

Appendix 3A

APPENDIX 3A

REVIEW OF CURRENT CONDITIONS –
WASTE MINIMISATION

In 1988 the Ministry of Housing & Local Government (MHLG) prepared an “Action Plan for a Beautiful and Clean Malaysia” (ABC)¹. The objective of the ABC Plan was: -

“...to establish a firm, technical, institutional and financial basis for providing public cleansing services ... to promote a higher standard of environmental quality and to enhance resource conservation”.

Specific to the 3 Rs, *Statements 6 & 7* of the National Policy Statements asserts that: -

Statement 6

Reduction of municipal solid waste generation especially that of packaging wastes and household chemical wastes should be encouraged, involving the producers and distributors of consumer goods as well as consumers themselves.

Statement 7

Municipal solid waste should be treated as a resource and all efforts must be made to recycle and recover most of the materials that are presently burnt or buried.

1. Recycling and the Concession Agreement

Under the draft Concession Agreement² to be executed between the Federal Government and the Concessionaire, the Government shall grant the Concessionaire the sole and exclusive right to:

- a) carry out the solid waste management services and charge customers;
- b) take over and carry out improvement works on existing facilities;
- c) design, construct, commission, operate, manage and maintain new facilities;
- d) a concession period of twenty (20) years with a possible extension (at Government’s option).

It is also understood that a target for rate of recycling³ was set at 22% of the total quantity of waste collected before, or by the end of, the concession period.

In addition, it is noted that the concessionaire is required to conduct publicity programmes, which will include efforts to minimise the generation of waste and promote reuse and recycling.

¹ Action Plan for a Beautiful & Clean Malaysia, Ministry of Housing & Local Government, 1988

² Draft Concession Agreement as discussed with Alam Flora Sdn. Bhd. and Southern Waste Management Sdn. Bhd.

³ Recyclables includes but is not limited to waste paper and cardboard, waste glass, waste plastics, waste cans and other metals (per Draft Concession Agreement –see footnote above).

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2. Types of Recyclables in Malaysia

Recyclables in the Malaysian context refer to the following key items⁴: -

i. Paper

Recyclable paper is categorised by the paper fibre length and amount of ink, coating and contamination. It comes in the form of: -

- Newspapers
- High-grade paper (office mixed paper, computer paper)
- Mixed paper (glossy magazines)
- Corrugated cardboard (packaging material)

ii. Plastic

Plastic recyclables are categorised by the type of plastic resin used in the manufacture. The common types of plastic resin and product form are: -

Category	Examples of Materials
PET	Carbonated soft drink bottles, food containers, shampoo bottles
HDPE	Detergent bottles, juice jugs, milk jugs, motor oil containers, food containers
PVC	Food containers, plastic pipes, wire insulation
LDPE	Thin film packaging and food wrapping, regular plastic and trash bags, disposable diapers, agricultural and construction plastic sheeting
PP	Plastic bottle caps, container covers, lead acid battery casing, bottle labels, plastic crates
PS	Polystyrene food packaging, foam cups and plates, injection moulded packaging material
Others	Mixed and multi-layered plastic for packaging

iii. Metals

The recyclables metals can be classified as scrap metals, ferrous and non-ferrous metals: -

Category	Examples of Materials
Scrap metals	White/bulky goods such as refrigerators, stoves, automobiles and miscellaneous post-consumer steel/iron products.
Ferrous metals	Iron & steel materials such as steel containers, kitchen ware, countertops, industrial scrap, etc.
Non-ferrous metals	
Aluminium	Aluminium cans, tubing doors, siding, cookware, cooling coils and fins, automobile parts

⁴ Southern Region Technical Proposal, Southern Waste Management Sdn Bhd, 4 December 2000.

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Category	Examples of Materials
Copper	Wire, tubing, plumbing fixtures, brass & bronze products
Lead	Batteries, cables, bearings, tyre weights
Nickel	High-strength and corrosion-resistant alloys
Tin	Tin cans, tin plating, solders
Zinc	Alloy scrap, galvanising wastes, zinc sheeting

iv. Glass

Recyclable glass is sorted based on colour, melting temperatures and level of contamination. Recyclable glass consists of clear, green and amber glass bottles and containers. Glassware, plate glass and laminated automobile glass is categorised separately. It is noted that mirrors are not suitable for recycling due to the use of hazardous coatings.

v. Others

The other recyclables are as follows: -

Category	Examples of Materials
Garden waste	Tree and shrub trimmings, grass clippings
Organics	Food waste, compostable fraction of household waste
Leather	Clothing, furniture covers
Textiles	Clothing, curtains, banners, furniture fabric, textile factory rejects
Wood	Furniture, pallets, container, boxes, sawdust, chipboard
Construction waste	Demolition debris, concrete, bricks, asphalt, lumber, tiles, plaster, sand, aggregate, window glass
Rubber	Tyres, floor mats, rubber belting, car bumpers
Waste oil	Automobile oils, hydraulic oils, industrial process oils, lubricating oils *

*Note: * These may be categorised as Scheduled Wastes under the Environmental Quality (Scheduled Waste) Regulations 1989 and can only be treated and disposed at prescribed premises.*

Appendix 3A**3. The Organic Fraction Of Waste**

Composting and anaerobic digestion⁵ are solid waste management options that offer the potential to divert from the landfill a substantial portion of the waste stream i.e. the wet "organic portion". Given the significant volume of organics in the Malaysian waste stream, composting can increase the overall quantity of waste diverted from disposal when it is combined with other recycling and waste reduction programmes.

Composting is normally defined as a controlled process of natural degradation through which organic waste, including food waste, garden waste, and other biodegradable matter, is reduced in volume and converted to form a stable material that can be used for horticultural and agricultural applications. This product may also have commercial potential.

Recognising cultural and religious restriction to the widespread use of organic waste from foodstuff, the most appropriate waste for composting is green waste. Mixed organic waste could be used for landfill cover and landfill site restoration.

Existing Composting Initiatives

The Department of Agriculture, Ministry of Agriculture, encourages composting of agricultural waste⁶. The department reported that oil palm waste is being composted but demand for the product is limited. Farmers have reported their preference for chicken dung compared to compost mainly due to its lower price. In some cases, chicken dung is also being processed and sold at a price three times that of raw dung. Composting of agricultural wastes has not been widely practiced, due to the relatively large area required for the fermentation process and difficulty in applying the products to the crops (chicken dung is applied by spraying). Standards have been issued for the Production, Processing, Labelling and Marketing of Plant-based Organic Food (MS1529) which would relate to all organic food.

The preference for chicken dung was confirmed by the Federation of Malaysian Vegetable Growers Association, which has 1000 members⁷. The price is about RM 3.00 for 30-40 kg. The Association estimates that 400-500 tonnes of compost is being used in Malaysia, and about 30,000 ha of land under vegetable farming. According to the Secretary General of the Association, in selecting fertilisers, the member's priority is cost, effectiveness and availability. The Federation also reported that there were no specific standards issued by the Government.

