Final Report

Report No 8

Capacity Building for Local Government Units

September 2003
METRO MANILA SOLID WASTE MANAGEMENT PROJECT (TA 3848-PHI)

FINAL REPORT

REPORT NO: 8

CAPACITY BUILDING FOR LGUS

Project Team

Neil Varey, AEA Technology, Project Director
Luis F. Diaz, CalRecovery, Inc., Technical Team Leader

Nick Allen, GlobalWorks, Disposal
Reynor Rollan, ENR Consultants, Disposal
Horace Crowe, AEA Technology, Institutional
Levi Buenafe, GlobalWorks, Institutional
Luis Diaz, CalRecovery, Inc., Medical Waste
Linda Eggerth, CalRecovery, Inc., Community Awareness
Grace Favila, ENR Consultants, Community Awareness
Roger Lopez, ENR Consultants, Social
Manjit Kahlon, AEA Technology, Solid Waste
Joey Sta. Ana, GlobalWorks, Solid Waste
Richard Pook, AEA Technology, Financial
Agnes Palacio, GlobalWorks, Financial

September 2003
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Executive Summary

One of the areas that have been emphasized throughout the project is Capacity Building of Local Government Units. RA 9003 requires every LGU to prepare a solid waste management plan; to promote the segregated collection of waste fractions (recyclables, biodegradables, and residual waste); to establish community-based facilities at which the recyclables can be sorted and processed for transfer to markets and the biodegradables can be composted to produce a soil amendment; and to plan for disposal of waste at well designed and managed disposal facilities.

Efforts during the first part of the project were focused on identifying the needs of the LGUs in these areas, and on defining general subject areas in which the Consultants could provide assistance during the second part of the project.

Preliminary Activities

Activities conducted early in the project served to introduce the project to the communities and to determine their needs, as well as to establish the process for working with the LGUs selected to receive direct technical assistance.

- **LGU Surveys and Meetings** – A series of meetings were held with representatives of the solid waste management departments of each of the 17 LGUs in Metro Manila. LGUs were asked to complete a survey that was designed to assess the status of activities related to the implementation of the requirements of RA 9003. The following areas were identified in which technical assistance was needed:
  - Meeting the requirements of RA 9003
  - Preparation of the 10-year plan
  - Establishment of user fees
  - Provision of collection service for the commercial sector by the municipality
  - Definition of responsibility for final disposal of the waste

- **LGU Selection for Technical Assistance** -- One objective of the project was to provide direct assistance to a few selected LGUs in activities related to the preparation of their 10-year solid waste management (SWM) plans. Eight LGUs were selected through a competitive tendering process: Makati, Malabon, Manila, Muntinlupa, Navotas, Pasig, Quezon City, and Valenzuela.

- **Technical Working Group** – Meetings were held with representatives from the eight selected LGUs. Technical Working Groups were formed to assist the LGUs in the various aspects of the project.

Resource Documents

Two resource documents were prepared and submitted with the Interim Report:

- **Guidance on SWM Technologies** – The guidance document was prepared to assist LGUs in making suitable choices for future facilities and practices needed as part of their SWM plans. The document presents experiences in many countries around the world, covering key aspects of solid waste management from waste generation and characterization, to collection, treatment, and disposal systems.

- **Metro Manila SWM Planning Tool** – A computer-based model was developed to assist LGUs in the development of SWM plans, and especially to determine the types, number, and associated costs for new facilities needed in meeting required RA 9003 targets.
Ten-year Solid Waste Management Plans

The Consultants assisted the LGUs in the preparation of their solid waste management plans.

- **Annotated Outline** – In cooperation with the NSWMC, a comprehensive annotated outline was prepared that could be used by LGUs for the preparation of the SWM plans. A draft of the outline was distributed to representatives of LGUs and other agencies that participated in the seminar/workshop. The outline was finalized and submitted to the NSWMC, and has been made available to all agencies that have requested it.

- **Seminar/Workshop for Preparation of SWM Plans** – A comprehensive seminar/workshop was organized and conducted by the Consultants, in March 2003 in Antipolo.

  - **Seminar** – The one-day seminar was designed to provide an overview on the components of the SWM plans and general information on solid waste management practices, and was open to all of the LGUs in Metro Manila, selected LGUs from regions outside of Metro Manila, and representatives from regional and national agencies.

  - **Workshops** – A series of workshops were conducted for three days after the seminar, specifically for the eight LGUs that had been selected to receive special assistance under the project. The workshops covered a wide range of waste management topics. Write-shops were held to provide assistance to the LGUs in preparing elements of their plans, and the LGUs presented the conceptual strategies that they had prepared on the final day.

- **Preparation of SWM Plans** – Assistance was provided to the LGUs in the preparation of their solid waste management plans.

- **Waste Analysis and Characterization Studies (WACS)** – Technical assistance was provided in the planning and conduct of WACS. Detailed information about the waste characterization program is provided in the *Waste Analysis and Characterization Study*, Report No. 3 of this project.

Community-based Solid Waste Management Projects

Assistance has been provided to the LGUs in the implementation of community-based recycling projects. Due to the importance of community-based recycling in enabling communities to meet the mandates of RA 9003, an important part of the Metro Manila Solid Waste Management Project involves providing assistance to the LGUs in the implementation of projects. Eight LGUs were selected for assistance and were eligible to receive:

- technical assistance in terms of project formulation, design and implementation, and
- financial assistance through the issuance by ADB of funds set aside in the project for this purpose.

Through the assistance, the LGUs are enabled to implement, expand, or enhance community-based recycling activities, e.g., segregated collection, recycling, and composting. The project could include equipment, supplies, personnel, operations and maintenance, IEC, etc., and could be allocated to one or more than one barangay. As part of this TA, the ADB set aside a special fund, consisting of US$200,000, to be used by the selected LGUs for the design and implementation of community-based solid waste management projects.

A number of criteria were identified as being important for selection of the community-based recycling projects, including:

- Technical and financial sustainability
- Could serve as a model for other communities in Metro Manila
- Low technology
- Low cost
- Supported by community and barangay leaders
In addition, in identification of the projects, the consultants made every effort to promote a variety of approaches, in order to provide a broader base for evaluation.

During the project development process, the LGUs were requested to submit to the project office a concise (about two pages) concept paper, which would explain the general idea of the project. In addition, the LGUs were given guidelines in terms of amounts of funds available to them. In order to treat every LGU in the same manner, the available funds were divided into eight parts such that each LGU would be eligible to receive approximately US$25,000. Once the concept paper was submitted and approved or revised by the project team, the LGUs were requested to submit a formal proposal. In general, the formal proposal consisted of a technical description and a cost estimate. Upon receipt of the formal proposals, the project team reviewed the proposals and either requested clarification from the proponents or made a recommendation to the ADB.

Five projects have been approved by the ADB for funding and have been implemented. A summary of the approved projects is presented in Table E-1.

### Table E-1. Description of ADB-funded CBSWM Projects

<table>
<thead>
<tr>
<th>LGU</th>
<th>Description of Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Makati</td>
<td>Design and implementation of two types of mobile material recovery facilities</td>
</tr>
<tr>
<td>Muntinlupa</td>
<td>Improvements to the existing materials recovery facility</td>
</tr>
<tr>
<td>Pasig</td>
<td>Improvements to the composting, recycling, and livelihood operations in Brgy. Ugong</td>
</tr>
<tr>
<td>Quezon City</td>
<td>Improvements to the recycling and composting operations in Brgy. Holy Spirit</td>
</tr>
<tr>
<td>Valenzuela</td>
<td>Implementation of segregated collection system, and recycling and composting operations in Brgy. Mapulang Lupa</td>
</tr>
</tbody>
</table>

**Summary**

One of the major emphases of this project involved capacity building of Local Government Units. The project team conducted some activities to define the needs for capacity building for the LGUs. This led to the selection of eight LGUs to receive direct technical assistance, and in particular capacity building, from the project team. The following activities have been conducted:

- Guidance on solid waste management technologies;
- Development of a solid waste management planning tool;
- Preparation of an annotated outline for the 10-year plans;
- Assistance in the preparation of 10-year plans;
- Conduct of waste analysis and characterization studies; and
- Development of community-based solid waste management projects.
1 Introduction

The Terms of Reference of the TA as well as decisions reached during the tripartite meeting on 26th February 2003 directed the Consultants to concentrate on some aspects of waste management that would be of most benefit to the Government. One of the areas to be emphasized throughout the project is capacity building of local government units (LGUs). Consequently, the work that was conducted during the first part of the project was used by the Consultants to define general subject areas in which the Consultants could provide specific assistance during the second part of the project.

