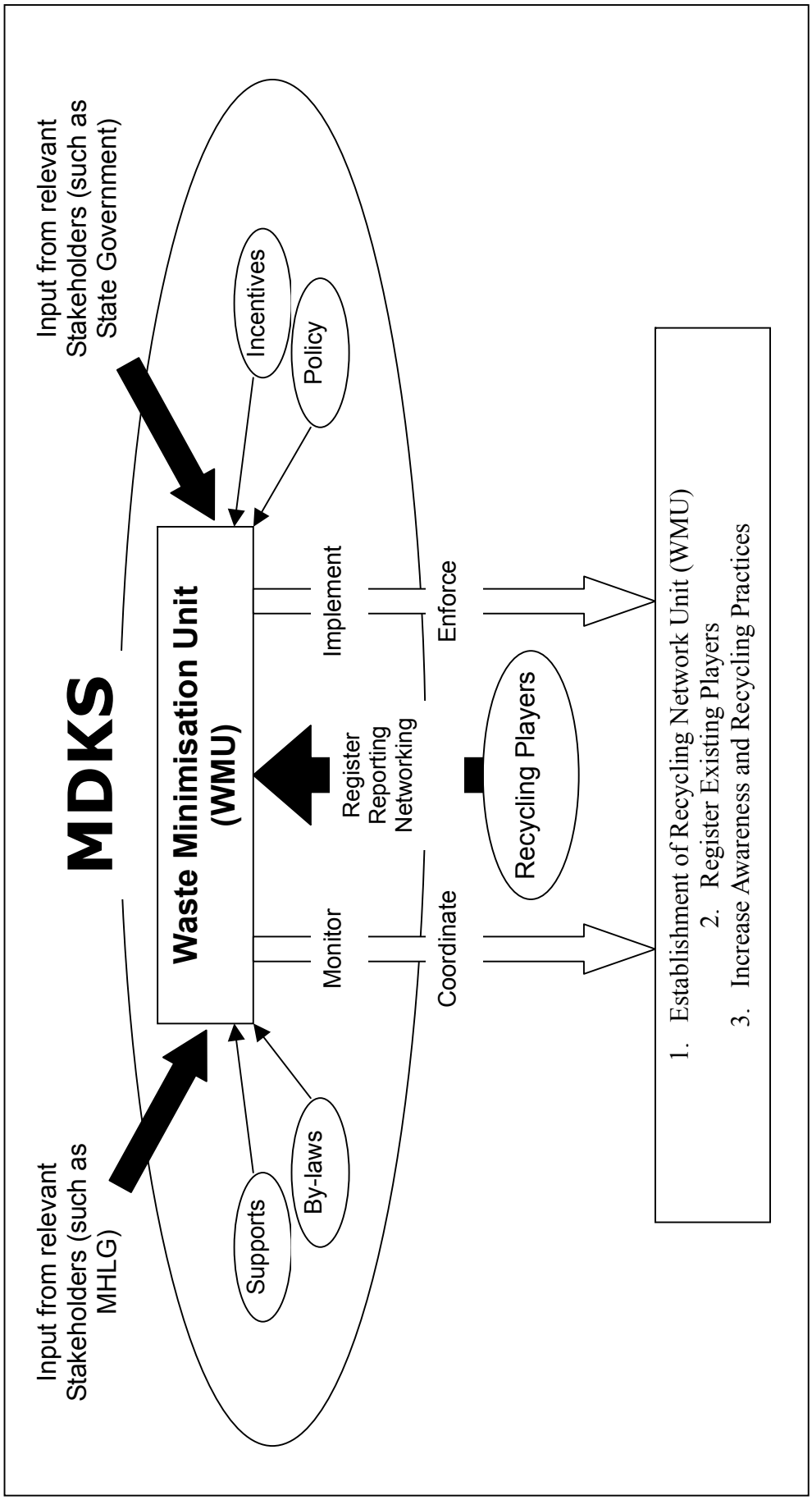

Figure 4.3 Overall Frameworks for the Actions to be taken in the Local Action Plan

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 MDKS as targeted in this Action Plan, some indicators and measures shall be established. Some performance indicators and measures shall be set up, as shown in the examples 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 MDKS 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	Half yearly
4	Questionnaires to the selected numbers of waste generation sources (households, BEs and industries etc.) to find out the practice of waste retained, waste handling and subsequently to determine the issues, problems faced and comments from the waste generators to improve the entire recycling system	Yearly
5	Annual reports on the development and implementation of the overall waste minimisation and recycling programmed	Yearly
6	Annual workshop with the registered recycling players	Yearly

All the reports in relation to waste minimisation and recycling in MDKS 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:

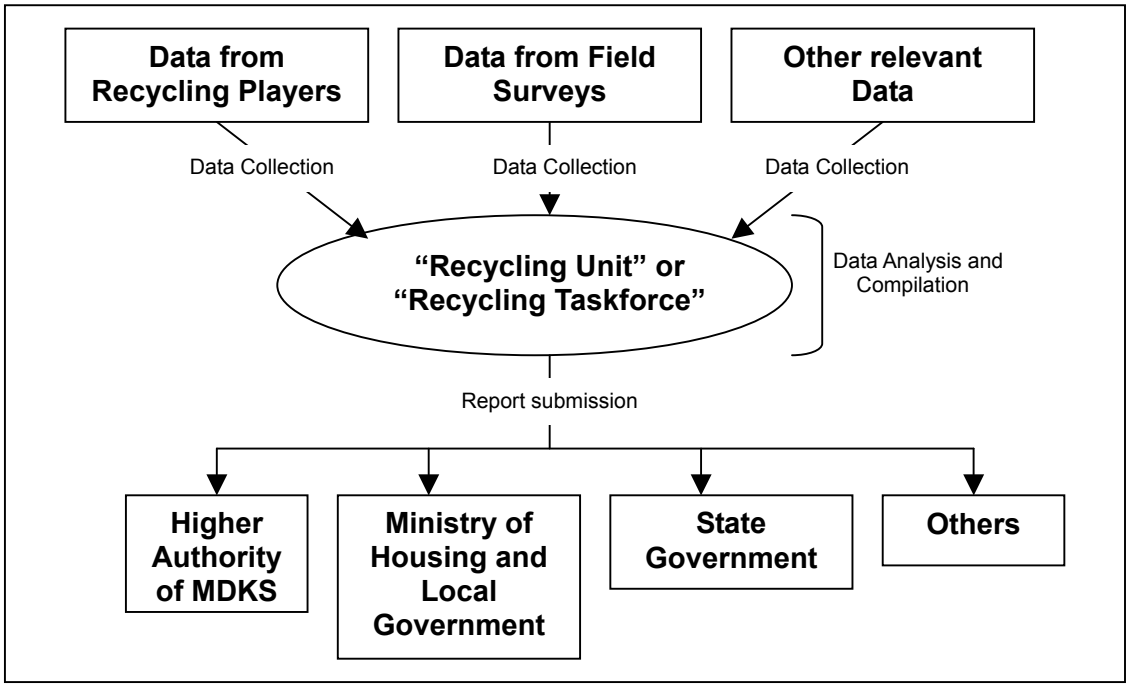

Figure 5.1 Suggested Framework for Entire Reporting System

5.3 Implementation Schedule of Action Plan

The entire Action Plan is made for the duration of 5 years from 2006 to 2010. The proposed schedule of the implementation of this Action Plan is:

Table 5.3 Proposed Schedule for Implementation of Action Plan

No	Action Plan	2006	2007	2008	2009	2010
1	Establish a Waste Minimisation Unit (WMU) within MDKS					
2	Set up facilities for recycling Information and drop off centre					
3	Establish formal registration system for recycling players (started with voluntary registration)					
4	Pro-active registration of recycling players					
5	Certification / awards to recycling players					
6	Mandatory registration of recycling players					
7	Implement awareness campaigns in MDKS areas					
8	Set up mini drop off centres in schools and additional recycling centres					
9	Waive of license renewal fees					
10	Provision of incentives (such as parking coupons etc.)					
11	Review of existing by-laws					
12	Amendment and enforcement of by-laws					
13	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 MDKS	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 MDKS	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:

	Types	**Amount / month**	**Unit**	**Source (from)**	**Buyers (To)**
Within MDKS Areas	☐ Aluminium				
	☐ Cardboard				
	☐ Plastics				
	☐ Papers				
	☐ Glass				
	☐ Scrap Metal (Iron)				
	☐ E-wastes				
	☐ Batteries				
	☐ Others _____				
	☐ Others _____				
	☐ Others _____				
	☐ Others _____				

	Types	**Amount / month**	**Unit**	**Source (from)**	**Buyers (To)**
Outside MDKS Areas	☐ Aluminium				
	☐ Cardboard				
	☐ Plastics				
	☐ Papers				
	☐ Glass				
	☐ Scrap Metal (Iron)				
	☐ E-wastes				
	☐ Batteries				
	☐ Others _____				
	☐ Others _____				
	☐ Others _____				
	☐ Others _____				

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Local Action Plan (2006 - 2010)

Waste Minimisation

for

Majlis Daerah Kinta Selatan (MDKS)

"Jom Pakat Kitar Semula"

By:
Majlis Daerah Kinta Selatan (MDKS)

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

Japan International Cooperation Agency (JICA)

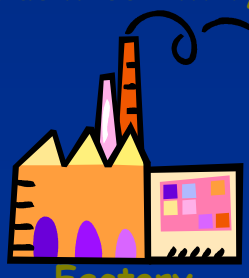
What are your responsibilities ?