On the part of the Concessionaires, Alam Flora Sdn. Bhd. considers it is necessary to introduce composting plants and material recycling facilities.⁸ The company plans to construct composting plants to convert green waste and selected organic waste into compost⁹.

It has also been made known to the Study that, there are two known compost plants in Teluk Intan, Perak and in Johor, which use oil palm waste as feedstock. Both the plants export their products.

⁵ See also **Appendix 6A of Volume 3** Summary of Technology Options.

⁶ Meeting with Department of Agriculture, Malaysia on 27 March 2002

⁷ Meeting with Secretary General Federation of Malaysian Vegetable Growers Associations on 23 March 2002

⁸ Meeting with Alam Flora Sdn Bhd on 12 March 2002

⁹ Seminar paper entitled " Privatisation Of Municipal Solid Waste Management-Malaysian Experience, Mohamed Siraj Abdul Razack, Alam Flora Sdn Bhd, November 2001

Appendix 3A**4. Research & Development into Biological Treatment of Waste**

With regard to research related to composting, it is known that various universities and research institutions have carried out projects particularly with regard to agricultural wastes. During the Seventh Malaysia Plan period (1996-2000) it was reported that out of the 137 projects (under the Environment sector) approved for funding under the "Intensification of Research in Priority Areas (IRPA) during 1996-1999, only one was related to treatment of organic waste¹⁰. The project was: -

- i. Biological Waste Management-Bioconversion of lignocelluloses Waste (UKM).

During the Sixth Malaysia Plan period (1991-1995), the Malaysian Agriculture Research & Development Institute (MARDI) under its 'Strategic' sector, carried out several projects¹¹. The projects included: -

- i. Environmental Biotechnology (Bioconversion of Agro-wastes into Useful By-products).
- ii. Studies on Compost Development From Oil Palm Empty Bunches.
- iii. Improvement in the Nutrient Quality of Oil Palm By-products for Animal Feed Through Solid Fermentation.
- iv. Improvement in the Nutrient Quality of Cocoa By-products for Animal Feed Through Solid Fermentation.

It is noted that no studies have been undertaken by this body, related to the composting of solid waste.

5. The Informal and Formal Recycling Industry

Traditionally, activities related to the 3Rs are primarily undertaken on an informal basis. They consist mainly of domestic reuse of materials, door-to-door collection of recyclables (newspaper and magazines, cans and bottles), tailgate sorting by collection crews (Local Authorities and contractors), and collection by scavengers at disposal sites. In addition to these three types of recyclables, other items collected include cardboard, plastic materials, textiles (clothing), rubber products, and metals including aluminium cans. These are hauled to 'collection centres' that are usually located in the vicinity of disposal sites where they are sold to middlemen. This informal 'system' has developed over a long period and in that time has proven to be functional and beneficial in the recovery of recyclables.

A study carried out on behalf of the MHLG in November 2001 indicated that the level of recovery of recyclables was highest by collection crews, at 1.6% of total wastes recovered, followed by scavenging at 1.4%, and then households (at source) at 1.25%¹². The study revealed that 2.3% of the waste (by weight), sampled from collection vehicles servicing residential areas in Kuala Lumpur, is recyclable (MHLG, 2001). This study was conducted by surveying collection activities involving wastes that are hauled to the Taman Beringin landfill. In contrast, the same study showed that only 1.6% and 0.8% are recyclables from waste sampled in commercial areas

¹⁰ Senarai Projek-Projek R & D/IRPA Alam Sekitar Yang Telah Diluluskan Dalam RMK 7 (1996-2000) dan RMK6 (1990-1995), Kementerian Sains, Teknologi dan Alam Sekitar, 20 Ogos 1999

¹¹ Senarai Projek-Projek R & D/IRPA Alam Sekitar Yang Telah Diluluskan Dalam RMK 7 (1996-2000) dan RMK6 (1990-1995), Kementerian Sains, Teknologi dan Alam Sekitar, 20 Ogos 1999

¹² Report on Recycling and Resource Recovery Survey, MHLG, 8 November 2001.

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and from mixed residential-commercial-industrial areas, respectively. Of the waste recovered by collection crews, paper was the main item recovered (74%), followed by plastic (13%), and metals (11%), and the remainder textiles. Middlemen buyers stationed at the access road leading to the landfill were found to buy about 20 tonnes of recyclables daily (0.8% of the 2,400 tonnes received at the landfill). 80% of the materials bought consisted of newspapers, cardboard and magazines. Only about 11% were steel and aluminium items, 6% plastic, 1% glass bottles and 0.1% lead batteries.

In the last decade, businesses that utilise 'used materials' as raw material have emerged as important collectors and reprocessors of recyclables, in particular paper products, glass and plastic. There are currently 26 factories that use recycled materials with the majority located in Selangor State. The list of manufacturers that use recycled materials is given in **Annex 1** and their locations are presented in **Figure 1**.