The report is divided into the following sections.

- **Section 2** – overview of the various activities conducted early in the project to determine the needs of the communities and to establish the process for working with the LGUs selected to receive direct technical assistance:
  - LGU surveys and meetings
  - LGU selection for technical assistance
  - Technical working group

- **Section 3** – resource documents that were prepared:
  - Guidance on solid waste management technologies
  - Solid waste management planning tool

- **Section 4** – assistance in preparation of 10-year solid waste management plans:
  - Preparation of an annotated outline for the 10-year plans
  - Assistance in the preparation of 10-year plans
  - Assistance in the conduct of waste analysis and characterization studies

- **Section 5** – assistance in the development and implementation of community-based solid waste management (CBSWM) projects

Other capacity building activities are discussed in the *Institutional Report*, Report No 7, of this project.

2 Preliminary Activities

The various activities conducted early in the project are reviewed in the following paragraphs. The activities served to introduce the project to the communities and to determine their needs, as well as to establish the process for working with the LGUs selected to receive direct technical assistance.

2.1 LGU Surveys and Meetings

At the beginning of the project, the Consultant conducted a series of meetings with representatives of the solid waste management departments of each of the 17 LGUs in Metro Manila. In some instances the meetings included the Mayor. A survey instrument was designed to assess the status of activities related to the implementation of the requirements of RA 9003, in particular the preparation of solid waste management plans, to identify the capacity building status and needs, and to clarify the roles and responsibilities of the LGUs. The survey was carried out during July and August 2002. Follow-up meetings and consultations were conducted with representatives from the LGUs to investigate the responses provided, to gather additional information, to review and analyze responses, and to clarify omissions.
The results of the survey and meetings helped to identify areas in which technical assistance was needed. Some of these areas include:

- Meeting the requirements of RA 9003
- Preparation of the 10-year plan
- Establishment of user fees
- Provision of collection service for the commercial sector by the municipality
- Definition of responsibility for final disposal of the waste

### 2.2 LGU selection for Technical Assistance

One objective of the project was to provide direct assistance to a few selected LGUs in activities related to the preparation of their 10-year solid waste management (SWM) plans.

During an extensive process that commenced in late July 2002, criteria were developed and agreed with personnel from DENR for the selection of LGUs that would receive technical assistance from the Consultants. In early September 2002, the LGUs were requested to respond to the criteria in accordance with the selection process established. Initially, five LGUs were chosen based on the competitive tendering requirements set out in the selection process. Following discussions between the DENR, ADB and the Consultant in mid-October, three additional LGUs were included, making a total of eight LGUs that would be recipients of Consultant advice and recommendations in support of LGU development of 10-year SWM plans. The implementation of the program of assistance in the development of the 10-year plans was delayed as a result of the selection process.

The following eight LGUs were selected through the competitive tendering process: Makati, Malabon, Manila, Muntinlupa, Navotas, Pasig, Quezon City, and Valenzuela. A meeting was held in which the Mayors, or their representatives, of the participating LGUs were invited and during which the Memorandum of Understanding with each LGU was signed (see Figure 1).

![Figure 1. Photograph of DENR MOA Signing with Valenzuela](image)

### 2.3 Technical Working Group

A meeting was conducted with representatives from the eight selected LGUs in late October 2002. During the meeting, the nature of the project and the level and type of assistance to be provided to the LGUs was discussed. Members of the team explained that this work would cover technical support in relation to waste analysis and characterization studies (WACS) see Report No.3, Waste Analysis and Characterization Study. Additionally, the assistance would include other important aspects of solid waste management such as capacity building, financial management issues and the provision of effective information, education, and
communication (IEC) programs, see Report No 10, *Information Education and Communication*. On-going development of community-based solid waste management (CBSWM) project initiatives as integral parts of these plans was also introduced.

Working group meetings with representatives from LGUs were initiated shortly after the initial meeting. These meetings were scheduled to discuss detailed specific topics including waste characterization surveys and IEC development needs. Additional working groups were also established to address such issues as financial management; capacity strengthening and development; technology development; and specific solid waste management initiatives focusing on CBSWM schemes.

## 3 Resource Documents

### 3.1 Guidance on SWM Technologies

A document was prepared and issued to assist LGUs in making suitable choices for future facilities and practices needed as part of their 10-year SWM plans. This document presents experiences in many countries around the world, covering all key aspects of solid waste management from waste generation and characterization, to collection, treatment and disposal systems. In the document, the Consultant made every effort to relate these technologies to their short, medium, and long-term applicability for adoption in Metro Manila. The report was presented in the Interim Report but will also be available on the project website.

### 3.2 Metro Manila SWM Planning Tool

In seeking to assist LGUs in the development of 10-year plans, and especially to determine the types, number and associated costs for new facilities needed in delivering required RA 9003 targets, a computer-based model was developed. The model was designed to be used for the entire Metro Manila area or for individual LGUs to identify the facilities required on a year-by-year basis over a defined time period (20 years has been used). Of course, the results obtained from the model depend on the accuracy and detail of input data provided. The type of input data includes: waste generation over time, waste composition, and proposed capacities and throughput for a range of waste treatment facilities, each separately specified. Additional information regarding the planning tool is presented in the Interim Report and is available on the project website.

## 4 Ten-year Solid Waste Management Plans

### 4.1 Annotated Outline

Members of the project team, in close cooperation with the NSWMC, developed a comprehensive annotated outline for the preparation of 10-year SWM plans by the LGUs. A draft of the outline was distributed to representatives of LGUs and other agencies that participated in the Seminar/Workshop in Antipolo, Rizal in March 2003 (see Section 4.2). Based on discussions and suggestions made during the Workshop, the outline was revised. The final version of the annotated was submitted to and approved by the NSWMC.

The annotated outline has been made available to all agencies that have requested it, both by the Consultants and by the NSWMC. A copy of the outline is presented in Annex 1; a summary of its contents is presented in Table 1.
<table>
<thead>
<tr>
<th>Table 1. Summary of Contents of Annotated Outline for LGU Solid Waste Management Plans</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXECUTIVE SUMMARY -- Overview of the plan including current situation, vision, and objectives</td>
</tr>
<tr>
<td>1. INTRODUCTION -- Introduction to the plan to the reader including purpose and approach</td>
</tr>
<tr>
<td>1.1 Purpose</td>
</tr>
<tr>
<td>1.2 Approach</td>
</tr>
<tr>
<td>1.3 Acknowledgements</td>
</tr>
<tr>
<td>2. City/Municipal Profile -- Key information about the city/municipality</td>
</tr>
<tr>
<td>2.1 Location</td>
</tr>
<tr>
<td>2.1 History</td>
</tr>
<tr>
<td>2.2 Population</td>
</tr>
<tr>
<td>2.3 Economic Profile/Land Use</td>
</tr>
<tr>
<td>2.4 Physical Characteristics</td>
</tr>
<tr>
<td>3. Current Solid Waste Management Conditions -- Description of solid waste management practices in existence</td>
</tr>
<tr>
<td>3.1 Institutional Arrangements</td>
</tr>
<tr>
<td>3.2 Inventory of Equipment and Staff</td>
</tr>
<tr>
<td>3.3 Source Reduction</td>
</tr>
<tr>
<td>3.4 Collection</td>
</tr>
<tr>
<td>3.5 Transfer</td>
</tr>
<tr>
<td>3.6 Processing Facilities</td>
</tr>
<tr>
<td>3.7 Final Disposal</td>
</tr>
<tr>
<td>3.8 Special Wastes</td>
</tr>
<tr>
<td>3.9 Markets for Recyclables</td>
</tr>
<tr>
<td>3.10 IEC</td>
</tr>
<tr>
<td>3.11 Costs and Revenues</td>
</tr>
<tr>
<td>3.11 Key Issues</td>
</tr>
<tr>
<td>4. Waste Characteristics -- Uses results of WACS and recycling information to determine quantity and composition of waste generated</td>
</tr>
<tr>
<td>4.1 Disposed Waste (from WACS)</td>
</tr>
<tr>
<td>4.2 Diverted Waste</td>
</tr>
<tr>
<td>4.3 Generated Waste</td>
</tr>
<tr>
<td>5. Legal/Institutional Framework -- Overview of existing institutional arrangements in order to identify parties responsible for undertaking the relevant aspects of the plan</td>
</tr>
<tr>
<td>5.1 Local Laws and Regulations</td>
</tr>
<tr>
<td>5.2 Roles</td>
</tr>
<tr>
<td>5.3 City/Municipal Solid Waste Management Board</td>
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<tr>
<td>5.4 Barangay Solid Waste Management Board</td>
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<tr>
<td>5.5 Stakeholders Participation</td>
</tr>
<tr>
<td>6. Plan Strategy -- Delineation of the desired outcome of the solid waste management plan</td>
</tr>
<tr>
<td>6.1 Vision</td>
</tr>
<tr>
<td>6.2 Targets</td>
</tr>
<tr>
<td>6.3 Strategies</td>
</tr>
</tbody>
</table>
Table 1. Summary of Contents of Annotated Outline for LGU Solid Waste Management Plans (continued)