Individual

Office

Hotel

Business entity



Factory

School

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

Reduce

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

Reuse

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

Recycle

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

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

Please register with MDKS !!

Introduction

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

Our Objective

"To achieve Material Cycle Society in MDKS"

What is Recycling Rate ?

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

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

What are our targets ?

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

- Plastics
- Aluminium Cans
- Ferrous Metals

- Glass
- Papers

All about Wastes in MDKS

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

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

Projection ...

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

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

Our Actions to Achieve the Targets

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

"Kitar Semula Kreatifkan Minda, Bersihkan Alam Sekitar"

For information, please contact:

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

PART 6

LOCAL ACTION PLAN IN MP SUBANG JAYA

Local Action Plan

3Rs Start Today

MPSJ

JICA

Table of Contents

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 of human lifestyles. In Malaysia, about 8 million tons of solid waste is generated every year (2003) 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 Local Action Plan serves as a guideline for 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 Perbandaran Subang Jaya

April 2006

Subang Jaya 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: 1) Gross Domestic Product • Agriculture, livestock, forestry and fishing • Mining and quarrying • Manufacturing • Construction • Services 2) Labour Force • Labour Force • Labour Force Participation Rate • Unemployment 3) Employment by Sectors • 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	Local Action Plan
LAP-WM	Local Action Plan on Waste Minimisation
MHLG	Ministry of Housing and Local Government
MPSJ	Majlis Perbandaran Subang Jaya (S. Jaya Municipal Council)
MSW	Municipal Solid Wastes
NGO	Non-governmental Organisation
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 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 Background and Objectives

With the stable growth of the economy and active commercial and industrial activities, management of solid waste has become one of the central concerns in Malaysia. Due to limited availability of the land, minimising the amount of solid waste disposal at landfills is an acute issue to be addressed through partnership of all relevant stakeholders including federal/ local government, 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 since June 2004. The Study includes identification on the status and issues of waste minimisation in Malaysia. To materialise 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 minimising the amount of municipal solid waste to be disposed at the 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 MANAGEMENT AND RECYCLING IN MPSJ

2.1 Waste Management in General

Municipal Solid Waste (MSW) is essentially household waste and also includes wastes generated 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 in 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 reportedly 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

Majlis Perbandaran Subang Jaya (MPSJ) or Subang Jaya Municipal Council was instituted under the Local Government Act 1976 (Act 171). Before it was declared as council status in 1994, it was known as Majlis Daerah Petaling (or Petaling District Council).

MPSJ was gazetted a Municipality on 2 January 1997 with a total land area of 161.8 km2 under its administration. The MPSJ is divided into three main areas namely:

a) Damansara Subang Area (also known as Subang Jaya Area), which constitutes Subang Jaya and Bukit Lanchang,
b) Puchong Area which constitutes the whole areas of Puchong
c) Seri Kembangan Area which constitutes Serdang, Seri Kembangan, Universiti Putra Malaysia and part of the Air Hitam Reserve Forest.

SWM in all areas of MPSJ is under the management of Alam Flora Sdn Bhd (AFSB) as the solid waste concessionaire company responsible for SWM in central zone of Peninsular Malaysia. Within MPSJ, coordination regarding matters on SWM with AFSB is under the administration of the Department of Health and Urban Services.

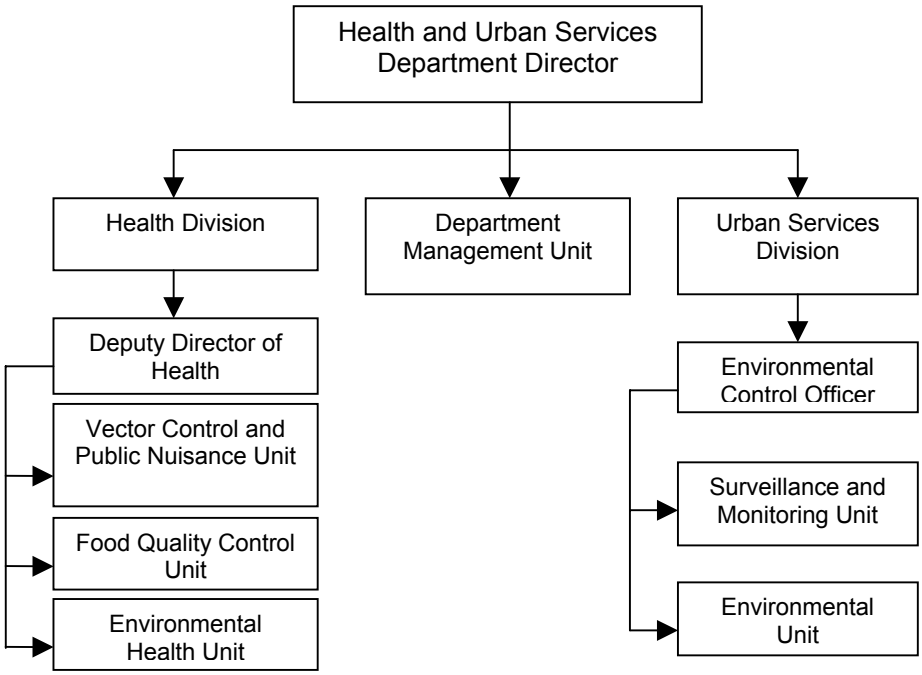
The main objective of the Department of Health and Urban Services is to raise urban environmental health standards in the MPSJ administered areas through planning, implementation and monitoring activities related to health, cleanliness and efficient or effective environmental control, which is congruent with current related legislation.

Among the overall strategies outlined to achieve these overall objectives that are related to waste minimisation and recycling are:

a) To ensure a comfortable and clean environment through efficient urban cleaning services

b) To set up pollution control and conservation of the environment to enhance the quality of the environment.

In general, the organisation structure of the Department of Health and Urban Services of MPSJ is shown in Figure 2.1 as follows:



Source: MPSJ, Annual Report (2004)

Figure 2.1 Organisation Structure of Department of Health and Urban Services

The functions of the two units under Urban Services Division that are directly related to SWM and recycling are:

a) Surveillance and Monitoring Unit

- ✓ To conduct quality control monitoring on privatised solid waste and cleansing services
- ✓ To manage complaints received and provide feedback.
- ✓ To manage the takeover of areas from developers for the purpose of cleansing maintenance
- ✓ To manage illegal dumpsites
- ✓ To manage construction waste of privatised buildings
- ✓ Enforce the relevant Acts and *"Undang-undang Kecil" (by-law)* which are related to SWM
- ✓ To organise *"Gotong-Royong"*

b) Environmental Control Unit

- ✓ Planning, outlining policies and to implement the Recycling Programmes
- ✓ To carry out patrols and visits to premises of factories/foundries to control pollution and to act on pollution complaints
- ✓ To inspect development areas

2.1.2 The SWM Service Areas

MPSJ covers a total area of 161,180 hectares. Of the total MPSJ administered area, 2,305.57 hectares are housing (14.24%), where 689.58 hectares (4.26%) of it are village type housing *(Kampung)*. Landuse for industry comprises of 938.21 hectares, or approximately 6% of the total landuse. On the other hand, landuse for commercial sector is approximately 245.97 hectares or 1.52% of the total landuse areas.

a) Population

The main townships in MPSJ are Subang Jaya, Puchong and Seri Kembangan, which contains approximately 60% of the total population. The areas under the MPSJ can be categorised as predominantly urban with scattered rural areas.

The Census 2000 notes that the total population for the area is 437,121. Table 2.1 provides a detailed breakdown of the population in the MPSJ. However, according to Subang Jaya Local Structure Plan (2000-2010), the population recorded for year 2000 is 440,438, and it is projected to grow on average at 2.4% from 2000 to 2005 annually, 2.1% from 2006 to 2010, and 1.9% from 2011 to 2015. Table 2.2 provides the projected population for MPSJ at 5-year intervals.

Table 2.1 Population of MPSJ by Different Area

Areas	Population
Subang Jaya	146,561
Kampung Baru Puchong	44,152
Kuchai	6,617
Puchong Bt. Duabelas	652
Serdang Lama	233
Seri Kembangan	66,481
Others	172, 425
Total	437,121

Source: Census 2000, DOS 2001.