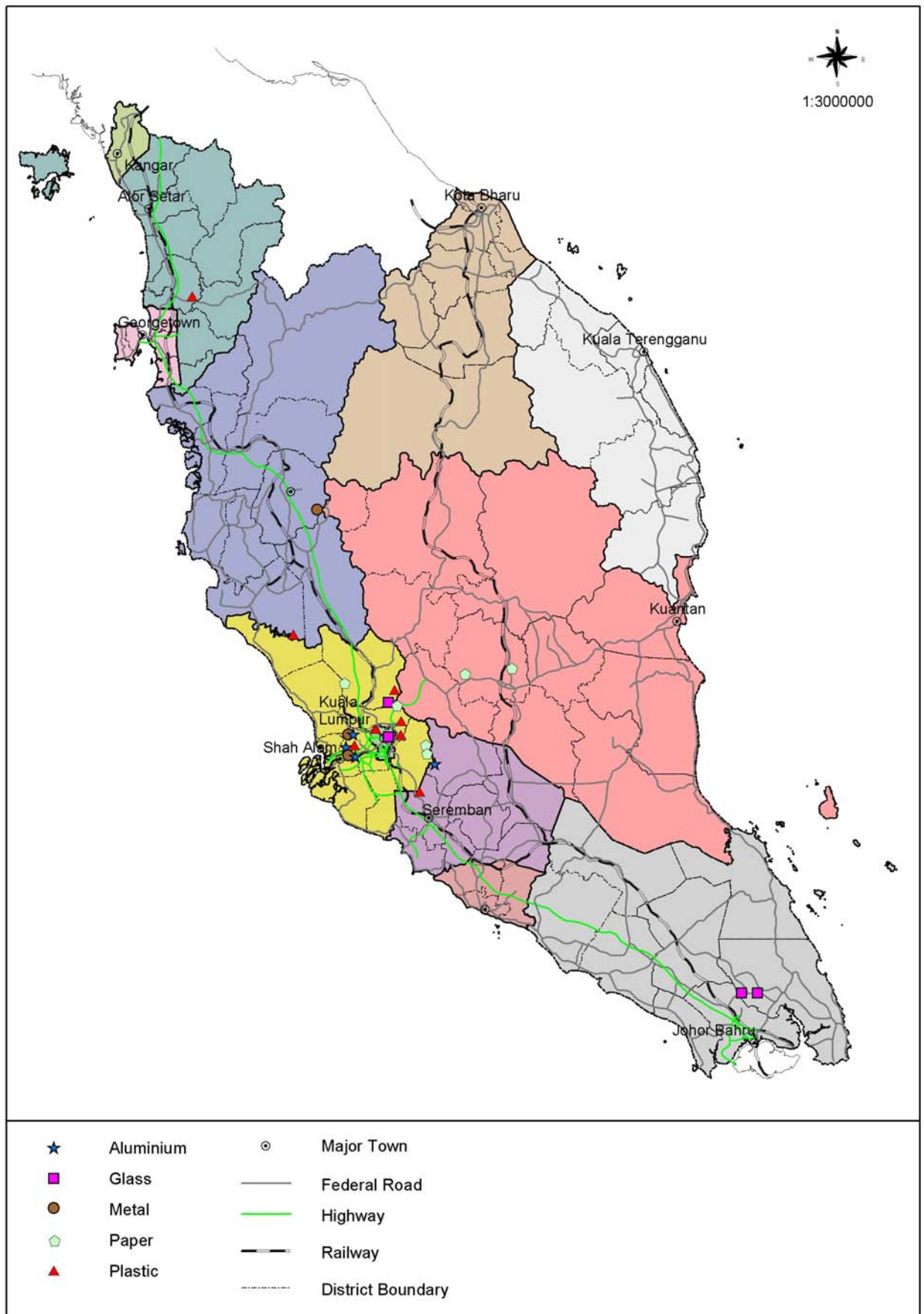
More recently, with interim takeover of collection and disposal services, Alam Flora and Southern Waste have established recycling centres (drop off or buy back centres). Recyclables collection centres are either in fixed locations where demand is high, or mobile, so that more communities can be involved. They usually comprise publicity posters, leaflets, weighing scales and different types of storage containers, for recyclables. These efforts are complemented by activities carried out by residents associations, schools, NGOs and charitable organisations. Industry organisations, such as the Malaysian Plastic Manufacturer Association (MPMA), are also involved in recycling initiatives. Collection centres require to be well publicised, on a regular basis, to ensure continuity of support.

The list of collection centres operated by LAs, Concessionaires, NGOs, local community and charity organisations, and private organisations (dealers or middlemen), is given in **Annex 2**. Their distribution by States is shown in **Figure 2**.

On the part of the Local Authorities, those participating in the recycling programme are involved in public awareness campaigns and the provision of recycling bins. This is elaborated below in the section on Government 3Rs Initiatives.

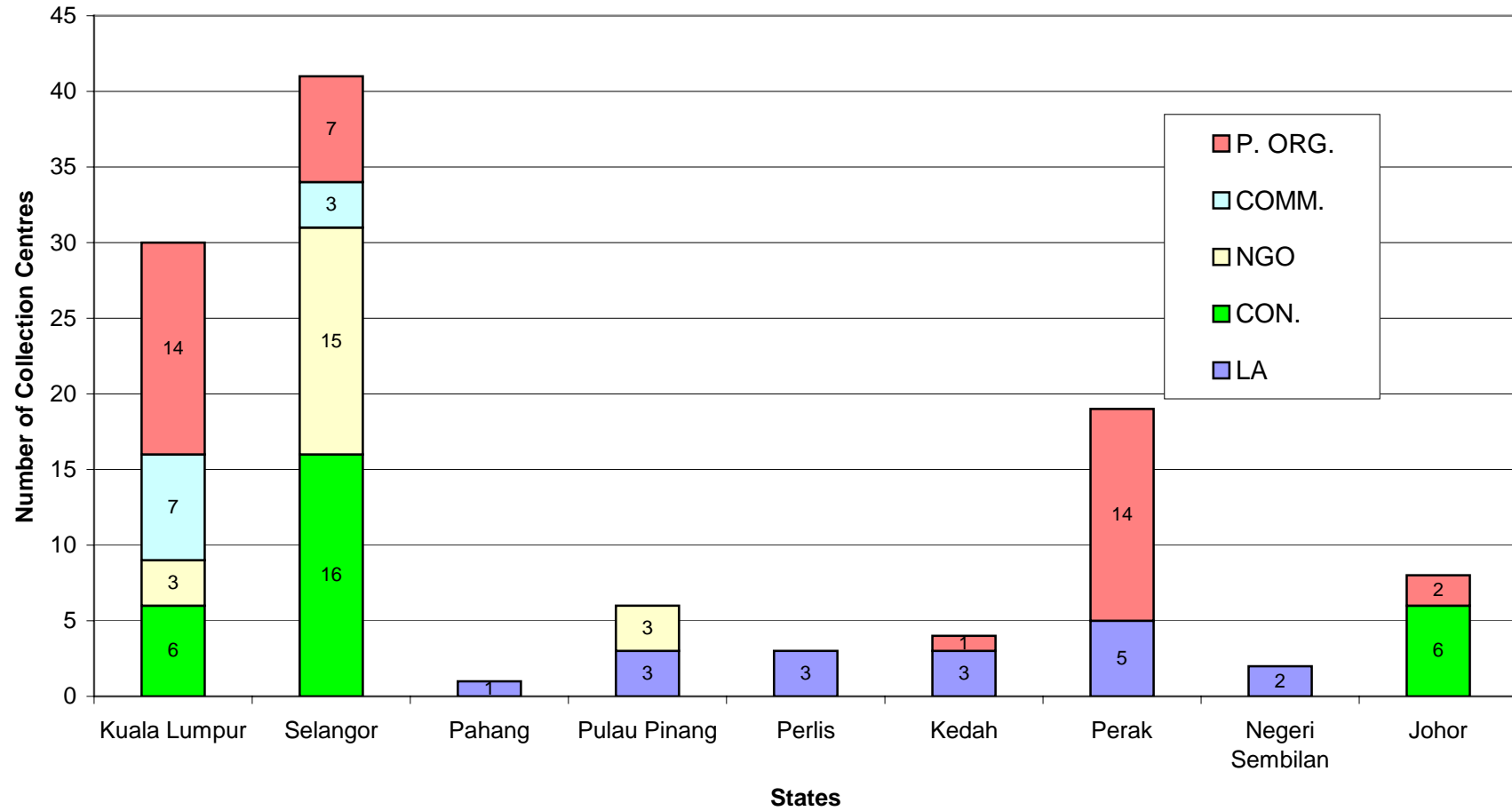
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Figure 1: Location of Recycling Facilities



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Figure 2 : Distribution of Collection Centres by States



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6. Current Stakeholders in the 3Rs

At present the major stakeholders in connection with the 3Rs can be grouped as follows:

i. Government of Malaysia

The Federal Government, acting through its central agency, i.e. the Economic Planning Unit, is responsible for policymaking and the allocation of budget for SWM. Recycling activities are included within this budget. The Ministry of Housing and Local Government (MHLG) is charged with the responsibility of policy and strategic planning of solid waste management while its Local Government Department is responsible for implementation of plans and programmes. Local Government, through the Local Authorities, is responsible for implementing solid waste management activities including collection, treatment and disposal, together with enforcement activities, under the Local Government Act, 1976. The State Governments are responsible for land, which is essential for 3Rs facilities. Matters related to prevention and regulatory control of pollution of the environment fall under the purview of the Department of Environment, Ministry of Science, Technology and the Environment.