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
</table>
| 7. SWM System | Detailed description of each program that will be implemented to reach the objectives and targets defined in Section 6
  7.1 Source Reduction
  7.2 Collection
  7.3 Segregation, Recycling, and Composting
  7.4 Transfer (if applicable)
  7.5 Disposal
  7.6 Special Wastes
  7.7 Information, Education and Communication (IEC)
  7.8 Market Development |
| 8. Implementation Strategy | Discussion of the logistics of how the solid waste management system will be implemented.
  8.1 Framework
  8.2 Diversion Projections
  8.3 Monitoring Program
  8.4 Alternatives Analysis
  8.5 Incentive Programs |
| 9. Institutional Aspects | Existing and planned structure for implementation of plan
  9.1 Roles
  9.2 Legal |
| 10. Social and Environmental Aspects | Discussion of social and environmental issues related to development of full-scale infrastructure
  10.1 Social Aspects
  10.2 Environmental Aspects |
  11.1 Investment cost
  11.2 Annual Costs
  11.3 Funding Options
  11.5 Cost Evaluation and Comparison
  11.6 Summary |
| 12. Plan Implementation | Implementation phases, milestones, and schedule
  12.1 Phases and Responsibilities
  12.2 Milestones
  12.3 Implementation Schedule |
| References | |
4.2 Seminar/Workshop for preparation of 10-year plans

A comprehensive seminar/workshop was organized and conducted by the Consultant in March 2003 in Antipolo. Copies of the programs for the seminar and for the workshop are presented in Annex 2 along with copies of the presentations given. These are also available on the web site.

The one-day seminar was designed to provide an overview on the components of the SWM plans and general information on solid waste management practices. All of the LGUs in Metro Manila were invited, as well as members of selected LGUs from regions outside of Metro Manila and representatives from regional and national agencies. Photographs from the seminar are presented in Figure 2.

Figure 2. Seminar on March 11, 2003

A series of workshops were conducted for three days after the seminar. The workshops were developed specifically for members of the eight LGUs that had been selected to receive special assistance under the project. The workshops covered a series of topics including storage, collection, composting, medical waste treatment, financial management, and others. The workshops encouraged participation from the LGUs, and write-shops were held during which assistance was provided to the LGUs in preparing elements of their solid waste management plans. On the third day, the LGUs presented the conceptual strategies that they had prepared. Photographs from the workshop are presented in Figures 3-5.

Figure 3. Workshop on March 12-14, 2003
4.3 Preparation of 10-year plans

Based on the results of the workshop and using materials provided during and immediately after the event, members of selected LGUs set out in the preparation of draft 10-year solid waste management plans. The preparation of the plans involved numerous steps, including:

- Planning for and conduct of the waste analysis and characterization study (WACS), if not completed prior to the workshop
- Analysis of data from the WACS
- Collection of information for the description of the current system (e.g., breakdown of population, listing of collection vehicles, etc.)
- Development of strategy, using conceptual strategy developed at the workshop
- Writing of the plan document
Continuous assistance has been provided to the LGUs in the data analysis, development of strategies, and preparation of the solid waste management plans. The Consultants have reviewed draft plans submitted by the LGUs, and comments have been provided. The LGUs have been encouraged to share their work with other LGUs as a means of improving the process.

An example of draft SWM plans that has been prepared by an LGU is presented in Annex 3.

4.4 Waste Analysis and Characterization Studies

Members of the team have spent a considerable amount of effort in providing technical assistance to the LGUs in the planning and conduct of waste analysis and characterization studies (WACS). This process has included a general orientation to all of the key members of the LGUs on the most important aspects of the process. A copy of the presentation used for this purpose is included in the Waste Analysis and Characterization Study report, Report No. 3.

Furthermore, members of the team assisted in the planning and during the conduct of the waste characterization at the following LGUs: Makati, Manila, Muntinlupa, Pasig, Quezon City, and Valenzuela. A photograph from the planning session in Makati is shown in Figure 6.

Finally, the consultants worked very closely with key members of the staff of the various LGUs during the process of data analyses and presentation of the results. Detailed information about the entire waste characterization program is provided in the Waste Analysis and Characterization Study Report No. 3 of this project.

5 Community-based Solid Waste Management Projects

Assistance has been provided to the LGUs in the implementation of community-based recycling projects. RA 9003 requires every LGU to promote the segregated collection of waste fractions (recyclables, biodegradables, and residual waste) and to establish community-based facilities at which the recyclables can be sorted and processed for transfer to markets and the biodegradables can be composted to produce a soil amendment.

Due to the importance of community-based recycling in enabling communities to meet the mandates of RA 9003, an important part of the Metro Manila Solid Waste Management Project involved providing assistance to the LGUs in the implementation of projects. The LGUs selected for assistance in the project were eligible to receive:
technical assistance in terms of project formulation, design and implementation, and
financial assistance through the issuance by ADB of funds set aside in the project for this purpose.

Through the assistance, the LGUs have been enabled to implement, expand, or enhance community-based recycling activities, e.g., segregated collection, recycling, and composting. The projects could include equipment, supplies, personnel, operations and maintenance, IEC, etc., and could be allocated to one or more than one barangay. As part of this TA, the ADB set aside a special fund, consisting of US$200,000, to be used by the selected LGUs for the design and implementation of community-based solid waste management projects.

A number of criteria were identified as being important for selection of the community-based recycling projects, including:

- Technical and financial sustainability
- Could serve as a model for other communities in Metro Manila
- Low technology
- Low cost
- Supported by community and barangay leaders

In addition, in identification of the projects, the consultants made every effort to promote a variety of approaches, in order to provide a broader base for evaluation.

As of the writing of the Final Report, five projects have been funded and implemented.

### 5.1 Description of Process

#### 5.1.1 Project Development

A process was developed to expedite the identification of projects for implementation, the preparation of proposals, and the approval of the projects. The following steps were undertaken:

- Development of a plan of action which consisted of an evaluation of existing community-based solid waste management facilities throughout Metro Manila and the development of a list of possibilities for consideration by the LGUs
- Site visits to potential project sites
- Development of a framework for implementation and presentation of the framework to LGUs at the Workshop in March (see Table 2)
- Discussions with each of the LGUs at the Workshop to identify potential projects
- Submittal by LGUs of concept documents
- Review of concept documents
- Submittal by LGUs of proposals
- Review of proposals and submittal to ADB for approval

During the project development process, the LGUs were requested to submit to the project office a short, but concise (about two pages) concept paper, which would explain the general idea of the project. In addition, the representatives of the LGUs were given guidelines in terms of amounts of funds available to them. In order to treat every LGU in the same manner, the available funds were divided into eight parts such that each LGU would be eligible to receive up to a maximum US$25,000. Once the concept paper was submitted and approved or revised by the project team, the LGUs were requested to submit a formal proposal. In general, the formal proposal consisted of a technical description and a cost estimate. Upon receipt of the formal proposals, the project team reviewed the proposals and either requested clarification from the proponents or made a recommendation to the ADB.