Table 2.2 Projected Population of MPSJ at 5 Year Intervals

Year	2000	2005	2010	2015
Projected Population	440,438	496,769	551,484	605,790

Source: Subang Jaya Local Structure Plan, 2000 – 2010

b) Housing

The housing status for MPSJ is provided in Table 2.3. There are a total of 92,036 housing units in MPSJ. Of these housing units, 57% are terrace houses, and 34% are flats. A small percentage of the housing units are squatter houses (3%), semi-detached houses (3%) and 2% are bungalows.

There is almost full occupancy in all the three areas in MPSJ with Seri Kembangan recording 94% occupancy, Puchong 91% and Subang Jaya 94%. Therefore MPSJ has almost full occupancy of its housing units.

Table 2.3 Housing Units in MPSJ Area, 1998

Sub-areas	Squatter	Terrace	Flats	Semi-D	Bungalows	Total	% Occupied
Seri Kembangan	1,059	12,647	5,422	488	394	20,010	94.0%
Puchong	1,084	17,814	12,552	539	579	32,568	91.3%
Subang Jaya	916	22,459	13,540	1,402	1,141	39,458	94.2%
Total	3,059	52,920	31,514	2,429	2,114	92,036	93.5%

Source: Subang Jaya Local Structure Plan, 2000 – 2010

c) Commercial Units

As indicated in Table 2.4, the commercial sector in MPSJ is focused towards the retail and service enterprises. Almost 99% of the commercial enterprises are involved in these two sub-sectors while the remaining 1% is involved in wholesaling.

Table 2.4 Total Number of Business Entities and Industries in MPSJ (1998)

Sub-areas	Retail	Service	Wholesale	Industries	Total
Seri Kembangan	1,117	736	0	93	1,946
Puchong	1,091	812	0	142	2,046
Subang Jaya	2,056	2,555	93	145	4,849
Total	4,264	4,103	93	380	8,840

Source: Local Structure Plan, 2000 – 2010

d) Population Served

The total population covered with MSW disposal service in the MPSJ areas is about 72% for the year 2000. Subang Jaya has 100% coverage, while Seri Kembangan and Puchong have services for only 50% of the population. As also shown in Table 2.5, it is projected that the total population covered with MSW disposal service will be increased to more than 85% for all areas.

Table 2.5 Population Served

Year	2000	2005	2010	2015
Seri Kembangan	50%	65%	79%	94%
Puchong	50%	62%	74%	85%
Subang Jaya	100%	97%	94%	91%
Average Service Coverage	72%	78%	84%	90%

Source: Local Plan, 2000 – 2010

2.1.3 Waste Generation and Compositions

a) Waste Generation

The figures obtained from the JICA study on the waste generation, retained[1] and disposal are shown in Table 2.6 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 2.6 Waste Generation, Retained and Disposal Rates

No	Sources	Per Capita Rate (kg/cap/day)		
		Waste as Disposed (kg/cap/day)	Waste Recovered at Source (kg/cap/day)	Total Waste Generation rate (kg/cap/day)
1	Household	0.536	0.092	0.628
2	Business entities	0.179	0.090	0.269
Total		0.714	0.183	0.897

Source: Estimations from JICA Study 2005

Based on the population of 496,769 in MPSJ (2005), the estimated amounts of actual wastes generated, retained and disposed in MPSJ are calculated as follows:

a) Waste generation = 496,769 x 0.897 kg/cap/day
= 445.6 tons/day

b) Waste retained = 496,769 x 0.183 kg/cap/day
= 90.9 tons/day

c) Waste disposed = 496,769 x 0.714 kg/cap/day
= 354.7 tons/day

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

$$\frac{90.9 \text{ tons/day}}{445.6 \text{ tons/day}} \times 100\% = 20.4\%$$

b) Waste Composition

Various findings have been reported on waste composition in Malaysia. Nasir (2001) indicates that the waste composition for high-income area was around 48.32 percent of organic wastes, followed by paper (23.56 percent), plastic and rubber (9.37 percent), metal (5.93 percent), wood (4.82 percent), glass and ceramics (4.03 percent) and textile (3.97 percent).

However, based on the results of the study done by the JICA study on waste composition at source, the average waste composition was obtained as shown in Table 2.7 below:

Table 2.7 Waste Compositions in Different Income Level

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

No	Categories	High income	Medium income	Low income	Average
		Unit in %			
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 discarded 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, or illegally dumped. 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 2.8 as follows:

Table 2.8 Waste Compositions for Households & Business Entities

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

Source: JICA Study 2005

2.1.4 Waste Storage and Collection

a) Waste Storage

Wastes generated are temporary stored at their sources for later collection and disposal. Due to the limitation of storage space in urban areas and the biodegradability of the wastes, these wastes cannot be tolerated for more than a couple of days and must be removed.

In MPSJ areas, the storage bins for solid waste at source is normally prepared by the householders or owners except some communal bins which are provided by the waste concessionaire company. A variety of storage containers are used including metal bins, baskets, tins, wooden boxes, carton boxes, drums, half drums, stationary concrete bins and concrete enclosures depending on the types of wastes. In many premises, even no containers are provided and waste is packed in plastic bags and hung outside the house on fences, trees or just left at the roadside.

b) Waste Collection

The collection of municipal waste generated within MPSJ areas is carried out by Alam Flora Sdn Bhd as the SWM concessionaire company for central region of Peninsular Malaysia. The collection works were done either by Alam Flora or sub-contracted to

other waste collection contractors. On the other hand, some wastes generated from commercial and industrial premises are collected by other private contractors.

Collection activity in MPSJ areas is becoming increasingly complex because of the varying generation patterns, increasing quantity of wastes and high cost of fuel and labour. Wastes are collected either by using manually, semi-mechanically or fully mechanical systems. Manual collection is a common method used where the bins are collected manually by collection crews from door to door or specific places. The bins are usually small in size and it is commonly practised for open trucks and also where the storage bins are not standardised. Semi-mechanical collection systems use hydraulic lifter attached to the collection vehicles. In many cases, wastes are collected manually into a semi-mechanically collection truck with hydraulic lifter because of the difficulties of using the system or un-standardised bins. A fully mechanical hauled-container system needs a "roll-on-roll-off" vehicle, which can transport a 15m3 container. Both fully and semi mechanically systems require the public to place the wastes into the bins before they can be collected.

In low-rise residential areas, the most widely practised methods of collection are door-to-door front kerbside collection and door-to-door back lane collection. In this case, the wastes are collected and loaded directly into the collection vehicles. In some cases where the houses or areas are not fully accessible to collection vehicles, central collection points are established and communal bins are placed. In some cases, the house owners are requested to bring out their wastes and throw them into the communal bins, but in other cases, workers collect the wastes from each household and transport them to a central collection point by using handcarts, in which case of double handling of waste occurs.

In commercial areas, both the door-to-door collection and communal bin systems are used. The most widely used bin is the communal containers, but large metal containers handled by tilt frame vehicles are also used in many places. The use of communal bin systems is affected by the availability of suitable place to install the bins.

Some private and concession companies had introduced paid collection services for construction, garden and bulky wastes. The services can be classified into two categories, namely scheduled services and on-call services. The use of private contractors in waste collection is gradually increasing.

2.1.5 Waste Treatment and Disposal

The wastes collected within Subang Jaya areas are sent to Air Hitam Landfill, which is located in Puchong area. The landfill is operated by a private company (Worldwide Landfills Sdn Bhd).

2.2 Recycling of Municipal Solid Waste in MPSJ

2.2.1 Background of Recycling in MPSJ

Recycling began in MPSJ in 1997 (MPSJ Community Recycling Centre under UN-Habitat's programme). MPSJ realised that effective waste management should include waste minimisation. The first initiative that the MPSJ took was to increase the environmental awareness of the residents through a recycling programme. Stakeholders in the programme were the community including the residents association or neighbourhood watch groups, the municipality, various government departments, schools and the private sector such as waste collection companies and non-governmental organisations (NGO).

Residents were enlightened on the benefits of recycling such as the income derived from recycling, reducing expenditure on waste management as well as conserving the natural environment for the country etc. Stakeholders were called upon to provide assistance and support to the programme.

The main objectives of the community recycling programme are:

- To encourage the participation of three sectors of society in local administration in order to enhance good governance agenda
- To enhance the understanding and increase awareness on the importance of sustainable and balanced development
- To enhance the understanding on the need to reduce the quantity of waste and optimise its reusable quality

The unit that is responsible for waste minimisation and recycling programme is the Environmental Unit. The two main responsibilities of this unit are:

- To develop and implement Recycling Programmes for MPSJ
- To operate Environmental Monitoring Programmes

2.2.2 Existing Recycling Programmes

The MPSJ recycling programme was officially launched on the 4th of April in 1998. There are several recycling programmes that are currently being carried out.