Other agencies at Federal, State and local levels have responsibilities that are in some way related to 3Rs. Federal agencies include the Ministry of Education, Ministry of Health (Health & Engineering), Ministry of International Trade & Industry (Investment, Industrial Development & External Trade), Department of Inland Revenue (Tax Incentives), and the Town & Country Planning Department (Spatial Planning). State agencies include the State Economic Planning Unit (Socio-economic Development Planning), State Economic Development Corporations (Promotion of Development Programmes) and the State Departments of Federal Agencies operating at State level.

ii. Solid Waste Concessionaires

Originally, four (4) consortia were awarded the concession for solid waste management in 1995. To date only two are operational, namely: -

- Alam Flora Sdn. Bhd. (Central & East Coast Regions)
- Southern Waste Management Sdn. Bhd. (Southern Region)

These companies are responsible for the 3Rs infrastructure and related services including public awareness.

iii. Solid Waste Recyclers/ Reprocessors

These are some of the companies that utilise recyclables in their manufacturing process. The main recyclables used are paper, plastic, glass and aluminium cans. The major stakeholders include: -

Paper

- Malaysian Newsprint Industries Sdn. Bhd.
- Genting Sanyen Industrial Paper Sdn. Bhd.
- Malayan Paper Sdn. Bhd.
- Muda Paper Mills Sdn. Bhd.

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- KL Glass Manufacturers Sdn. Bhd.
- Malaysian Sheet Glass Sdn. Bhd.

Plastic

- May Plastic Industries Sdn. Bhd.

Metals

- Amalgamated Aluminium & Alloy Sdn. Bhd.
- Kampar Steel Sdn. Bhd.

iv. “Informal Recycling System”

These are a mixed group comprising scavengers who collect recyclables, the door-to-door buyers, and middlemen buyers who purchase recyclables for sale to recycling facilities or for export. Others who operate within this group are the scrap yard operators who buy all types of recyclables and bulky items, such as refrigerators. Appliance repair shops and workshops are another group that accepts machines and appliances for dismantling and cannibalising of spare parts. Alam Flora also acts as a middleman buyer through its 3Rs programme, with the setting up of buy-back centres at strategic locations in its area.

v. Solid Waste Recycling Partners

This group represents businesses that co-operate with the Government and Concessionaires, or with NGOs, in implementing reduction and recycling activities. They include multi-national and national corporations, businesses in the manufacturing, services and banking sectors, and offices that generate large volumes of recyclables, supermarket and departmental store chains, and petrol stations. For example, the supermarket chain Carrefour and the finance house Public Finance are closely involved in partnerships with Alam Flora Sdn. Bhd.

vi. Non-Government Organisations (NGOs)

The NGOs have a direct or indirect interest in the 3Rs as a source of revenue, and for purposes related to sustainable development objectives. They also play a vital role in promoting awareness and implementing community recycling programmes. They include environmental organisations, social and residents associations, manufacturers associations, consumer associations, the construction industry, property developers and professional associations. A list of key NGOs is shown in **Table 1**.

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Table 1 : Table of Key NGOs

	Organization	Activities
1.	Persatuan Kebajikan Xim Phou Moon Malaysia	A volunteer organisation that collects recyclables at collection centre in many supermarkets throughout the country.
2.	Malaysian Plastic Manufacturers Association (MPMA)	Association of major plastic manufacturers involved with recycling programmes and promotion. Also a partner in National Recycling Day 2001.
3.	World Wide Fund for Nature Malaysia (WWF)	Conducts nature, wildlife and environmental conservation research. Also a partner in National Recycling Day 2001.
4.	Malaysian Pulp & Paper Manufacturers Association	Association of major paper manufacturers involved with recycling programmes and promotion.
5.	Treat Every Environment Special (TrEES)	A volunteer organisation that collects recyclables at collection centre in many supermarkets mainly in the Klang Valley.
6.	Consumers Association of Penang	Represents the interests of businesses and the public in Penang, including environmental issues.

vii. Research Institutions and Universities

This group provides an important link by carrying out studies related to solid waste and contributing to the database on solid waste. They also provide technical expertise to assist the Government in assessing waste management technologies. Some of these organisations provide state of the art laboratory facilities for analytical purposes e.g. the Malaysian Institute for Nuclear Technology has facilities for waste composition and characterisation studies. Those that are active in the field of solid waste management include: -

- Universiti Putra Malaysia (UPM)-Member of Technical Committee to advise Minister of Housing & Local Government.
- Universiti Teknologi Malaysia (UTM)-Member of Technical Committee to advise Minister of Housing & Local Government.
- Universiti Malaya (UM).
- Malaysia Institute for Nuclear Technology Research (MINT) - Member of Technical Committee to advise Minister of Housing & Local Government.
- SIRIM-Standards and appropriate technology.

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With regard to research related to SWM, during the Seventh Malaysia Plan period (1996-2000), it was reported that out of the 137 projects (under the 'Environment' sector) approved for funding under the Intensification of Research in Priority Areas (IRPA) during 1996-1999, only four were related to SWM¹³. The projects were: -

- i. Solid Waste Reuse and Recycling Technology in Municipal and Industrial Applications (UPM).
- ii. Degradation of Municipal Solid Waste in a Properly Designed Sanitary Landfill Subjected to Local Conditions (USM).
- iii. Studies of the Chemical Transformation of Municipal Landfill and Treatment (UM).
- iv. Development of an Intelligent System for Solid Waste Management using Hybrid Knowledge Representation System (UKM).

With regard to training on SWM, it is believed that there are no formal training courses specific to SWM. Where SWM is included in the curriculum, it is usually as a module or an elective e.g. in the degree programmes offered by UPM and UTM, and the post-graduate degree in Community Health offered by UKM.