During the entire process, technical assistance was provided to the LGUs through meetings, discussions, and review of documents.
Table 2. CBSWM Project Funding Guidelines Provided to LGUs

<table>
<thead>
<tr>
<th>Source of fund:</th>
<th>Asian Development Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount available:</td>
<td>Maximum of US$25,000 is available to each of the 8 LGUs participating in the Project</td>
</tr>
<tr>
<td>Use of funds:</td>
<td>To implement, expand, or enhance community-based recycling activities, e.g., segregated collection, recycling, and composting. For the project identified, funds may be used for equipment, supplies, personnel, operations &amp; maintenance, IEC, etc. May be allocated to more than one community/barangay.</td>
</tr>
<tr>
<td>Important considerations:</td>
<td>Can be implemented in short term (2-3 months) Community support Barangay captain/council support Available site Segregated collection (if project is for a MRF or composting facility)</td>
</tr>
<tr>
<td>Procedure:</td>
<td>Discussion between LGU representatives and ADB project team to identify community-based projects Preparation of concept document -- brief description and cost estimate (1 to 2 pages) Submittal of proposed project concept to DENR for approval Preparation of proposal (3 to 5 pages) – description, cost estimate, implementation schedule. Supported by documentation of barangay council support and availability of site, and submittal of supporting financial information. Submittal of proposed project to ADB for approval Preparation of disbursement plan Implementation</td>
</tr>
</tbody>
</table>

5.1.2 Project Implementation

The consultants provided technical assistance to the LGUs during the implementation of their projects. This work included site visits to the projects to examine progress and suggest improvements; advice to the LGUs via telephone, e-mail, and during meetings; and other assistance as needed.

In addition, the consultants assisted the ADB in administering the projects through the review of invoices and monitoring of progress.

5.2 Description of Projects

Five projects were approved by the ADB for funding. A summary of the approved projects is presented in Table 3. and the approved budgets for the five projects are included in Annex 4.

Table 3. Description of ADB-funded CBSWM Projects

<table>
<thead>
<tr>
<th>LGU</th>
<th>Description of Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Makati</td>
<td>Design and implementation of two types of mobile material recovery facilities</td>
</tr>
<tr>
<td>Muntinlupa</td>
<td>Improvements to the existing materials recovery facility</td>
</tr>
<tr>
<td>Pasig</td>
<td>Improvements to the composting, recycling, and livelihood operations in Brgy. Ugong</td>
</tr>
<tr>
<td>Quezon City</td>
<td>Improvements to the recycling and composting operations in Brgy. Holy Spirit</td>
</tr>
<tr>
<td>Valenzuela</td>
<td>Implementation of segregated collection system, and recycling and composting operations in Brgy. Mapulang Lupa</td>
</tr>
</tbody>
</table>
The City of Makati faces a major problem in the implementation of its resource recovery and reduction program for solid waste management as it has limited available land for the construction of waste management facilities. Facing this constraint or challenge, Makati decided to develop mobile materials recovery facilities for the City's Resource Recovery and Reduction Program.

The project involves the development of two types of "mobile MRF's" to be used in the two districts in Makati: 1 van and 10 pushcarts. The mobile MRF's are designed to collect paper, plastic, metal, and glass.

The objectives of the project are:

- To provide the City with a tool that will be used for the recovery and reduction of recyclable wastes diverted from the waste stream by a minimum of 5% yearly;
- To provide the barangays with the prototype mobile MRF that can be adopted for their solid waste resource recovery and reduction program; and
- To push the barangay through the provision of infrastructure support, to implement, enforce and sustain their solid waste resource recovery and reduction program, most specially segregation at source.

The design for the van type of mobile MRF is depicted in Figure 7, and for the pushcarts in Figure 8.

As of mid-July 2003, the van and pushcarts had been designed and ordered.
5.2.2 Muntinlupa

The project in Muntinlupa includes: (i) expansion of the present MRF, (ii) shredding of coconut shells, where the by-products will be used by the City Plant Nursery and the local DA office for urban farming, and (iii) information, education and communications (IEC) support.

The objectives of the project are:

- To broaden the recycling program for the present nine areas/communities in two barangays
- To increase waste diversion through composting
- The expected benefits of the project include: reduction of waste for final disposal, reduction of truck/trip for waste collection, and landfill savings.

Photographs of the existing materials recovery facility, prior to expansion, are shown in Figure 9.

![Figure 9. Site of CBSWM Project in Muntinlupa, Prior to Expansion](image)

Figure 10 shows the progress on the MRF construction as of mid-July.

![Figure 10. CBSWM Expansion Project in Muntinlupa, July 2003](image)
5.2.3 Pasig

The project in Pasig is designed to improve its community-based solid waste management system in Brgy. Ugong. The project includes: (i) improvement of the composting operation; (ii) implementation of a livelihood project using the compost produced for gardening; (iii) improvements to the recycling operation to increase efficiency in packing and storing recyclable materials; (iv) enhancements to the Doy Pack livelihood project; and (v) public awareness activities.

The objectives of the project are:

- Improve operations at the composting facility to reduce the moisture content of the feedstock, produce a high quality compost, and expand operations
- Implement a livelihood project in which the compost produced will be used to grow vegetables that can be used by the community or sold
- Increase efficiency at the recycling center and expand operations
- Enhance the existing livelihood project using Doy Packs to produce bags, folders, and other items for sale
- Increase recycling through public education

Photos of the existing composing operation and livelihood project are shown in Figures 11-13.
5.2.4 Quezon City

The project implemented by Quezon City is designed to improve and expand the existing materials recovery and composting facility in Brgy Holy Spirit.

The objectives of the project are:

- To provide and implement a waste management system in Barangay Holy Spirit.
- To implement waste segregation in every source of waste within the barangay.
- To improve the efficiency of waste processing in the facility, which covers composting, recycling, and urban farming.

The improvements to the system include:

- Procurement of processing materials and equipment
- Increase in the area of composting
- Addition of a greenhouse eco-center structure
- Conduct of an IEC campaign

Photographs of the materials recovery facility in Brgy Holy Spirit, prior to expansion, are shown in Figure 14.

![Figure 14. Site of CBSWM Project in Quezon City, Prior to Expansion](image)

Photographs showing the progress of the project as of mid-July 2003 are shown in Figures 15-18.

![Figure 15. Composting Operation in Quezon City, Static Pile](image)  
![Figure 16. Composting Operation in Quezon City, Turned Windrow](image)
5.2.5 Valenzuela

Valenzuela was approved to implement a community-based ecological solid waste management project in Brgy. Mapulang Lupa. The project involves social mobilization, training of personnel, implementation of segregated collection, and establishment of a materials recovery facility and windrow composting operation.

The objectives of the project are:

- To organize the community to adopt the practice of segregation of waste at source, recycling, reuse and backyard composting and gardening.
- To establish a materials recovery facility and windrow composting operation.
- To form a Technical Working Group with representatives from each purok, and to train them on implementation and monitoring of the project.
- To train Eco-aides in the proper handling of waste.
- To establish linkage with junk shops and industries for the marketing of the recyclables.
- To establish a monitoring scheme on project implementation.

Figure 19 shows the MRF site at the start of construction, and Figure 20 shows the collection vehicle prior to delivery.
6 Summary

One of the major emphases of this project involved capacity building of Local Government Units. Early in the project, the team conducted some activities to define the needs for capacity building for the LGUs, including: the conduct of a survey and meetings with stakeholders. This led to the selection of eight LGUs to receive direct technical assistance, and in particular capacity building, from the project team. The following activities have been conducted:

- Guidance on solid waste management technologies;
- Development of a solid waste management planning tool;
- Preparation of an annotated outline for the 10-year plans;
- Assistance in the preparation of 10-year plans;
- Conduct of waste analysis and characterization studies; and
- Development of community-based solid waste management projects.
# Annex 1 Annotated Outline for LGU Solid Waste Management Plans

<table>
<thead>
<tr>
<th>EXECUTIVE SUMMARY</th>
<th>Overview of the plan including current situation, vision, and objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Introduction</td>
<td>Introduction to the plan to the reader including purpose and approach</td>
</tr>
<tr>
<td>1.1 Purpose</td>
<td>• City/municipality’s vision related to solid waste management</td>
</tr>
<tr>
<td></td>
<td>• Key issues facing the community</td>
</tr>
<tr>
<td></td>
<td>• Goals for the plan, and how the plan will help to alleviate the issues facing the community</td>
</tr>
<tr>
<td></td>
<td>• Intent of RA 9003 and its effect on solid waste management</td>
</tr>
<tr>
<td>1.2 Approach</td>
<td>• Approach used in preparing plan, e.g., compilation of existing information, conduct of WACS, using results of previous studies, involvement of stakeholders, etc.</td>
</tr>
<tr>
<td></td>
<td>• Data sources, e.g., National Solid Waste Management Commission, Solid Waste Management Board, City Planning and Development Office and City Engineering Office provide data for analyses and development of forecasts.</td>
</tr>
<tr>
<td>1.3 Acknowledgements</td>
<td></td>
</tr>
</tbody>
</table>