(a) Schools Recycling Programme

Recycling programmes in schools were carried out with the aim of creating environmental awareness among school children. Information on effects of waste disposal on the environment is disseminated to the students via training camps and workshops. Issues and problems are discussed and they have the opportunities to express themselves on what kind of environment they would like to live in and discuss ways on how to save the environment.

The "School Recycling Programme" and "School Recycling Competition" has been a success. The number of schools that are participating in this programme has risen from 10 in 1998 (when the programme was first launched) to 42 in 2004.

(b) Community/ Resident Committees Recycling Programmes

Another approach used is to construct a convenient building to house a collection centre for recyclable items. The cost of the building is funded by the MPSJ but is handed to the local resident association to manage and maintain. Whatever profits generated from the dealings are retained by the Residents Association.

(c) MPSJ Recycling Centres

MPSJ also realised that while promoting recycling programmes, there is a need to provide facilities to support the campaign. Other than providing the public with coloured bins to differentiate the waste materials, it is also necessary to provide collection centres at appropriate places where people can send their recyclable items in bulk.

The MPSJ first opened a recycling centre at its office premises every Sunday although the frequency has now been increased. This was done to encourage

residents to recycle their waste. Residents could bring their recyclable items in their own vehicles and drop them at the centre. There are also similar centres at Puchong Jaya, Taman Kinrara Section and the MPSJ Stadium.

Table 2.9 Recycling Centres in MPSJ

No	Location	Day	Time	Managed By
1	Carrefour, Subang Jaya	Wednesday – Sunday, weekly	10.00am to 6.00pm	Alam Flora
2	Giant, Subang Jaya	Tuesday – Sunday, weekly	12.00pm to 6.00pm	TREES
3	IOI Mall, Puchong	Monday–Saturday & Sunday	10.30am – 6.00pm 10.30am – 4.00pm	Genting Industrial Paper
4	MPSJ Building, Subang Jaya	Monday – Friday & Sunday	Office Hours 8.30am – 11.00am	MPSJ
5	SS17, Subang Jaya	Daily except Fridays	9.00am – 11.00pm	TrueMax Sdn. Bhd.
6	Sunway Pyramid	Daily except Wednesday & Thursday	10.00am to 5.00pm	Alam Flora
7	Taman Tasik Wawasan, Pusat Bandar Puchong	Everyday except Monday and Friday, weekly	10.00am to 12.00pm	JKP Zone 20
8	USJ 1, Subang Jaya	Tuesday & Saturday	9.00am-5.00pm	JKP Zon 5
9	USJ 9, Subang Jaya	Monday - Wednesday & Saturday	2.00pm – 4.00pm	JKP Zone 2
10	The Mines, Puchong	Monday – Saturday & Sunday	10.30am – 6.00pm 10.30am – 4.00pm	Genting Industrial Paper

Sources: MPSJ Annual Report, MPSJ website & MPSJ brochure

(d) MPSJ Recycling Vehicles

Recycling Lorries - The MPSJ also provides two types of mobile collection service. In June 2004, MPSJ received 2 recycling lorries from the Ministry of Housing and Local Government (MHLG). The table below provides the schedule of this service from January 2005.

Table 2.10 Collection Schedule of MPSJ Recycling Lorries

Day	Time	Location
First and Third Sunday of the Month	8.30am to 10.00am	Puchong Permata Flat
	10.00am to 11.30am	Puchong Permata 2 Flat
	11.30am to 1.00pm	Puchong Permata 3 Flat
Second and Fourth Sunday of the Month	8.30am to 10.00am	Sri Jati, Tasik Wawasan Flat
	10.00am to 11.30am	Sri Pinang, Tasik Wawasan Flat
	11.30am to 1.00pm	Tasik Wawasan Low cost houses

Source: MPSJ Annual Report 2004

Recycling Van - MPSJ also provides its very own "MPSJ Recycling Van" or "Van Kitar Semula MPSJ." It was launched officially on the 8th of February 2003. The objective of this service is to further encourage recycling activities

among the residents. The van will provide collection service according to a schedule from any Recycling centres or any residential area within MPSJ.

The guidelines for utilizing this service are as follows:

- ✓ Customers can make appointments via telephone or by visiting the Department of Health and Urban Services (DHUS /*Jabatan Kesihatan dan Perkhidmatan Bandar*) at the MPSJ office.
- ✓ Contact details - Address, telephone number and estimation of quantity of recycling materials to be collected should be provided if the resident telephones. Alternatively a form should be filled if the customer comes to the office (DHTS).
- ✓ Customers intending to use this service have to ensure that the amount to be collected must be reasonable (i.e. a minimum of 50 kg)
- ✓ If the recyclable quantities are small, customers are advised to send it to recycling centres
- ✓ Applications will be processed in two (2) working days from the date of application
- ✓ Customers will be informed of the collection date

The service is operational every working day, from Mondays to Fridays, between 8.30 am to 4.30 pm on public holidays; operations are subjected to booking and human resource availability. The following table provides the price of the recyclable items purchased by the MPSJ Recycling Van.

(e) Recycling Exhibitions

Recycling exhibitions were organised to promote the "Recycling Programme." A total of 15 recycling exhibitions were organised for the year 2004. The table below provides the list of exhibitions organised in the year 2004.

Table 2.11 Recycling Exhibitions in MPSJ in 2004

No	Programme/Activity	Date
1	Recycling Exhibition, Meet The Customers Day , Summit Shopping Centre	14 February 2004
2	Recycling Exhibition, Anti – Dengue Campaign, Meet the People & Officiating of Community Hall & IT Centre organised by JKP Zone 13 at MPSJ Community Hall, Bandar Baru Puchong	14 March 2004
3	Recycling Exhibition, Meet the Customers Day, IOI Mall, Puchong	10 April 2004
4	Recycling Exhibition & *"Gotong-Royong"* at USJ1, organised by JKP Zone 5	1 May 2004
5	Recycling Exhibition, *"Gotong-Royong"* at SS18, Subang Jaya	20 June 2004
6	Recycling Exhibition & Meet the Customers Day, South City Plaza	26 June 2004
7	Recycling Exhibition & *"Gotong-Royong"*, Taman Serdang Utama, Jalan 14/2 Serdang	4 July 2004
8	Recycling Exhibition & *"Gotong-Royong"* at PKNS Apartments Residents Association Community Hall , Jalan 7/1 Seri Kembangan	18 July 2004
9	Recycling Exhibition & *"Gotong-Royong"* at USJ11/3 organised by JKP Zone 2	8 August 2004

10	Recycling Exhibition on the occasion of Community Day at SMK Bandar Puchong Jaya (A)	14 August 2004
11	Recycling Exhibition & *"Gotong-Royong"* at Taman Mawar Community Hall filed (TK), Section 5, Puchong	22 August 2004
12	Recycling Exhibition at UPM	10 September 2004
13	Recycling Exhibition at SMK USJ 23	21 October 204
14	Recycling Exhibition on the occasion of the MPSJ Recycling Day and the officiating of the USJ1 Recycling Centre	5 December 2004
15	Recycling Exhibition & *"Gotong-Royong"* on the occasion of the Launch of "MPSJ Recycling Lorry Services" at Pusat Bandar Puchong	19 December 2004

Source: MPSJ Annual Report 2004

2.2.3 Types of Recycling Players

There are several different categories of recycling companies in MPSJ areas which are playing important role in recycling activities. These include the concessionaire company, recycling industries, as well as some recyclable traders or middlemen etc.

A list of companies involved in recycling in MPSJ is shown in Table 2.12 below. However, it should be noted that there are possibly many other private companies that are involved in the recycling business but not being known to, or registered under MPSJ.

Table 2.12 List of Private Companies Involved in Recycling

No	Company Name and Address	Tel & Fax No.	Recyclable Materials Targeted
1.	Alam Flora Sdn. Bhd. Level 4, Wisma HICOM, No.2, Jalan Usahawan U 1/8, Seksyen U1, 40150 S.Alam.	Tel : 03-20527922 / 03-20527851 / 03-78748433 Fax: 03-2028144	Old newspapers, magazines, books, computer paper, aluminium and iron tins, plastic bottles, cardboard boxes, old clothes.
2.	Treat Every Environment Special (TREES) Sdn. Bhd No. 3, Jln Bukit Menteri Selatan 7/2,46050 P.Jaya.	Tel : 03-79587978 / 03-79573977 Fax: 03-7573977	Old newspapers, magazines, books, computer paper, aluminium and iron tins, plastic bottles, cardboard boxes, old clothes.
3.	Positif Marketing (General Trading & Recycle) 54, Jalan Wawasan ¼, Pusat Bandar Puchong, 47100 Puchong.	Tel : 019-2194138 Fax: 03-58826746	Old newspapers, magazines, books, computer paper, aluminium and iron tins, plastic bottles, cardboard boxes, old clothes.
4.	TRUEMAX (M) Sdn. Bhd No.66, Jalan SS19/7, 47500 Subang Jaya	Tel : 03- 56350679 Fax: 03-56343119	Old newspapers, magazines, books, computer papers, aluminium tins, plastics, glass bottles, cardboard.
5.	Persatuan Buddha S. Jaya Lot. 12593, Jalan Kewajipan SS 13, 47500 S.Jaya.	Tel : 03-7348181 / 03-7315299	Old newspaper, used clothes
6.	Genting Sanyen Industrial Paper Sdn. Bhd. Kompleks Perindustrian Kertas Langat, Lot.7090 Mukim Tanjung 12, Karung Berkunci No. 206, Banting	Tel : 012-6638987	Old newspapers, magazines, books, computer paper, aluminium and iron tins, plastic bottles, cardboard boxes, old clothes.
7.	MS Manira Enterprise 46, Jln SS 19/15, Tmn Sg. Way,	Tel : 016-6819077	Old newspapers, magazines, books, computer paper, aluminium