Public Health Inspectors (PHIs) and Public Health Assistants (PHAs), who are responsible for waste management enforcement at LA level, do not have formal training in SWM. Their training at the Public Health Institute was reported to be strongly oriented toward rural health management¹⁴.

viii. The Public

The public, or consumers and generators of solid waste, have an interest in securing more efficient recycling services and, where possible, obtaining some financial returns through buy-back schemes. They also represent the key to any successful 3Rs initiative because reduction and waste separation at source begin with the waste generator.

7. Waste Composition of Recyclables

There is no known comprehensive data on the recyclable content in Malaysian waste streams. However, ad hoc studies reveal that the combined paper, plastic and metal content in waste may vary between 25% in a rural area, such as Muar, to 44% in an urban area such as Kuala Lumpur (Nasir et al, 1995). It was also reported that the highest recyclable content is paper i.e. 27% and 30.8% of total solid waste generated in the LAs for Petaling Jaya and Seberang Perai, respectively¹⁵.

¹³ Senarai Projek-Projek R & D/IRPA Alam Sekitar Yang Telah Diluluskan Dalam RMK 7 (1996-2000) dan RMK6 (1990-1995), Kementerian Sains, Teknologi dan Alam Sekitar, 20 Ogos 1999.

¹⁴ Seminar paper entitled " A Comparative Analysis of Malaysian and the U.K. Waste Policy and Institutional Framework", Wan Ramle Wan A.Kadir, 2001

¹⁵ Seminar paper entitled " An Overview of Solid Waste Management in Malaysia, 1999", Mohd. Nazeri bin Salleh, Local Government Department, Ministry of Housing and Local Government, 12 August 1999.

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A more recent study for Kuala Lumpur was undertaken in year 2000, in connection with the EIA Report for the proposed thermal treatment plant at Kampung Bohol. It revealed that up to 60% of the waste collected is composed of organics and paper, 18% is plastic and rubber, and the remainder is composed of ceramics, metal, wood, textiles and other materials¹⁶. Up to 40% of materials such as, paper, plastic, metals, glass and textiles in household solid waste, may be recycled (MHLG, 2001). The study showed that organic waste is the biggest component, at 50%, and this has the potential for conversion to compost.

It was also reported that of the waste disposed at landfills, 38% is paper, 18% is plastics, 14% metals and 2% glass¹⁷.

8. Recycling & Diversion Rate

In various studies the current recovery rate of recyclables is estimated to range between 2-5%. No comprehensive data is available and the MHLG estimates the present rate to be around 5%, based on studies carried out by Universiti Putra Malaysia¹⁸. In Kuala Lumpur, the current recycling rate was estimated to be between 4-5%¹⁹.

For example, it is estimated that presently about 57,000 tonnes of paper are disposed of in landfills every month, and current diversion rate from landfills is only 150 tonnes/month²⁰. It was estimated that the combined efforts of 30 small companies recycle only 3% of the total plastic consumed²¹.

It is noted that the Government has proposed a target of 22% recovery rate by the end of the concession period. Both Alam Flora²² and Southern Waste have targeted a 1% annual increase in recycling rate during the concession period, in line with the proposed Government requirement.

9. Market Demand for Recyclables

There is no known comprehensive data on the market demand for recyclables in Peninsular Malaysia. Fluctuations in demand are often determined by the price of production using virgin materials as opposed to one using recycled materials. Higher cost of virgin material can lead to higher demand for recyclables.

The current prices offered by Alam Flora and TrEES for recycled materials are listed in **Table 2**.

¹⁶ A Detailed Environmental Impact Assessment of the Proposed Thermal Waste Treatment Plant for Solid Waste Management Kampung Bohol, Mukim Sungai Besi, Kuala Lumpur Malaysia, Local Government Department, MHLG, July 2000.

¹⁷ New Straits Times, "Why Plastics are hard to Replace", 13 October 1992.

¹⁸ "Waste Recycling in Malaysia Problem & Prospects". M.Nasir Hassan, 1999

¹⁹ Report on Recycling and Resource Recovery Survey, MHLG, 8 November 2001

²⁰ Seminar paper entitled " Opportunities and Challenges of Paper Recycling in Malaysia", Mulhall, Philip J., Malaysian Newsprint Industries Sdn. Bhd. November 2001

²¹ Fact Sheet - Positive Action with Plastics, WWF, undated.

²² Seminar paper entitled " Privatisation Of Municipal Solid Waste Management-Malaysian Experience, Mohamed Siraj Abdul Razack, Alam Flora Sdn. Bhd. November 2001

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Table 2 : List of Prices for Recycled Materials

Item	Material List (Kg)	Participating Organisations	
		Alam Flora (RM)	TrEES (RM)
1.	Newspaper/magazines	0.15	0.15
2.	Cardboard boxes	0.10	0.12
3.	Plastics	0.10	-
4.	Aluminium tin	1.80	2.00
5.	Iron tin	0.10	0.10
6.	Glass bottles	0.05	0.10
7.	Old clothes	-	0.30
8.	Computer paper	0.20	0.35

*Above materials price list may change due to market forces.

Source : Ministry of Housing & Local Government, Recycling Unit

Southern Waste does not have data for the southern region²³. However, they have noted a high demand for paper and cardboard in the southern region, partly attributing this to the good support from buyers in the paper recycling business. Similarly, aluminium is in good demand as the cost of production of a recycled can is estimated to be 5% less than from virgin raw materials. Demand for ferrous and non-ferrous metals is considered moderate, and this market situation can be attributed to the unsteady supply and difficulty in separating the metallic components, to meet industry standards. Glass, like aluminium, is in demand due to the relatively lower cost of producing glass products from cullet. However, recyclable glass is selective and usually more lucrative when specific sources are identified and sourced directly. Demand for plastic, is considered to be low, particularly due to lack of labelling of type of plastic and the relatively lower cost of production using virgin materials.

Malaysian Newsprint Industries Sdn. Bhd. (MNI) reports that the Mentakab Mill requires 300,000 metric tonnes of old newspapers and old magazines per annum²⁴. Only 30% is available from local sources and 210,000 metric tonnes is imported annually from overseas sources. The company estimates that "...all wasted newspapers produced in Malaysia can makeup 6,000 stacks; each as tall as the PETRONAS Twin Tower, enough for six months supply of raw materials". Its subsidiary, Recovered Paper Division based in Kepong, is responsible for collection of the recyclables.

In addition, a survey²⁵ carried out in 2001 revealed the following: -

- MNI currently recycles about 305,000 tonnes of black and white paper a year. The company estimates that they would require 400,000 tonnes per year of recyclables in the next five years.
- Genting Sanyen Industrial Paper Sdn. Bhd. currently recycles about 230,000 tonnes of corrugated boxes a year. Its subsidiary, Persis Hijau Sdn. Bhd., is responsible for collection of the recyclable boxes. With the expansion of its

²³ Meeting with Southern Waste Management on 29 March 2002

²⁴ Seminar paper entitled " Opportunities and Challenges of Paper Recycling in Malaysia", Mulhall, Philip J., Malaysian Newsprint Industries Sdn. Bhd. November 2001

²⁵ Report on Recycling and Resource Recovery Survey, MHLG, 8 November 2001

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production lines, the company estimates that they would require an additional 30% of recyclables (300,000 tonnes per year).