## 2. City/Municipal Profile

<table>
<thead>
<tr>
<th>2.1 Location</th>
<th>Key information about the city/municipality</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1 History</td>
<td>• Location of the city/municipality including map indicating locations of barangays, as well as residential, commercial, and industrial centers, and agricultural areas.</td>
</tr>
<tr>
<td></td>
<td>• Land area.</td>
</tr>
<tr>
<td>2.2 Population</td>
<td>• Historical background.</td>
</tr>
<tr>
<td>2.3 Economic Profile/Land Use</td>
<td>• List of industries within the city/municipality.</td>
</tr>
<tr>
<td></td>
<td>• Land use map, in particular showing the urban and rural land use classification.</td>
</tr>
<tr>
<td></td>
<td>• Major transportation routes and traffic conditions.</td>
</tr>
<tr>
<td>2.4 Physical Characteristics</td>
<td>• Geography, geology, hydrology, soil and climate of the area or region.</td>
</tr>
</tbody>
</table>

## 3. Current Solid Waste Management Conditions

<table>
<thead>
<tr>
<th>3.1 Institutional Arrangements</th>
<th>Description of solid waste management practices in existence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• List of existing agencies of the city administration that handle SWM and its services, and the roles and responsibilities of the agencies. Should include all aspects of SWM such as: collection, recycling, disposal, IEC, accounting, implementation and enforcement of regulations.</td>
</tr>
<tr>
<td>3.2 Inventory of Equipment and Staff</td>
<td>• List of existing equipment, its capacity and present conditions, make, model, location for repairs, and others.</td>
</tr>
<tr>
<td></td>
<td>• Number of personnel and classification working in SWM by department or type of service.</td>
</tr>
<tr>
<td></td>
<td>• Type of staff training available.</td>
</tr>
<tr>
<td>3.3 Source Reduction</td>
<td>• Discussion of existing waste reduction practices.</td>
</tr>
<tr>
<td>3.4 Collection</td>
<td>• Description of existing system for each service area, including those serviced by private haulers.</td>
</tr>
<tr>
<td></td>
<td>• Type of collection ( segregated vs. non-segregated).</td>
</tr>
<tr>
<td></td>
<td>• Frequency of collection to same area for each type of collection.</td>
</tr>
<tr>
<td></td>
<td>• Description of areas not currently receiving collection service.</td>
</tr>
<tr>
<td></td>
<td>• If collection service is by a private hauler, provide a list of the haulers, service areas, types of waste collected, location where waste is deposited.</td>
</tr>
<tr>
<td>3.5 Transfer</td>
<td>• Description of facilities used to transfer solid waste.</td>
</tr>
<tr>
<td></td>
<td>• List of facilities including location, capacity, types of materials accepted, and source of materials.</td>
</tr>
<tr>
<td>3.6 Processing Facilities</td>
<td>• Description of facilities used for processing waste, such as material recovery facilities (MRF’s) and composting facilities.</td>
</tr>
<tr>
<td></td>
<td>• List of facilities including location, capacity, types of materials accepted, source of materials, and brief description of operations.</td>
</tr>
</tbody>
</table>
### 3.7 Final Disposal
- Description of facilities used for the final disposal of solid waste or residues from processing.
- List of facilities including location, ownership, capacity, types of materials accepted, source of materials, brief description of operations, and number of scavengers.
- Evaluation of the situation of scavengers working at existing dumpsite.

### 3.8 Special Wastes
- Existing storage, collection, and disposal practices for special wastes (includes junk cars, infectious/medical waste, waste oil recycling, scrap tires, construction and demolition debris and sewage sludge, as well as hazardous waste generated by individual households and businesses that may enter the disposal site).
- Report of available information on the quantities of these wastes disposed.

### 3.9 Markets for Recyclables
- List of junk shops in the city/municipality. Include types and quantities of materials accepted if possible.
- List of industries in the city/municipality that use or could use recycled materials.

### 3.10 IEC
- Description of IEC program.
- List of IEC activities. Include message, targeted audience, and effectiveness.

### 3.11 Costs and Revenues
- Annual budget for SWM.
- Expenditures for previous year. Include capital investment, operation and maintenance, and contracted services.
- Revenues for previous year. Include revenues from allocations, from fees charged for the service, and from fines.

### 3.11 Key Issues
- Brief description of key solid waste management issues facing the community.

### 4. Waste Characteristics
*Uses results of WACS and recycling information to determine quantity and composition of waste generated*

#### 4.1 Disposed Waste *(from WACS)*
- Quantity of waste disposed, by sector (e.g., low-income residential, middle-income residential, high-income residential, commercial, institutional, industrial, markets) (in kg/day and tonnes/year)).
- Composition of waste disposed, by sector (in wt. %).
- Results of bulk density analysis (in kg/m3).
- Results of moisture content analysis (in %).
- Summary tables and figures showing the quantity and composition of disposed waste by, by sector.

#### 4.2 Diverted Waste
- Estimate of quantity of waste currently recycled and composted based on existing information, and from results of 3.4 and 3.6.

#### 4.3 Generated Waste
- Estimate of quantity of waste generated (disposed + diverted).
- Projection of quantity of waste generated based on population projections.

### 5. Legal/Institutional Framework
*Overview of existing institutional arrangements in order to identify parties responsible for undertaking the relevant aspects of the plan*

#### 5.1 Local Laws and Regulations
- Related laws and regulations and their relevant provisions.
- Permitting procedures for solid waste facilities as well as inspection and compliance procedures.

#### 5.2 Roles
- Roles of the City SWM Board, the city, barangay, private entities and institutions as generators, citizens, NGOs and recycling companies.

#### 5.3 City/Municipal Solid Waste Management Board
- Sangguniang Panglungsod Ordinance No. for creating the CSWM Board.
- List of members of the CSWM Board.
- Description of activities to date and planned activities.

#### 5.4 Barangay Solid Waste Management Board
- List of BSWM Boards formed to date and schedule for Boards in other barangays.

#### 5.5 Stakeholders Participation
- Activities conducted and future plans to involve stakeholders in development and implementation of plan.

### 6. Plan Strategy
*Delination of the desired outcome of the solid waste management plan*

#### 6.1 Vision
- Discussion of vision and goals
6.2 Targets
- Diversion targets for each year, 10-year planning period.
- Disposal targets for each year, 10-year planning period.

6.3 Strategies
- Brief description of strategies to reach diversion targets (detail will be provided in Section 7).
- General description of coordination with barangays to implement segregated collection, MRF’s, and composting facilities.
- General description of collection and transfer.
- Overview of plans for disposal.
- Discussion of other key elements of strategy.

7. SWM System
Detailed description of each program that will be implemented to reach the objectives and targets defined in Section 6

7.1 Source Reduction
- Source reduction programs to be implemented and implementation schedule.
- Sectors to target.
- Materials to be addressed and methods to determine the categories of solid waste to be diverted.
- Capability and economic viability of the city/municipality in implementing the program for this component.
- Technical requirements for the ordinances and other formal actions to be taken by the city/municipality.
- Social impacts on stakeholders involved or affected.
- Estimated diversion resulting from source reduction.

7.2 Collection
- Collection of segregated recyclable and compostable materials is the responsibility of the barangay. Collection of mixed solid waste and residuals is the responsibility of the city/municipality. The SWM plan should describe how the city/municipality would coordinate collection activities with the barangay.

7.2.1 Overview
- Description of the strategy for collection, based on the projected quantities of segregated biodegradables and recyclables, and of residual waste.
- Description of collection process for each type of waste.
- Types of collection vehicles, collection frequency, collection points, and types of containers.
- Entity responsible for providing collection for each type of waste, and for each sector.

7.2.2 Collection equipment and routes
- Description of each generator type and service area, and the particular requirements for collection equipment.
- Table listing current number of vehicles (compaction vehicles and/or dump trucks) and projection of additional vehicles to be purchased by year.
- Rationale for selection of the equipment.
- Listing of collection routes or service areas.

7.2.3 Private collection service
- If collection service will be conducted by private haulers, provide a rationale for contracting out the service.
- Listing of service areas, types of waste to be collected, location where waste will be taken.
- Discussion of basic terms of contract.

7.2.4 Storage and set-out
- Types of containers to be used for each generator type and service area, and rationale for selection of types of containers.
- Set-out requirements (i.e., placement, time of day, etc.).

7.2.5 Segregated recyclables
- Strategy for implementing segregated collection of recyclables in each of the barangays.
- Types of materials to include types of vehicles, collection frequency, types of containers.
- Assistance the city/municipality will provide to the barangay.