No	Company Name and Address	Tel & Fax No.	Recyclable Materials Targeted
	Petaling Jaya, 46000 Selangor		and iron tins, plastic bottles, carton boxes, old clothes, plastic, glass, old computers, electrical goods
8.	Solok Jaya Enterprise 1078, Jln. Yadi, Teluk Pulai, Klang, Selangor	Tel : 03 - 33737102, H/p: 016-6241019	Used clothes, old computers/ printers/ monitors.
9.	MABA Cycleplast Sdn. Bhd. 11, Jln. Sg. Keramat 5, Klang Utama, 42100 Klang	Tel : 016-6916036	Plastic (in large quantities)
10.	Indahirah Enterprise 11, Jln Daun Payung 18/11, Seksyen 18, 40200 S. Alam	Tel : 017-3168312, H/p: 017-6566011	Old newspapers, magazines, books, computer paper, aluminium and iron tins, plastic bottles, cardboard boxes.
11.	Perniagaan Logam Haniff Sdn. Bhd. 244, Jln Besar Batu Tiga, 40510 S. Alam	H/p: 018-2218485	Old newspapers, magazines, books, computer paper, aluminium and iron tins, plastic bottles, cardboard boxes.
12.	Recycle Care Trading 7-2-8, Blok 7, Jln 2/127, Happy Garden, 58200 Kuala Lumpur	H/p: 012-3192877	Old newspapers, magazines, books, computer paper, aluminium and iron tins, plastic bottles, cardboard boxes.

Source: MPSJ website

2.2.4 Types and Amount of Recyclable Materials

Based on the data on waste composition, the amount of recyclable materials expected from the wastes stream in MPSJ is calculated in Table 2.13:

Table 2.13 Amount of Recyclable Materials in MPSJ

No	Composition	Total Recyclables	
		%	Amount (tons/year)
1	Papers	31.4	51,330.44
2	Plastic	8.2	13,515.64
3	Glass	4.0	7,741.12
4	Ferrous metals	1.8	3,236.39
5	Aluminium	0.6	1,122.19
6	Others (Non recyclables)	54.0	85,698.86
Total		100.0	162,644
Total amount of recyclable materials available (tons/year) =			76,945.79
Total amount of recyclable materials available (%) =			47.3%

Note: 1) other non recyclables include major portion of food wastes

As shown in Table 2.13 about 47.3% of the wastes disposed of from the generation sources are recyclable materials (76,945.8 tons/year). Out of this figure, the main recyclable materials found are paper (51,330.4 tons/year), followed by plastics (13,515.6 tons/year).

2.2.5 Current Recycling Performance

Shopping Centres - Shopping centres were also encouraged to set up recycling centres at their premises. 371,165.87 kg of recyclables was collected through this component in 2004. The shopping centres that participated in this programme were the IOI Mall in Puchong, the Giant Hypermarket in Subang Jaya, the Carrefour Hypermarket in Subang Jaya and the Mines Shopping Centre. The Giant Hypermarket was the first to set up a recycling collection point on July 6, 1999. The collection location is normally situated very close to the parking area to enable convenient dropping off by customers.

CBO, NGO, Charity Organisations and Private Recycling Programmes - MPSJ also co-operates with several private sector and non-governmental organisations (NGOs) to ensure the success of the Recycling Campaign.

A total of 66,054.5 kg were collected in 2004 through this component as compared to 45,114 kg collected in 2003.

Table 2.14 Recyclable Collection through Resident Committees

Components	Recyclables Collected (kg)		Total Recyclables Collected (kg)
	2003	2004	
Recycling Bins	2,450.7	1,722.0	4,172.7
Recycling Centres	42,663.3	64,332.5	106,995.8
Total	45,114.0	66,054.5	111,168.5

Source: MPSJ Annual Report, 2004

Some examples of the detailed information on the recycling performance of these programmes are listed below:

a) Seri Sinar Charitable Foundation (Pertubuhan Amal Seri Sinar) – This charitable foundation collects recyclable as a means to raise funds for the needy. 91,260 kg recyclable was collected in 2004. Seri Sinar has three recycling locations. They are (i) the playground near TESCO's Puchong, (ii) Kinrara Section 1 Morning market and (iii) Puchong Jaya Morning Market

b) OMG Media Sdn. Bhd. (Silver Box Recycling Bin) – The OMG Media Sdn. Bhd. is an advertising company. It designed the recycling bins, which can be simultaneously used as a medium for advertising (Silver Box Recycling Bin). 2,106 kg was collected through this method in 2004.

Petrol Stations (3Rs bins) - The component involving Petrol stations managed to collect 2,330.89 kg of recyclable in 2004. These were collected through public bins that were located at various petrol stations in MPSJ.

Recycling Programmes in Schools - The weight collected varies from an average of 709 kg to 10,400 kg per school. The years 1999, 2000 and 2001 recorded unusual high recyclables collected. The usual amount collected is in the region of 860 kg per school.

Table 2.15 School Recycling Programme, 1998 – 2004

Year	No. of Schools Participating	Weight of Recyclables Collected (kg)	Average Weight Per School (kg)
1998	10	9, 059.15	905.92
1999	16	82, 502.50	5,156.41
2000	24	250, 471.80	10,436.33
2001	20	201, 342.90	10,067.15
2002	26	25, 492.90	980.50
2003	34	24, 122.50	709.49
2004	42	34, 851.40	829.80

Source: MPSJ Annual Report 2004

As shown the data obtained by MPSJ is covering only part of the recycling activities and it does not reflect the actual recycling rate of the areas. Based on information obtained by MPSJ on various recycling activities, the recyclables collected in year 2004 in MPSJ was summarised in Table 2.16 as follows:

Table 2.16 Total Recyclables Collected in MPSJ (Year 2004)

No	Activities	Total Recyclables Collected (Tons/year)
1	Shopping Complex	371.1
2	Recycling Bins (NGOs, CBOs etc.)	4.2
3	Recycling Centres (NGOs, CBOs etc.)	107.0
4	3Rs Bins (Petrol Stations)	2.3
5	Recycling in Schools	34.9
Total		519.5

In other words, the data obtained by MPSJ is covering very limited information of recycling activities and it does not reflect the actual recycling rate of the areas. By using the equation of calculating recycling rate for year 2004, i.e.

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

$$\text{Recycling rate (\%)} = \frac{519.5 \text{ t/year} \times 100\%}{162{,}644 \text{ t/year}}$$

$$= 0.32\%$$

Note: It should be noted that the recycling rate calculated are showing only parts of the recycling activities in MPSJ.

From this calculation, it is clear that the recycling rate calculated is much lower as compared to the figure calculated for waste retained, which is about 20.4%. This is because many of the wastes being retained and recycled are not known by MPSJ, and therefore the data on recyclables collected is not captured and reported. (The waste retained also includes un-accounted for waste which may be illegally dumped).

2.2.6 Other issues on Recycling in MPSJ

Some issues were identified in the implementation of recycling programmes in MPSJ:

- Recycling focuses only on certain valuable materials (such as metals and

papers); some other recyclable materials are collected less (such as glass).
- Many recyclers are not known or not registered under MPSJ.
- No proper networking between the recyclers, industries, MPSJ and other recycling players.
- Some recyclers are operating in backyards or illegally without proper operating system (polluting the environment).
- 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 3-colour bins located at various locations are not being used.

The possible countermeasures for these issues are summarised in Table 2.17 as follows:

Table 2.17 Issues on Recycling in MPSJ and the Possible Countermeasures

No	Issues	Possible Countermeasures
1	Recycling focuses only on certain materials	Find possible markets for recyclables from outside MPSJ
2	Many recyclers are not known	Create a registration system for recycling players within MPSJ areas
3	No proper networking between the recycling players	Proper database management and registration system to create networking between the recycling players
4	Some recycling players are operating in backyard or illegally	Regular inspection, create registration system and enforcement to formalise the illegal recycling players
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 located at various locations are not being used	Remove the unused recycling bins and relocate the bins at more strategic locations

2.3 Improvement and Promotion of Waste Minimisation and Source Separation

There is no source separation and waste minimisation being carried out at households and business entities in MPSJ (except some materials are sorted out to be sold to collectors especially old newspapers and aluminium cans). 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.