- KL Glass Manufacturers Sdn. Bhd. utilises only recycled glass in its operations and in the last four years recycled about 1090 tonnes of glass annually. The recyclables are sourced directly from hotels, pubs, restaurants, charity homes, supermarkets and independent suppliers. The company has expansion plans and estimates a ten-fold increase (10,920 tonnes per year) in its recyclable glass requirements.
- Malaysian Sheet Glass Sdn. Bhd. processes about 3,250 tonnes recycled glass sheet (cullet) per year (45 tonnes per day). It also plans to expand its business and estimates a demand of 20,000 tonnes per year of glass in the next five years. The company foresees adequate supply from domestic sources. Its annual total sale (mainly domestic) is about RM 7 million.
- May Plastic Industries Sdn. Bhd. recycles an average of 600 tonnes of plastic per year (1.7 tonnes per day) to produce plastic products (bottles and kitchenware). It also plans to expand its business and will require 1,150 tonnes per year for the next five years. It foresees a shortage of supply from domestic sources and already is purchasing materials from Hong Kong.
- Amalgamated Aluminium & Alloy Sdn. Bhd. recycles about 300 tonnes of aluminium and 15,450 tonnes alloy per year. The company produces about 13,200 tonnes of aluminium cans and alloy per year, valued at RM 67.3 million). It also plans to expand its business and estimates a two-fold increase (to 32,000 tonnes per year) in its recyclables supply in the next five years.

The current recycling capacity for the companies mentioned above is summarised in the following table (see **Table 3**).

Table 3 : Summary of Recycling Companies and Their Current Capacities

Company	Type of Recyclable	Current Capacity (Tonnes per yr)
Malaysian Newsprint Industries Sdn. Bhd.	Black and White Paper	305,000
Genting Sanyen Industrial Paper Sdn. Bhd.	Corrugated Boxes	230,000
KL Glass Manufacturers Sdn. Bhd.	Glass	1,090
Malaysian Sheet Glass Sdn. Bhd.	Recycled Glass Sheet (Cullet)	3,250
May Plastic Industries Sdn. Bhd.	Plastic	600
Amalgated Aluminium & Alloy Sdn. Bhd.	Aluminium	300
	Alloy	15,450

Appendix 3A**10. 3Rs & Public Relations - Initiatives by Government**

Following the launch of the 'Action Plan for a Beautiful & Clean Malaysia' (ABC) in 1988, the MHLG launched its first recycling programme involving 23 LAs in 1993. The programme was partly successful for Majlis Perbandaran Petaling Jaya, Majlis Perbandaran Melaka and Dewan Bandaraya Kuching Utara, which were able to sustain the programme. The programme could not be maintained at the other LAs and the MHLG attributed the weaknesses²⁶ to: -

- Lack of market for recyclables in certain parts of the country
- Diminished public confidence due to poor collection services
- Lack of public awareness and promotion programmes
- Lack of participation by stakeholders
- Lack of LA personnel dedicated to the programme
- Lack of policy and master plan for recycling

Subsequently, the MHLG has set up A National Recycling Steering Committee chaired by the Minister and this represents the highest level of policy making in the country. In December 2000 the MHLG re-launched the National Recycling Programme with the primary objective of inculcating the habit of the 3Rs. This time a target was set to achieve 1% annual increase of recycling. The programme was launched at 29 selected LAs that were deemed to be ready for programme implementation. Four items with a ready market were promoted i.e. paper, glass, metal (aluminium & steel cans) and plastics.

A consultant has been engaged by the Ministry of Housing and Local Government (MHLG) to develop and implement the public awareness campaigns. It is a joint programme with the two concessionaires. It is a 2-year programme and at the end of that period, it will be reviewed.

During the first year, 3-colour bins (>2000 sets) were distributed among the participating LAs. In addition, the Ministry encouraged the setting up of collection centres. The media of television, newspapers and leaflets/posters for distribution were employed to publicise activities. Roadshows in various towns were held at shopping malls and schools. The tagline "*Think before you throw*" was introduced.

During the second year of implementation (from November 2001) the public awareness campaigns were intensified and the programme was made open to other LAs. To-date 67 LAs (out of total 145) are participating in the 3Rs programme. Incentives given to these LAs include the provision of new collection vehicles. Recycling bins were redesigned and the Ministry continued to encourage the setting up of more collection centres. A three-pronged approach was adopted, targeting at the masses, schools and corporate companies. Again, the media of TV advertising and newspapers will be used. At the school level, a group of local celebrities will be introduced as "*Fresh Friends*". Corporate bodies comprising hotels, petrol kiosks, fast food restaurants and the universities are also targeted.

²⁶ Seminar paper entitled " Partnership between Government, Waste Management Companies, Recyclers and the Consumers in the Context of 3R", Engku Azman Tuan Mat, Local Government Department, November 2001

Appendix 3A

11th November has been designated "National Recycling Day" and it was launched in November 2001 at Bukit Jalil, Kuala Lumpur. The SWM Concessionaires and other organisations, including Ericsson, F & N, LTM Bio Industries, MNI, MPMA, WANITA MCA and WWF sponsored the event. The event was launched by the Minister of Housing and Local Government and the day's programme included games, concerts by popular performers and the collection of recyclables (paper, glass, aluminium & steel cans and plastic). Also Ericsson batteries could be exchanged for game tokens.

The MHLG has also set up a website "www.kitarsemula.com". By accessing the website, the public are able to obtain information about recycling activities.

It was determined on start-up that public participation is crucial to the success of the programme. At the end of this 2-year programme, a series of surveys will be conducted to measure the awareness attained and the effectiveness of the programme.

Awareness activities implemented by MHLG are complemented by those carried out by respective LAs and Concessionaires in distributing leaflets publicising, and giving guidelines on, recycling e.g. those produced by Dewan Bandaraya Ipoh and Alam Flora.

11 3Rs & Public Relations - Initiatives by Concessionaires

Since taking over services on an interim basis beginning in early 1997, both Alam Flora and Southern Waste Management have planned and implemented programmes in connection with the 3Rs. Alam Flora promoted the 3Rs and implemented Public Awareness Programmes that include: -

- School Programme
- Community Programme
- Waste-Wise Programme
- Waste Recovery at Landfills
- Recyclers' Network.