7.2.6 Segregated compostables
- Strategy for implementing segregated collection of recyclables in each of the barangays.
- Types of materials to include types of vehicles, collection frequency, types of containers.
- Assistance the city/municipality will provide to the barangay.
### 7.2.7 Mixed solid waste/residuals
- Plan for collecting mixed solid waste (until segregated collection is implemented in all barangays).
- Plan for collecting residuals.
- Table listing type of collection vehicle, capacity, and collection frequency by year for 5 years. In preparing table, consideration should be given to the quantities of waste requiring collection and disposal as diversion programs are implemented.
- Types of containers that may be used for set-out.
- Plan for increasing coverage area to provide collection service to all parts of the city/municipality (if applicable).

### 7.3 Segregation, Recycling, and Composting
- Segregation and recycling and composting of segregated materials are the responsibility of the barangay. The SWM plan should describe how the city/municipality would work with the barangay to implement the programs.

#### 7.3.1 Segregation
- Strategy for promoting segregation in each of the barangays.
- Strategies for start-up, implementation, monitoring, and enforcement.
- Assistance the city/municipality will provide to the barangay.

#### 7.3.2 Recycling
- Strategy for implementing MRF’s in each of the barangays or in clusters of barangays.
- Strategies for start-up, implementation, monitoring, and enforcement.
- Materials to be recycled, methods of determining categories of recyclable waste for diversion
- Existing capacity, future demand, and how the capacity will be met (e.g., new facilities and expansion of existing facilities)
- Assistance the city/municipality will provide to the barangay.
- Implementation schedule.

#### 7.3.3 Composting/Management of Biodegradable Waste
- Overall strategy for managing biodegradable waste.
- Quantity of waste, by barangay, to be composted.
- Existing capacity, future demand, and how the capacity will be met (e.g., new facilities and expansion of existing facilities).
- Strategy for implementing composting facilities in barangays or in clusters of barangays.
- Strategies for start-up, implementation, monitoring, and enforcement.
- Materials to be composted, methods of determining categories of biodegradable waste for diversion
- Acceptable technologies and layouts of composting facilities.
- Assistance city/municipality will provide to the barangay.
- Implementation schedule.

#### 7.3.4 Marketing
- Existing and planned markets for each recyclable material and for compost.
- Estimated prices for recovered materials and average selling price/average price.
- Strategies for expanding markets.
- Evaluation of feasibility of procurement preferences for recycled materials by city/municipality.

### 7.4 Transfer (if applicable)
- Strategy for use of transfer facilities.
- Existing capacity, future demand, and how the capacity will be met (e.g., new facilities and expansion of existing facilities).
- Locations for new facilities, types and quantities of waste that will be accepted, source of waste, and destination of waste.
- Description of transfer station design and operations.
- Strategies for start-up, implementation, monitoring, and enforcement.
- Implementation schedule.

### 7.5 Disposal
- Disposal plan for 10-years including identification of prospective sites for future use. Include plans for upgrading or closing existing facilities to meet requirements for controlled disposal sites and sanitary landfills.
<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
</table>
| 7.5.1 SW Disposal Capacity | • Projection of the amount of disposal capacity needed to accommodate mixed solid waste and residuals, by year for a 10-year period.  
• Comparison of existing disposal capacity with capacity requirements.  
• Description of overall plan for disposal, by year |
| 7.5.2 Existing Facilities | • For each facility, indicate status (open dump, controlled dump, sanitary landfill) and disposal capacity.  
• For open dumps, provide plan to close or to convert to controlled dumps within 3 years of effectivity of RA 9003. Improvements to include: a well-maintained access road; restriction of waste to small working areas; regular cover of waste using inert material; control of surface water, litter, and waste picking; maintaining records etc.  
• For controlled dumps, provide plan to close or to convert to sanitary landfills (SLF) within 5 years of effectivity of RA 9003.  
• Strategies to extend life span and capacity of the existing disposal site.  
• Closure plans to include methods of remediation of existing sites. |
| 7.5.3 New Facilities | • General description of new facilities (controlled dumps or sanitary landfills) that will be built. Include: location, ownership, capacity, and lifespan.  
• Explanation of how the design will meet the requirements of RA 9003 and its IRR.  
• Rationale for site selection and in the design for the facility. Refer to criteria set out by the ESWMA and by the earlier DAO 98. |
| 7.5.4 Sanitary Landfill (SLF) Design | • Demonstration that the capacity will be adequate for a minimum of 5 years. Address the population to be served, projected quantities of waste disposed, density of compacted waste, and volume of soil cover in the SLF.  
• Cross-sectional model of SLF as adapted to a flat area, mountainous area or any proposed area.  
• Method for collection and treatment of leachate, and its adequacy to handle the projected maximum quantity of leachate (calculated based on the average daily rainfall for the maximum months multiplied by the area).  
• Operational practices to reduce the risk of environmental impact. |
| 7.6 Special Wastes | • Existing storage, collection, disposal practices and the proper handling, re-use and long-term disposal.  
• Estimated quantities of special wastes to be generated in the future.  
• Description of programs to be implemented by the city/municipality describing how to handle, re-use, recycle, and provisos for long-term disposal. |
| 7.7 Information, Education and Communication (IEC) | • Purpose and content of information dissemination, education and communication program |
| 7.7.1 Introduction | • Discussion of strategy including need for public education and involvement.  
• Problems/issues that will be addressed.  
• Purpose of IEC activities (i.e., information dissemination, education, motivation, advocacy).  
• Audiences that will be targeted. |
| 7.7.2 Core Messages | • Discussion of core message(s) for each target audience.  
• Explanation of how message will be coordinated with other agencies.  
• Description of how IEC activities will support solid waste management program activities, e.g., source reduction, litter prevention, segregation, recycling, and composting. |
| 7.7.2 Approach | • Discussion of approach(es) for each target audience.  
• Matrix of planned activities. Include: purpose, target audience, subject of message, method, responsible party, and monitoring plan.  
• Implementation schedule. IEC activities should be integrated with infrastructure and should be on-going.  
• Cost of activities (to be incorporated into financial plan (see Section 11)). |
| 7.8 Market Development | • Methods for developing markets for recycled materials and compost.  
|                        | • Evaluation of the feasibility of procurement preferences to encourage the purchase of products made from recycled materials.  
|                        | • Evaluation of the feasibility of procurement preferences to encourage the purchase of compost. |

<table>
<thead>
<tr>
<th>8. Implementation Strategy</th>
<th>Discussion of the logistics of how the solid waste management system will be implemented.</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.1 Framework</td>
<td>• Overview of each program to be implemented, by generator segment, by year. Include source reduction, recycling, composting, disposal, etc.</td>
</tr>
<tr>
<td>8.2 Diversion Projections</td>
<td>• Table of types and percentages of materials to be diverted to meet the mandated diversion requirement.</td>
</tr>
<tr>
<td>8.3 Monitoring Program</td>
<td>• Description of monitoring program to provide accurate information and to show whether or not policies are succeeding and to monitor the performance of the SWM plan.</td>
</tr>
<tr>
<td>8.4 Alternatives Analysis</td>
<td>• Options the municipalities might consider in their efforts to divert waste materials from disposal.</td>
</tr>
</tbody>
</table>
| 8.5 Incentive Programs    | • Description of program providing for incentives (rewards, grants, fiscal incentives and non-fiscal Incentives) that will be provided to concerned sectors in order to encourage wide participation in the implementation of the plan.  
|                        | • Potential benefits, if any, of Eco-labeling. |

<table>
<thead>
<tr>
<th>9. Institutional Aspects</th>
<th>Existing and planned structure for implementation of plan</th>
</tr>
</thead>
</table>
| 9.1 Roles               | • Future roles of the city SWM Board, the city, barangay, private entities and institutions as generators, citizens, NGOs and recycling companies.  
|                        | • Strategy for cooperation with the city/municipal SWM Board.  
|                        | • Coordination with other entities (e.g., barangays, NGOs, business leaders). |
| 9.2 Legal               | • Recommended changes to city structure.  
|                        | • Zoning and building code changes.  
|                        | • Plans to impose penal provisions.  
|                        | • Other legal requirements. |