2.3.1 Key Issues in Waste Minimisation and Source Separation

Some issues were identified in the implementation of waste minimisation and source separation programmes in MPSJ:

- 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 constraint

Some possible countermeasures for these issues are summarised in Table 2.18 as follows:

Table 2.18 1Issues on Waste Minimisation and Source Separation in MPSJ 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	Corporation with private contractors to collect recyclable; provision of incentive for private collectors etc.
5	Volumes of recyclable materials separated at source are too low	Educate the public to proper handle and store the recyclables at source; Encourage active participation in community recycling bins / centre by incentives etc; Provision of incentive 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 of the prices of recyclable materials; raise funds by getting sponsorship from various possible sponsors as well as federal government.

CHAPTER 3 TARGETS OF WASTE MINIMISATION

3.1 Projection of Future Waste Generation

The projection of future waste generation in MPSJ for years 2006 to 2010 is summarised as follows, assuming that there is no significant change in the waste composition:

Table 3.1 Projection of Waste Generation in MPSJ (2006-2010)

Categories		2005	2006	2007	2008	2009	2010
		(tons/year)					
1	Food wastes	54,034.47	55,420.97	57,794.12	60,272.12	62,859.78	65,562.14
2	Waste papers	51,330.44	52,949.85	55,376.33	57,918.77	60,582.93	63,374.93
3	Plastics	13,515.64	13,947.39	14,589.34	15,262.11	15,967.25	16,706.38
4	Glass	7,741.12	8,041.29	8,439.07	8,857.36	9,297.26	9,759.93
5	Ferrous Metals	3,236.39	3,355.54	3,518.23	3,689.15	3,868.74	4,057.45
6	Aluminium	1,122.19	1,161.41	1,216.63	1,274.58	1,335.42	1,399.30
7	Others	31,664.39	32,846.54	34,447.64	36,130.17	37,898.45	39,757.01
TOTAL		162,644.7	167,723.0	175,381.4	183,404.3	191,809.9	200,617.1

Note: 1) Annual waste growth rate for household used = 2%
2) Population growth rate = 4.24% per year
3) Waste composition assumed to be no change

In terms of recyclable materials, the projection of the total main targeted recyclable materials generated in MPSJ for years 2006 to 2010 is estimated as shown in the following Table 3.2.

Table 3.2 Projection of Total Recyclables (2006-2010)

No	Materials	2005	2006	2007	2008	2009	2010
		(Tons/year)					
1	Papers	51,330.4	52,949.9	55,376.3	57,918.8	60,582.9	63,374.9
2	Plastics	13,515.6	13,947.4	14,589.3	15,262.1	15,967.3	16,706.4
3	Glass	7,741.1	8,041.3	8,439.1	8,857.4	9,297.3	9,759.9
4	Ferrous Metals	3,236.4	3,355.5	3,518.2	3,689.2	3,868.7	4,057. 5
5	Aluminium	1,122.2	1,161.4	1,216.6	1,274.6	1,335.4	1,399.3
Total		76,945.8	79,455.5	83,139.6	87,002.0	91,051.6	95,298.0

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 Waste Minimisation and Recycling Targets

As shown earlier, the recycling rate in MPSJ can be calculated as:

$$\text{Recycling rate (\%)} = \frac{519.5 \text{ t/year}}{162{,}644 \text{ t/year}} \times 100\%$$

$$= 0.32\%$$

Note: It should be noted that the recycling rate calculated shows only part of the recycling activities in MPSJ.

This recycling rate calculated is low because some of the recyclables being collected and recycled are not known by MPSJ, especially those by the private collectors.

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

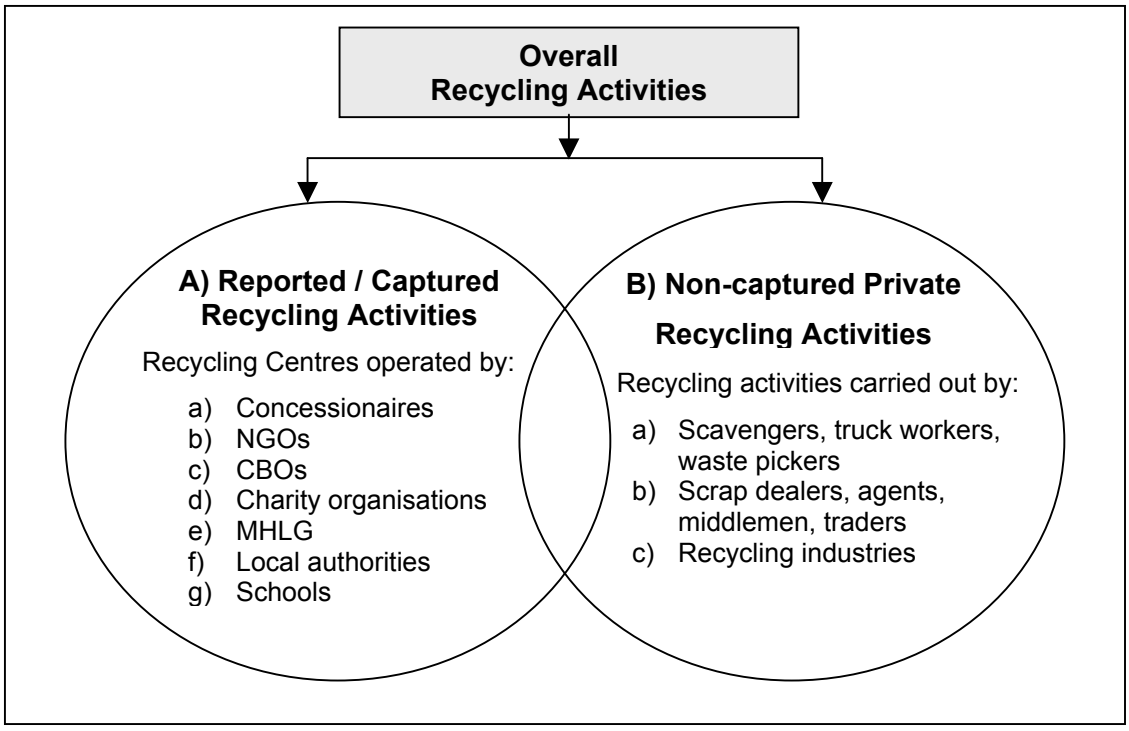


Figure 3.1 The Overall Recycling Activities

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

The target recycling rates for MPSJ from year 2006 to 2010 are shown in Table 3.3 below:

Table 3.3 Target Recycling Rates for MPSJ (2006 – 2010)

2005	Target Recycling Rates (%)				
	2006	2007	2008	2009	2010
0.32%	3.0%	4.0%	5.0%	7.0%	10.0%

3.3 Summary of Key Figures on SWM and Recycling in MPSJ

In summary, the key figures obtained on SWM and recycling in MPSJ are summarised in Table 3.5:

Table 3.5 Summary of Key Figures for MPSJ (Year 2005)

No	Parameters	Figures
1	Total waste generated (tons/day): Per capita waste generation rate (kg/cap/day):	445.6 0.897
2	Total waste retained at source (tons/day): Per capita waste retained rate (kg/cap/day):	90.9 0.183
3	Total waste discarded (tons/day): Per capita waste discarded rate (kg/cap/day):	354.7 0.714
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	 51,330.4 3,236.4 1,122.2 13,515.6 7,741.1
6	Current Recycling Rate <u>Targets:</u> a) 2006 b) 2007 c) 2008 d) 2009 e) 2010	0.32% 3.0% 4.0% 5.0% 7.0% 10.0%

CHAPTER 4 ACTIONS TO ACHIEVE THE TATFETS

4.1 Main Approaches

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

Approach 1: Institutional Setup in MPSJ
Approach 2: Registration of Existing Recycling Players
Approach 3: Increase Awareness and Recycling Practices

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

4.2 Institutional Setup in MPSJ

Under the JICA Pilot Project (implemented since May 2005) a Waste Minimisation Unit (WMU) was established in MPSJ, mainly to implement programmes of the JICA Pilot Project as well as to manage the database that is related to recycling and waste minimisation in MPSJ.

Upon completion of the JICA Pilot Project in early 2006, MPSJ will review the entire setup of the WMU, and re-structure the unit as necessary based on requirements and lessons learnt from the Pilot Project. Necessary expansion of the WMU will be made so that sufficient manpower is allocated for the unit to oversee and coordinate all matters relevant to recycling and waste minimisation in MPSJ.

The WMU will act as the coordinator to lay the groundwork for the activities, which include programmes such as conducting waste flow surveys, mobilizing stakeholders as well as implementing, monitoring and sustaining the source separation projects carried out under the JICA Pilot Project, i.e. at D'Palma Condominium, South City Plaza Shopping Mall and MPSJ Complex itself.