Alam Flora has prepared a Public Relations and Education Programme (PREP)²⁷ for implementation throughout the privatisation period. PREP's strategies are: -

- To make the public aware and understand the garbage problems and how they affect the environment
- To make the public understand Alam Flora's role in solving issues
- To obtain support to report illegal dumpers
- To educate the public to understand their role in protecting the environment
- To involve the public in 3Rs activities
- To instil to the public the 'dos and don'ts' of garbage handling and its effects

The methods employed are: -

- Briefing to key 'influencers' (Politicians, NGOs)
- Media Relations
- Launch of National Logo/Activities

²⁷ Seminar paper entitled " Privatisation Of Municipal Solid Waste Management-Malaysian Experience, Mohamed Siraj Abdul Razack, November 2001

Appendix 3A

During the interim takeover period, Alam Flora initiated the promotion of the 3R and public awareness programmes. These programmes are run simultaneously and cover the following sectors:

- Schools
- Communities
- Industries and institutions
- Waste recovery at landfill sites
- Recyclers' network

The schools programme is named "KitS" and is carried out at schools in all service areas in collaboration with Malaysian Newsprint Industries Sdn. Bhd. (MNI) and Genting Sanyen Paper Industries. The programme consists of talks on 3R awareness, and student participation in recyclable collection activities (mostly newspapers), with the assistance of Alam Flora. Incentives are provided to encourage the 3Rs and include: -

- Monetary incentives for the recyclable;
- A computer for the school if the volume of recyclables reaches the targeted amount.

The community programme involves Alam Flora co-operating with community associations to conduct 3Rs awareness programmes. The community programme also aims towards creating collection centres. To date, 8 Buy-Back Centres (BBC) and 31 Mobile Recycling Centres (MRC) have been established in Kuala Lumpur, Selangor and Pahang. The MRC in Kuantan is reported to be the most successful so far. These centres complement those established by non-governmental organisations (NGOs), such as TrEES and Residents Associations.

The Waste-wise programme is aimed toward industries and institutions. Under this programme, Alam Flora will create a partnership with institutions or industries on 3R efforts. In joining the programme, the partner is required to commit to implementing or expanding solid waste reduction, and a reuse and recycling programme in their work place, with the assistance of Alam Flora. There are three complementary components to the programme i.e.:

- Waste prevention;
- Recyclables collection;
- Purchase of recyclables.

The programme for *Waste Recovery at Landfills* includes the interception of recoverable materials before being landfilled, and the composting of green waste. Waste is sorted at a special area within the landfill site and the sorting conducted in a controlled manner to ensure the safety of individuals involved.

The Recyclers' Network is an informal organisation formed by Alam Flora and major players in the recycling industry. The network keeps members informed of developments in 3Rs activities. Programmes for specific material recycling are conducted among network members. The network also provides Alam Flora with ready-buyers of recyclables.

In addition to the above, Alam Flora plans to develop a Master Plan to address all aspects of 3Rs. Also planned is a database to monitor 3Rs activities in terms of quantities, types and participants.

Appendix 3A

Progressively toll-free numbers were established and publicised and the customer service system was improved. The communication system for operations was improved by including wireless telecommunications.

In the southern region, Southern Waste has also formulated a Public Relations Programme²⁸ that comprises the following: -

- Public Programmes
- Corporate Public Relations Programme
- Waste Management Seminars
- Schools Programme
- Customer Relations Department (including a Hotline)

SWM had initiated School Recycling Programmes in the LAs, taken over during interim takeover. About 160 secondary and primary schools in Johor and 45 in Melaka have participated in the programme. Recyclables collected by the schools are sold to recycling agents, and the proceeds are returned to the schools.

Two recyclables drop off centres have also been set up, one at Taruka transfer station in Johor Bahru and the other at the SWM Regional Office in Melaka.

²⁸ Southern Region Technical Proposal, Southern Waste Management Sdn. Bhd. 4 December 2000.

Appendix 3A

ANNEX 1

LIST OF FACTORIES THAT USE RECYCLED MATERIALS

	Name	Paper	Glass	Plastic	Al.	O. Metals
	Kuala Lumpur					
1	SPM Plastic Recycle S/B, Jln Sg Besi			1		
2	Teong Kim Plastic Industries, Setapak			1		
	Selangor					
1	Amalgamated Aluminium & Alloy S/B, Klang				1	
2	Amsteel Mills S/B, Klang					1
3	Muda Paper Mills S/B, Kajang	1				
4	Genting Sanyen Ind. Paper S/B, Banting	1				
5	Intraco Holdings S/B, Sabak Bernam			1		
6	Kian Joo Canning S/B, Klang				1	
7	Klang Hock Plastic Industries S/B, Kapar			1		
8	KS Secondary Fibre Supplier, Sg Buloh	1				
9	Kuala Lumpur Glass Manufacturer S/B, PJ		1			
10	LB Alumimium Berhad, Beranang				1	
11	Malayan Sheet Glass S/B, Sg Buloh		1			
12	Malaysian Plastic S/B, Shah Alam			1		
13	May Plastic Industries S/B, Rawang			1		
14	Metal Reclamation Industries S/B, Port Klang					1
15	RK Aluminium Smelting S/B, Klang				1	
16	United Paper Board (M) S/B, Batang Berjuntai	1				
17	United Recycle Fibre, Kajang	1				
	Pahang					
1	Malaysian Newsprint Industries S/B, Bentong	1				
2	Pascorp Industrial S/B, Bentong	1				
	Negeri Sembilan					
1	Future Plastic Industries S/B, Nilai			1		
	Perak					
1	Kampar Steel S/B, Kampar					1
	Kedah					
1	Plasticycle Industries S/B, Sg Petani			1		
	Johor					
1	Malaya Glass S/B, Tampoi		1			
2	Fraser & Neave, Tampoi		1			
	Total	7	4	8	4	3

Note: Al - Aluminium; O. Metals - Other Metals

Source: MHLG, 2002; Alam Flora Sdn Bhd 2002; Majlis Perbandaran Ipoh 2002, The Star, 8 April 2001