<table>
<thead>
<tr>
<th>10. Social and Environmental Aspects</th>
<th>Discussion of social and environmental issues related development of full-scale infrastructure</th>
</tr>
</thead>
</table>
| 10.1 Social Aspects                | • Significant social impacts (both positive and negative) from community-based SWM.  
|                                    | • Social acceptability of proposed solid waste system (including collection system and processing and disposal sites).  
|                                    | • Discussion of requirements of stakeholders.  
|                                    | • Discussion of conditions concerning scavengers at the disposal site and what the city/municipality can do to improve their conditions. |

| 10.2 Environmental Aspects        | • Discussion of environmental aspects of the proposed solid waste system.  
|                                    | • Environmental review requirements. |

|-------------------------------------|---------------------------------------------------------------------|
| 11.1 Investment cost               | • Breakdown of estimated investment cost by year for 5 years, by private and public sectors. Investment costs should address each component of the solid waste system, i.e., collection, transfer stations, MRF’s, composting facilities, and disposal facilities.  
|                                    | • Facility costs to include engineering and infrastructure.  
|                                    | • Equipment costs to include stationary equipment (e.g., shredder) and rolling equipment (e.g., collection vehicles).  
|                                    | • Estimated cost to be amortized based on life expectancy of facility/equipment. |
| 11.2 Annual Costs                                        | • Breakdown of annual costs by year for 5 years, by private and public sector.  
|                                                       | • Labor cost, including fringes, by labor category.  
|                                                       | • Administrative costs including insurance, office expense, etc.  
|                                                       | • Operating and maintenance costs including fuel, repair, supplies, etc.  
|                                                       | • Amortized investment cost.  
|                                                       | • Loan repayment schedule.  
| 11.3 Funding Options                                    | • Discussion of options to finance the capital investments, e.g., loans from financial institutions, central government grants, and municipal funds.  
|                                                       | • Discussion of options to finance recurring cost, e.g., local taxes, intergovernmental transfers, and user charges.  
|                                                       | • Presentation of existing and projected sources of revenues. Include consideration of revenues from collection of fees; outside sources of funds, collection and use of fines, and sources for the local SWM fund and their uses.  
|                                                       | • Specific projects, activities, equipment and technological requirement for which outside sourcing of funds or materials may be necessary.  
|                                                       | • Breakdown of revenues by year for 5 years, and by source.  
| 11.5 Cost Evaluation and Comparison                    | • Cost for waste management per service capita.  
|                                                       | • Cost for waste management by unit weight for each type of service, e.g., collection, processing, and disposal.  
|                                                       | • Comparison of costs for each component of the solid waste management system.  
|                                                       | • Discussion of ways to optimize costs.  
| 11.6 Summary                                           | • Tabular summary of investment costs, annual costs, and annual revenues by year.  
| 12. Plan Implementation                                | **Implementation phases, milestones, and schedule**  
| 12.1 Phases and Responsibilities                      | • Discussion of phases from the development of a plan to guide the operation and the implementing agency or persons/groups responsible.  
| 12.2 Milestones                                        | • Milestones in implementation of the institutional/legal aspects of the plan including: public hearings, final approval of plan, and establishment of the SW Division.  
|                                                       | • Milestones in implementation of the solid waste system described in the plan including: source reduction activities, segregated collection in each barangay, establishment of MRF’s and composting facilities, upgrade of dumpsites, establishment of sanitary landfills, IEC activities, etc.  
| 12.3 Implementation Schedule                          | • Tables or diagrams showing the schedule of implementation.  
|                                                       | • Schedule should include all of the programs discussed in Section 7.  
|                                                       | • Table summarizing diversion goals and quantities.  

**References**
Annex 2  Solid Waste Management Seminar/Workshop March 11-14, 2003

- Seminar Agenda
- Workshop Agenda
Seminar on Solid Waste Management Planning
March 11, 2003

8:00 am Opening Ceremony
Opening, Grace Favila, IEC Specialist
Welcoming Remarks, Dir. Albert Magalang, DENR NSWMC
Introduction, Dr. Luis Diaz, Technical Team Leader

8:25 am Solid Waste Management Plan Components
Vision/Goals, Grace Favila
LGU Profiles, Levi Buenafe, Institutional Specialist
Waste Characterization, Joey Sta. Ana, Solid Waste Specialist
Waste Reduction, Joey Sta. Ana
Collection & Transfer, Joey Sta. Ana
Recycling, Roger Lopez, Social Issues Specialist

10:05 am Break

10:25 am Solid Waste Management Plan Components (continued)
Processing, Luis Diaz
Composting, Luis Diaz
Disposal, Reynar Rolan, Disposal Specialist
Education & Public Information, Linda Eggerth, IEC Specialist
Special Waste, Manjit Kahlon, Solid Waste Specialist
Funding, Agnes Palacio, Financial Specialist

12:00 noon Lunch

1:00 pm Solid Waste Management Plan Components (continued)
Incentive Programs, Agnes Palacio
Privatization, Nick Allen, Sector Advisor

1:40 pm Questions and Answers

2:00 pm Waste Technologies
Processing Technologies (Source Reduction, Recycling, Composting), Luis Diaz

3:00 pm Break

3:20 pm Waste Technologies (continued)
Processing Technologies (Anaerobic Digestion), Luis Diaz
Medical Waste, Luis Diaz
Disposal, Nick Allen
Modeling, Manjit Kahlon

4:40 pm Questions and Answers

4:55 pm Closing
Agenda

Workshop on Solid Waste Management Planning

March 11-14, 2003

Tuesday, March 11
5:30 pm to 6:30 pm Orientation to Write-shop

Wednesday, March 12
8:00 am Introduction and Vision/Goals
8:45 am SWM Plans Background
9:45 am Break
10:00 am SWM Plans Background (continued)
12:00 noon Lunch
1:00 pm Community-Based Recycling/Other Technologies
2:35 pm Break
2:50 pm Community-Based Recycling/Other Technologies (continued)
4:30 pm Break
5:00 pm to Write-Shop
7:00 pm Vision

Thursday, March 13
8:00 am Medical Waste Strategy Development
9:45 am Break
10:00 am Medical Waste Strategy Development (continued)
12:00 noon Lunch
1:00 pm Financial Management
3:00 pm Break
3:15 pm Institutional Aspects
4:30 pm Break
5:00 pm to Write-Shop
7:00 pm Medical Waste

Friday, March 14
8:00 am Education and Public Information
9:45 am Break
10:00 am LGU Project Information
10:30 am Write-shop
11:00 am Preparation of Presentations
12:00 noon Lunch
1:00 pm Presentations
3:00 pm Closing
Annex 2a Solid Waste Management Seminar/Workshop

March 11-14, 2003

Workshop Presentations
Biogasification

- Introduction
- Principles
- Process description
- Process rate limiting factors
- Parameters
- Operational procedures
- Digester design
- End products
- Residues

Introduction

- The possibility of recovering energy from waste in the form of a combustible gas has prompted much interest
- Biogasification serves two purposes: waste treatment and energy production
- If viewed only as a waste treatment method, it may be less effective than composting due to technology and cost

Principles

Definition:
- biological decomposition of organic matter of biological origin under anaerobic conditions (i.e., in the absence of air) with the production of a gas (mostly methane)

Process Description

- In waste management, it takes place in three phases:
  1. polymer breakdown
  2. acid forming
  3. methane forming
- Generally, technical literature refers to the last two stages
- Process is sequential
Stability

- Overall, process rests upon maintenance of relatively critical balance
- Initially pH declines, then gradually rises – eventually, gas is produced
- End products: methane, carbon dioxide, other gases, and relatively stable residue

Physical Properties

- Particle size
- Moisture content
- Chemical composition: C/N
- Performance factors:
  - transfer of metabolic products
  - elements or compounds

Process Rate Limitation Factors

- Availability of nutrients in waste
- Cellulose converted into soluble carbohydrates
- Acid formers convert carbohydrates to low-weight fatty acids
- The final stage (methane formation) is the slowest, and thus the rate-limiting one

Environmental Factors

- Temperature:
  - mesophilic
  - thermophilic
- Substrate:
  - physical
  - chemical composition

Parameters

- Gas production and composition:
  - varies, depending upon substrate from 0.2 to 0.8 m³/kg of dry solids
  - composition is about 50% methane
- Destruction of volatile matter:
  - varies from 30% to 80%