Specifically for the paper recycling project, the WMU will take responsibility to liaise with various departments in MPSJ for the implementation of data collection, management and reporting system as well as the application of the recycling networking system.

Some other general roles expected for the officers in WMU are summarised as follows:

- Coordinate the networks between MPSJ and other stakeholders of recycling and waste minimisation including the industries and recyclers.
- Coordinate internally within MPSJ (such as with the enforcement teams and top management) on various activities of waste minimisation and recycling.
- Plan, organise and implement recycling programmes and other waste minimisation activities

- Design forms, and collect and compile information or database on waste minimisation and recycling that are submitted by various stakeholders to MPSJ.
- Periodically analyse, compile and report on the information or data collected for submission to relevant authorities.
- Design and prepare a booklet or directory on all available information of "solid waste management" and "recycling" in MPSJ.
- Carry out public relation works to ensure close relationship between MPSJ and the public including the industries and other recycling players.

4.3 Registration of Existing Recycling Players / Stakeholders

Under the JICA Pilot Project, a total of 52 recyclers, 10 recycling stations and 32 traders and collectors were identified and registered in MPSJ (Samples of registration forms are attached in Appendices A and B). Database containing the contact information of these stakeholders are available in WMU and will be made available in the MPSJ-WMU website. However, continuous efforts to capture and register more recycling stakeholders in MPSJ will be one of the main tasks of the WMU. Some possible measures are listed below.

4.3.1 Stakeholder Workshops

Based on the experience and lessons learnt from the Pilot Project, stakeholder workshop is important to be carried out on a regular basis, so that the stakeholders are well informed on the recycling activities and update of recycling information in MPSJ. The WMU will be taking responsibility to organise the stakeholder workshop once in every 6 months (twice a year), to ensure good communication and networking with the stakeholders. The WMU will make necessary announcement prior to the workshop, so that to attract and increase the participation rate. This approach will be on a voluntary basis and therefore it is important to ensure a clear understanding of the workshop purpose by the players, particularly on the benefits of creating a network among the recycling players or stakeholders.

4.3.2 Incentives to Recycling Players

In order to attract more participation to register with WMU, MPSJ will take initiatives to consider all ways of possible incentives for the recycling players. At the initial stage in the year 2006, MPSJ will issue a letter of recognition to recycling players or stakeholders who are actively involved and contribute in the creation of recycling network in MPSJ. At the later stage of the implementation of this LAP-WM (year 2007 onwards), other possible incentives will be proposed depending on the results or performance of the plan as well as decisions from the top management of MPSJ. This includes some possible legal and economic incentives.

4.3.3 Networking of Recycling Players

As follow-up from the Pilot Project, a directory of Stakeholder List and 3Rs activities in MPSJ will be published by WMU. This directory will be updated on a yearly basis, and serve to publicise the recycling activities that the recycling players are doing so that a recycling network can be established for the benefits of these stakeholders.

4.4 Increase Awareness and Recycling Practices

In order to increase awareness and recycling practices, MPSJ will carry out appropriate programmes such as source separation as learnt from experiences of previous JICA

Pilot Project in MPSJ. In general, through the coordination by the WMU, MPSJ will implement various programmes throughout the duration of this LAP, mainly to:

- Sustain the awareness campaign and source separation practices in pilot project areas, i.e. D'Palma Condominium, South City Plaza Shopping Mall and MPSJ Complex.
- Expand the experiences learnt from the pilot project to other areas of MPSJ.

4.4.1 Continuation of Source Separation and Awareness Campaigns

a) Residential at D'Palma Condominium

Source separation programme at D'Palma condominium will be continued and monitored closely by WMU. The programme will be carried out under the cooperation of the management office of the condominium as well as the private waste collector. Few other options will be tried such as working with NGOs for collection of recyclables from high-rise building so that the most effective and acceptable way of recycling practices among the high-rise building residents can be identified. The source separation programme will be extended to involve more residents of the condominium.

b) South City Plaza Shopping Mall

A buy-back centre was established in South City Plaza Shopping Mall during the JICA Pilot Project in MPSJ. The operation of the buy back centre is handled by Alam Flora Sdn Bhd as the waste concessionaire company. WMU will monitor closely the performance of the buy back centre, and continue providing publicity about the buy back centre to the nearby residents. Awareness campaigns will be organised in the shopping mall to attract participation on recycling, in cooperation with the Shopping Mall management office and Alam Flora Sdn Bhd.

c) MPSJ Complex

Under the JICA Pilot Project, the source separation programme in MPSJ complex was focusing mainly on collection of waste papers. This programme will be continued in MPSJ complex and targeted to be extended to other MPSJ offices such as branch offices in Seri Kembangan.

4.4.2 Expansion of Experiences to Other MPSJ Areas

The JICA Pilot Project in MPSJ has provided important experiences on implementation of recycling practices in MPSJ, particularly for source separation. Besides continuing the source separation and awareness campaigns in the pilot project areas, MPSJ through the coordination of RNU, will expand the experiences of pilot project to other areas in MPSJ from the year 2007 onwards. This includes expansion of D'Palma experience to other high-rise buildings in Puchong, Seri Kembangan and Subang Jaya; experience of MPSJ complex to other offices and experience of South City Plaza to other malls such as Sunway Pyramid, Mines Shopping Complex and Subang Parade etc.

In addition, MPSJ will expand the source separation programmes to other places within MPSJ areas, such as Universiti Putra Malaysia (UPM) as well as primary and secondary schools.

4.5 Cost Implication

The cost implication of the Action Plan depends on the implementation approach. Some relevant cost items and options in implementation of this Action Plan are listed in Table 4.1.

Table 4.1 Cost Items for the Implementation of Local Action Plan

No	Approaches	Cost Items
1	Institutional Setup in MPSJ	▪ Expansion of the existing WMU with more manpower and facilities ▪ Publicity on the WMU established <u>Optional:</u> ▪ Restructure or mobilise existing manpower internally, utilizing available premises and facilities.
2	Registration of Recycling Players	▪ Set up new facility and system for registration. ▪ Design and creation of registration forms, printing and distributions. ▪ Publicise information on the website to call for registration. ▪ Organise stakeholder workshops ▪ Provision of incentives to attract registration <u>Optional:</u> ▪ Publicise on existing MDKS website. ▪ Pro-active registration using existing MPSJ existing manpower
3	Increase Awareness and Recycling Practices	▪ Continuation of awareness campaigns etc in pilot project areas (such as source separation campaigns, road-shows, demonstration and awareness talk etc.) ▪ Establish more recycling centres ▪ Expansion of campaigns and pilot projects in other areas in MPSJ. ▪ Other expenses (such as printing and distribution of pamphlets, flyers and booklets etc.) <u>Optional:</u> ▪ Acquire supports or sponsorships from other sources for implementation of awareness and recycling campaigns such as the industries.

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.

In the case where new budget is necessary for implementation of the LAP-WM, the amount of allocation required depends very much on the scale of implementation.

Rough lump sump estimation on the budget required for each item of the implementation of the Action Plan on a 5 years basis is summarised as follows:

Table 4.2 Rough Budget Estimation for Implementation of the Local Action Plan

No	Descriptions	Budget (RM)
1	Expansion of existing "Waste Minimisation Unit (WMU)" – Computers with accessories, furniture and other consumables etc. (Capital costs)	50,000
2	Establish additional recycling centres as necessary – estimation of 30 recycling centres within 5 years with simple structure and set up (Capital Costs).	900,000
3	Operational Expenses – Publicity, manpower, utility costs, transportation, maintenance and other miscellaneous operational expenses (RM800,000/year x 5 years)	4,000,000
4	Continuation of recycling programmes in pilot project areas – Estimation of RM300,000/year x 2 years	600,000
5	Expansion of awareness campaigns etc to other areas of MPSJ (assuming 2 campaigns per year at RM250,000/each x 4 years)	2,000,000
6	Other expenses (such as printing and distribution of flyers, pamphlets, booklets to schools, manufacturers, business entities etc.) – Assuming RM500,000/year x 5 years	2,500,000
TOTAL		10,050,000
AVERAGE PER YEAR		2,010,000

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

In summary, the overall frameworks for the actions to be taken in the LAP-WM of MPSJ can be summarised as shown in Figure 4.1 as follows:

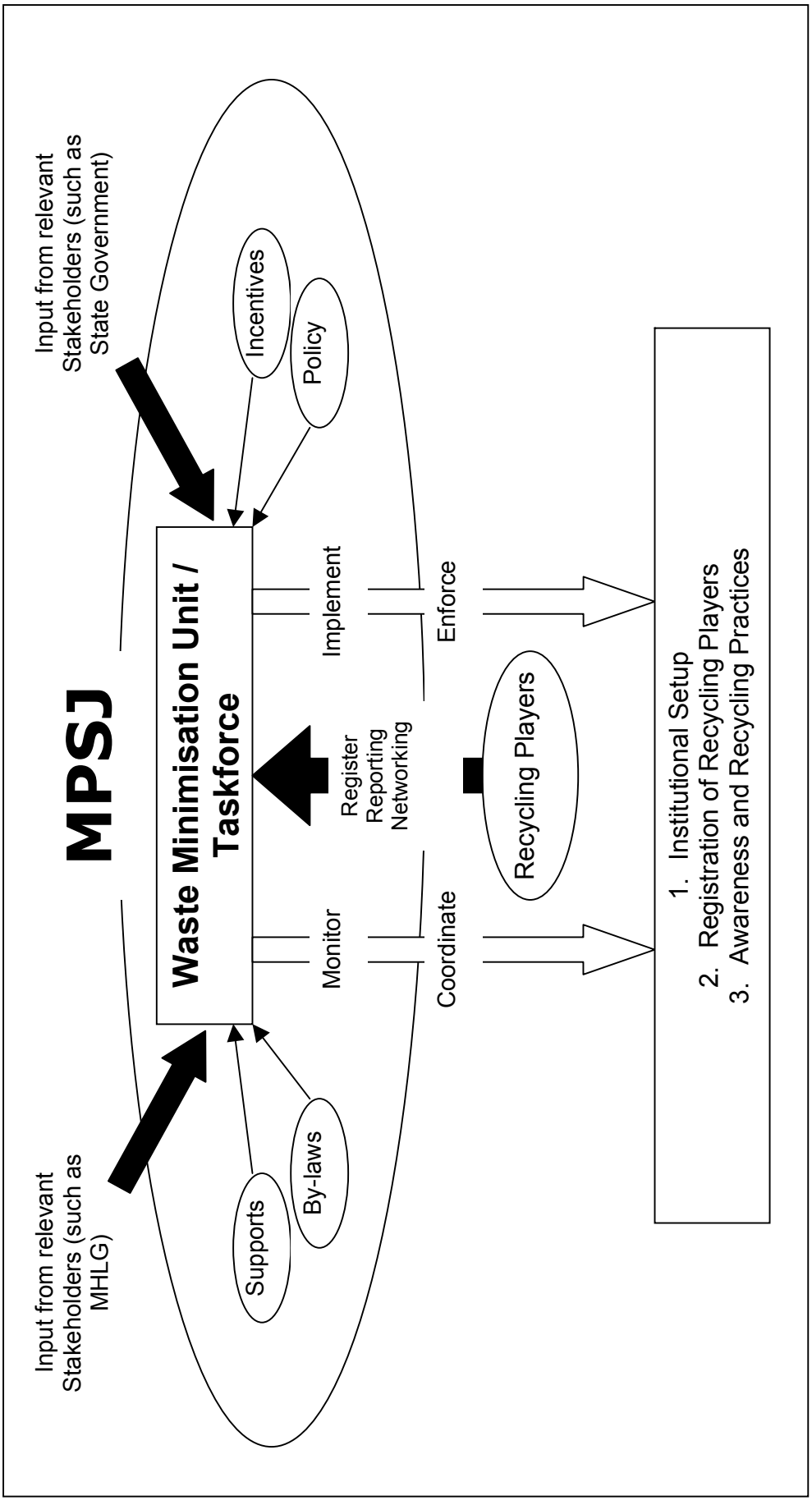


Figure 4.1 Overall Frameworks for the Actions to be taken in the Local Action Plan

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 MPSJ as targeted in this Action Plan, some indicators and measures shall be established. Some performance indicators and measures shall be set up, as shown in examples 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 MPSJ 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 MPSJ should be directly under the responsibility of the "Waste Minimisation 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:

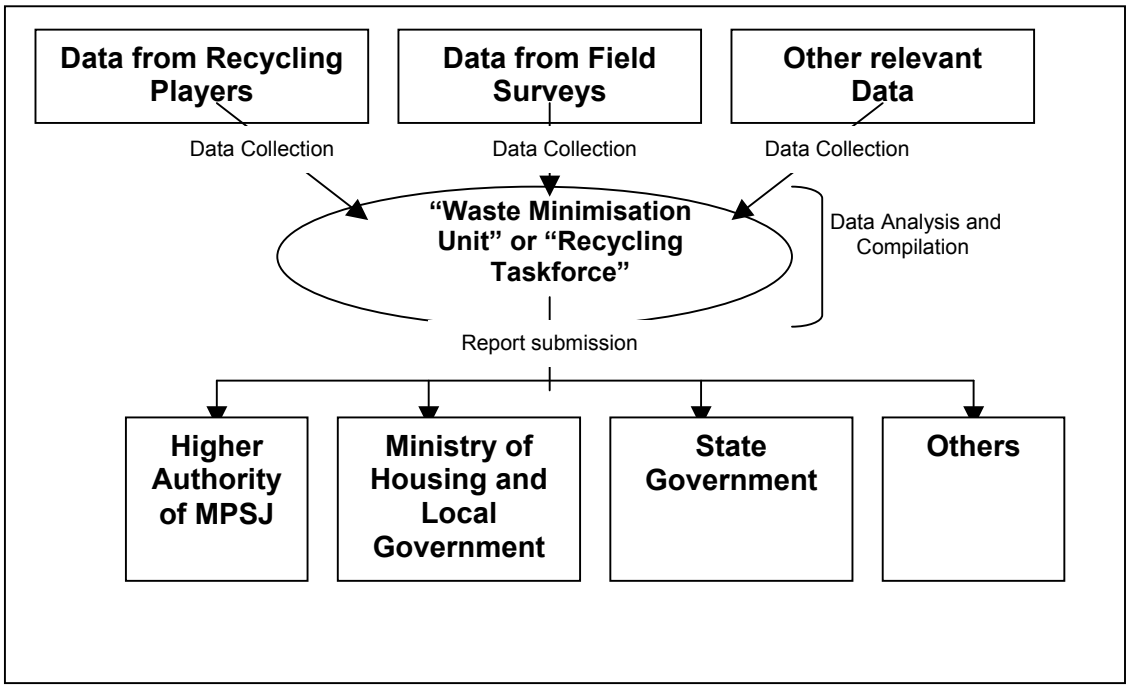


Table 5.1 Suggested Framework for Entire Reporting System

5.3 Implementation Schedule of Action Plan

The entire Action Plan is made for the duration of 5 years from 2006 to 2010. The proposed schedule of the implementation of this Action Plan is:

Table 5.3 Proposed Schedule for Implementation of Action Plan

No	Action Plan	2006	2007	2008	2009	2010
1	Expansion of the existing Waste Minimisation Unit (WMU) within MPSJ					
2	Establish and implement formal registration system for recycling players					
3	Establish, introduce and implement a user-friendly "recording system" to be reported periodically by the recycling players					
4	Organise stakeholder workshops (twice a year)					
5	Continuation of recycling programmes in pilot project areas (D'Palma Condominium, MPSJ Complex and South City Plaza)					
6	Expansion or implementation of new demonstration projects in other MPSJ areas (such as in schools, offices etc.)					
7	Review and provision of possible incentives					
8	Publish and update directory for 3Rs Stakeholders and recycling programmes					
9	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 MDKS	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 MDKS	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:

	Types	Amount / month	Unit	Source (from)	Buyers (To)
Within MDKS Areas	☐ Aluminium				
	☐ Cardboard				
	☐ Plastics				
	☐ Papers				
	☐ Glass				
	☐ Scrap Metal (Iron)				
	☐ E-wastes				
	☐ Batteries				
	☐ Others _____				
	☐ Others _____				
	☐ Others _____				
	☐ Others _____				
	Types	**Amount / month**	**Unit**	**Source (from)**	**Buyers (To)**
Outside MDKS Areas	☐ Aluminium				
	☐ Cardboard				
	☐ Plastics				
	☐ Papers				
	☐ Glass				
	☐ Scrap Metal (Iron)				
	☐ E-wastes				
	☐ Batteries				
	☐ Others _____				
	☐ Others _____				
	☐ Others _____				
	☐ Others _____				

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Local Action Plan

3Rs Start Today

By:
Majlis Perbandaran Subang Jaya (MPSJ)

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

Japan International Cooperation Agency (JICA)

Introduction

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

Our Objective

"To achieve Material Cycle Society in MPSJ"

What is Recycling Rate ?

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

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

What are our targets ?

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

- Plastics
- Aluminium Cans
- Ferrous Metals

- Glass
- Papers

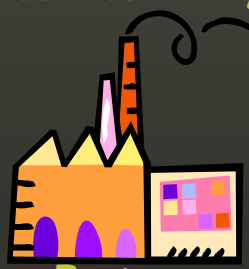
What are your responsibilities ?

Individual

Office

Hotel

Business entity



Factory

School

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

Reduce

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

Reuse

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

Recycle

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

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

Please register with MPSJ !!

All about Wastes in MPSJ

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

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

Projection

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

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

Our Actions to Achieve the Targets

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

For information, please contact:

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