Appendix 3A

Annex 2

COLLECTION CENTERS

	NAME	LA	CON.	NGO	COMM.	P. ORG.
A.	Kuala Lumpur					
1	Bangsar Park		1			
2	BP Amoco Malaysia, Jln Tun Perak					1
3	Buyback Centre, Desa Pandan		1			
4	Caltex Oil Malaysia Ltd., Jln Wisma Putra					1
5	Esso Malaysia Bhd., KLCC					1
6	Gabungan Persatuan Penduduk Kaw. Ampang Jaya				1	
7	Intraco Plastic S/B, Jalan Pahang					1
8	Jaya Jusco Store Bhd, Wangsa Maju					1
9	Kelab Kiwanis Malaysia, Gombak			1		
10	Laser Renu (M) S/B					1
11	MNI, Kepong Garden Ind. Park					1
12	Pasar Moden, Cheras		1			
13	Persatuan Pembangunan India Malaysia, Segambut				1	
14	Persatuan Pencinta Alam M'sia, Sri Damansara			1		
15	Persatuan Penduduk Bangsar Park				1	
16	Persatuan Penduduk Bukit Tunku Kuala Lumpur				1	
17	Persatuan Penduduk Tmn Tasik Bdr Sri Permaisuri				1	
18	Persatuan Pengguna Selangor & W.P., Pantai Baru			1		
19	Persatuan Pengurusan Kompleks Malaysia, Jln Imbi					1
20	Petaling Jaya Community Centre, Universiti Malaya				1	
21	Petronas, KLCC					1
22	PH Metal S/B, Jalan Sg Besi					1
23	PPRT, Cheras		1			
24	Prakrutih Enterprise, Tmn Lian Hoe					1
25	Public Finance					1
26	Recycling & Information Centre, Mid Valley		1			
27	Shell Malaysia Ltd., Jln Semantan					1
28	Shell Malaysia Trading S/B, Damansara					1
29	Vista Commanwel		1			
30	Wangsa Maju Residence Assoc.				1	
	Total :	0	6	3	7	14
B.	Selangor					
1	Alam Flora Pulau Ketam		1			
2	Ancorp Mall, PJ		1			
3	Beloga S/B, Klang					1
4	Carrefour, Subang Jaya		1			
5	Centre for Env., Tech. & Development M'sia, PJ			1		
6	Damansara Jaya Residence & Owners Assoc., PJ				1	
7	Gabungan Persatuan Pengguna Malaysia, PJ			1		
8	Giant, Shah Alam		1			
9	Hicom Glenmarie Area, Shah Alam		1			
10	Jelita Pesona S/B, Subang					1
11	JG Containers (M) S/B, Klang					1
12	Kaw. Pasar Tani, Stadium Shah Alam		1			
13	Kawasan Rukun Tetangga SS23 Tmn Sea, PJ				1	
14	Kelab Lions Malaysia			1		
15	Kelab Rotary Malaysia, Klang			1		
16	Kinrara Sek. 1 Town Hall		1			
17	Majlis Alam Sekitar ABIM (MASA), PJ			1		
18	Majlis Pertubuhan Waste Kebangsaan, PJ			1		
19	Metro Plaza, Kajang		1			
20	MPSJ Headquarters		1			
21	National Council Women Org. (NCWO), PJ			1		

Appendix 3A

Annex 2

COLLECTION CENTERS (Continued)

	NAME	LA	CON.	NGO	COMM.	P. ORG.
22	Persatuan Buddist Tzu-Chi Merit Society, Shah Alam			1		
23	Persatuan Kebajikan Xim Phou Moon, Cheras			1		
24	Persatuan Penduduk Rumah Pangsa PKNS Sect. 17, PJ				1	
25	Persatuan Perlindungan Alam Sekitar Malaysia, PJ			1		
26	Persatuan Saudagar-saudagar Minyak M'sia, Selayang			1		
27	Perusahaan Chew Hur S/B, Klang					1
28	Portpower (M) S/B, Pekan Semenyih					1
29	Puchong Jaya Town Hall		1			
30	Ready Ace S/B, Tmn Klang Jaya					1
31	Real Estate Housing & Housing Developers Assoc., PJ			1		
32	Salvation Army, Puchong			1		
33	Sect. 17/12, PJ		1			
34	Seksyen 18, Shah Alam		1			
35	Serdang Indor Stadium		1			
36	Tmn Alam Jaya, Cheras		1			
37	Tmn Ehsan, Selayang		1			
38	Treat Every Environmental Special, PJ			1		
39	Veneta System S/B, Glenmarie					1
40	Wisma DRB-Hicom, Shah Alam		1			
41	World Wide Fund for Nature (WWF), PJ			1		
	Total	0	16	15	3	7
C.	Pahang					
1	Ulu Tualang Landfill, Temerloh	1				
	Total	1				
D.	Pulau Pinang					
1	Bayan Baru Market Complex	1				
2	Depot MPP Kg Jawa Baru	1				
3	Persatuan Pengguna PP (CAP), Jln MacAlister			1		
4	PIFWA, Tanjung Bunga			1		
5	Sahabat Alam Malaysia, Lorong Maktab, PP			1		
6	Tmn Hill Side open area	1				
	Total	3	0	3	0	0
E.	Perlis					
1	Kangar Market Area	1				
2	Kaw. Tapak Keras, Tmn Sena Indah	1				
3	Urban Services Dept. MPKP	1				
	Total	3	0	0	0	0
F.	Kedah					
1	C.S. Ooi Enterprise, Kulim					1
2	Dewan Kenangan Sultan Abdul Hamid	1				
3	MDL Landfill	1				
4	MPKS Assessment Dept., Jln Sultanah Sambungan	1				
	Total	3	0	0	0	1
G.	Perak					
1	Atlantic Waste S/B, Ipoh					1
2	Ayer Tawar Branch Office	1				
3	Central Malaya Paper S/B, Ipoh					1
4	J.R. Auto Services, Ipoh					1
5	Jaya Hijau Enterprise, Ipoh					1
6	K.S. Secondary Fibre Supply S/B, Menglembu					1
7	Kong Citi Enterprise, Ipoh					1
8	Lumut Branch Office	1				
9	MDM Pulau Pangkor Landfill	1				

Appendix 3A

Annex 2

COLLECTION CENTERS (Continued)

	NAME	LA	CON.	NGO	COMM.	P. ORG.
10	Onn Plastic Recycle Trading,					1
11	PT Crusher and Typres Puffers, Lahat					1
12	Seng Kong Enterprise, Ipoh					1
13	SGPM Metal Recycling S/B, Ipoh					1
14	Shin Yu Enterprise, Ipoh					1
15	Sitiawan Branch Office	1				
16	SLL Machinery S/B, Ipoh					1
17	Sri Manjung Branch Office	1				
18	Sri Suria Enterprise, Kamunting					1
19	Yu Weng Trading Co., Menglembu					1
	Total	5	0	0	0	14
H.	Negeri Sembilan					
1	Lot 2152, Jalan Sikamat	1				
2	MPPD Store Km1, Port Dickson	1				
	Total	2	0	0	0	0
I.	Johor					
1	Gelang Patah Community Hall		1			
2	Giant		1			
3	Green Town Enterprise (M) S/B, Ulu Tiram					1
4	Masai Community Hall		1			
5	Perling Mall Supermarket		1			
6	Tman Johor Jaya Bus Terminal		1			
7	Tmn Universiti Bus Terminal		1			
8	Zeng Han Trading					1
	Total	0	6	0	0	2
	TOTAL (Peninsular Malaysia)	17	28	21	10	38

Note: LA: Local Authority, CON.: Concessionaire, NGO: Non-Governmental Organisation,
COMM : Community Organisation, P.ORG: Private Organisation

Source : MHLG, 2002; Alam Flora Sdn Bhd 2002; Majlis Perbandaran Ipoh 2002, The Star, 8 April 2001