Biogas Production from Digestion of Common Wastes

<table>
<thead>
<tr>
<th>Raw Material</th>
<th>Biogas (m³)</th>
<th>Temperatures (°C)</th>
<th>Methane Content (%)</th>
<th>Detention Time (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle manure</td>
<td>0.20 to 0.33</td>
<td>11.1 to 31.1</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Poultry manure</td>
<td>0.31 to 0.56</td>
<td>32.6 to 50.6</td>
<td>55 to 60</td>
<td>9 to 30</td>
</tr>
<tr>
<td>Swine manure</td>
<td>0.49 to 0.75</td>
<td>32.6 to 32.9</td>
<td>56 to 61</td>
<td>30 to 15</td>
</tr>
<tr>
<td>Sheep manure</td>
<td>0.37 to 0.81</td>
<td>--</td>
<td>64</td>
<td>20</td>
</tr>
<tr>
<td>Forage leaves</td>
<td>0.5</td>
<td>--</td>
<td>--</td>
<td>20</td>
</tr>
<tr>
<td>Sugar beet liquor</td>
<td>0.5</td>
<td>--</td>
<td>--</td>
<td>20 to 30</td>
</tr>
<tr>
<td>Algae</td>
<td>0.5</td>
<td>40 to 50</td>
<td>55</td>
<td>20 to 20</td>
</tr>
<tr>
<td>Night soil</td>
<td>0.38</td>
<td>20 to 26</td>
<td>--</td>
<td>20</td>
</tr>
<tr>
<td>Municipal refuse (USA)</td>
<td>0.33 to 0.35</td>
<td>35 to 60</td>
<td>55 to 60</td>
<td>15 to 30</td>
</tr>
</tbody>
</table>
Parameters (cont.)
- Volatile acid content:
  - concentrations of about 10,000 mg/liter
  - range of concentrations varies
- pH:
  - narrow range: 6.5 to 7.5

Operational Procedures
- Mixing and formation of scum
- Loading: measured in kg of VS/m³-day
- Detention time: from 15 to 30 days, has impact on volume of reactor
- Starting a digester: culture

Conventional Digestion (low solids)

Digester Construction Design Principles
- Conventional
- High-rate
- Contact (fixed-bed)

Digester Heating
Several alternatives:
- indirectly or directly
- solar, fossil fuel

Small-scale Designs
- Gobar
- Manure
- Chinese version
- Steel tank
- Others
End Products of Biogasification

- Properties of biogas:
  - vary widely
  - main components:
    - methane, 55% to 65%
    - carbon dioxide, 34% to 44%
  - other gases: nitrogen, water vapor, hydrogen sulfide, etc.
  - heating value ranges from 18,600 to 26,100 J/m³
- Biogas purification

Survival of Pathogens in Anaerobic Digestion Process

<table>
<thead>
<tr>
<th>Organisms</th>
<th>Temperature (°C)</th>
<th>Residence Time (days)</th>
<th>Die-off (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poliovirus</td>
<td>35</td>
<td>2</td>
<td>98.5</td>
</tr>
<tr>
<td>Salmonella spp.</td>
<td>22 to 37</td>
<td>b to 20</td>
<td>82 to 96</td>
</tr>
<tr>
<td>Salmonella typhosa</td>
<td>22 to 37</td>
<td>6</td>
<td>99</td>
</tr>
<tr>
<td>Bacillus cereus</td>
<td>30</td>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>Ascaris</td>
<td>29</td>
<td>15</td>
<td>90</td>
</tr>
<tr>
<td>Parasite cysts</td>
<td>30</td>
<td>10</td>
<td>100b</td>
</tr>
</tbody>
</table>

- Time in digester
- Does not include Ascaris

Residues

- Supernatant:
  - suspended colloidal solids and bacterial cells
- Sludge:
  - characteristics similar to compost
Composting

L. F. Diaz and L. L. Eggerth

Composting -- Definition

- Method of waste treatment in which solid wastes are biologically stabilized under controlled conditions
- Key words:
  - biological
  - stabilization
  - controlled conditions
- Co-composting:
  - composting of two or more residues together

Benefits of Composting

- Recovery of organic matter
- Extension of landfill life
- Stabilization of organic wastes:
  - reduced leachate and groundwater pollution problems
  - minimal production of biogas

Benefits of Composting (cont.)

- Benefits to soil:
  - improved aeration
  - improved water-holding capacity
  - addition of nutrients
  - improved efficiency of inorganic fertilizer usage
  - reduced soil cracking
- Increased resistance of crops to certain plant diseases
- Reduced erosion

Rate Controlling Factors for Composting

- Moisture content
- Temperature
- Nutrient concentration and availability:
  - C to N ratio
- Oxygen concentration
- pH level
- Particle size

Monitoring the Process

- Temperature rise and fall
- Odors
- O₂ and CO₂
- Degree of stability
Typical Curve of Temperature vs. Time in the Composting Process

Important Factors Affecting the Marketability of Compost Products
- Product quality:
  - level of impurities:
    - heavy metals
    - pathogens
    - glass
    - plastic
  - stability
  - nutrient content

Basic Composting Subsystems
- Pre-processing:
  - separation
  - size reduction
- Composting:
  - mixing
  - aeration
  - moisture control

Basic Composting Subsystems (cont.)
- Post-processing:
  - size reduction
  - screening
  - bagging

Important Factors Affecting the Marketability of Compost Products (cont.)
- Consistent composition
- Consistent availability
- Conformance with land application regulations:
  - heavy metals
  - pathogens
- Cost/Price

Fundamental Processing Relationships
- Cost of Processing
- Quantity
- Quality
- Degree of Processing
Promote low-technology options

- Small-scale:
  - home composting
  - vermiculture
  - use of manual aeration

Promote low-technology options (cont.)

- Medium- to large-scale (cont.):
  - consider the use of windrows:
    - manual aeration
    - mechanical aeration (FEL)
    - forced aeration
  - make sure key replacement parts will be available locally
  - demand guarantees by vendor

Evaluate low-cost options

- Low cost does not necessarily imply “low quality”
- Must be conducted by knowledgeable professionals
- Evaluation must be conducted in concert with affordability assessment

Green Waste Composting Facility (Turned Windrow)

Composting of segregated market wastes

Fresh wastes in foreground

Partially composted wastes
Fully Enclosed Composting Facility for Biosolids

- biosolids and yard wastes
- trenches (walls)

Biosolids Composting Facility

- biofilters

Keys to Success

- Political will to solve the problem of waste management
- Definition of a sound financial plan
- Development of a well thought-out contract with private entities (including prices and fines)
- Implementation of a thorough monitoring program
Composting – RA 9003

✓ Develop a program in combination with source reduction and recycling
✓ Composting components shall describe:
  ✓ Types of materials to be composted
  ✓ Methods for determining categories of solid wastes to be diverted through composting
  ✓ New facilities and expansion of existing facilities
  ✓ Methods for developing markets
✓ Identify program and implementation schedule to meet waste diversion requirements

Expansion of Existing Facilities

- Location
- Existing and potential capacity
- Acceptability to community leaders and residents
- Design
- Sustainability
  - Revenues (outside funding, markets)
  - Costs

New Facilities

- Site
  - availability
  - size
  - proximity to human receptors
  - distance from generators
- Community and political support
- Funding sources
- Design

Types of Materials

- Readily degradable materials
- Examples:
  - kitchen waste
  - green waste
  - market waste
- Quantity and composition
  - based on results of waste characterization studies
  - necessary to determine capacity of facility
- Consideration should be given to other available uses for organic materials

Market Development

- Potential markets
  - type
  - demand
  - distance from composting facility
  - specifications
  - competing products
- Purchase by LGU
  - demand
  - feasibility of procurement preferences
Program and Implementation Schedule

- Set goals for quantities of organic materials to compost
- Determine existing quantities diverted
- Define program for meeting goals
  - methods
  - location
  - schedule
Integrated Waste Management - Metro Manila

ORIENTATION TO WRITESHOPS
Manjit Kahlon
March 2003

Workshop organized within the framework of ADB’s ‘Metro Manila Solid Waste Management Project’ (TA3848-PHI)

CONSIDER during the next few days:
- Requirements under RA 9003
- Waste generation patterns
- Impact of Options reviewed or selected on size/type of facilities required
- Waste collection, treatment and disposal factors
- Resources needed to deliver chosen plan components

Writeshop Programme

<table>
<thead>
<tr>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
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</thead>
<tbody>
<tr>
<td>Each LGU to designate representative to plan &amp; lead writeshop</td>
<td>Development of LGU Visions</td>
<td>Medical Waste Issues</td>
</tr>
<tr>
<td>List key problems that are important to their LGU in developing SWM Plan</td>
<td>Background Information requirements</td>
<td>Financial Planning Aspects</td>
</tr>
<tr>
<td>List key success factors that will be crucial to the implementation of Plan</td>
<td>Reviewing Technologies</td>
<td>Institutional Aspects</td>
</tr>
<tr>
<td>List key training and resource requirements</td>
<td>Setting of Targets</td>
<td></td>
</tr>
<tr>
<td>Summarise Initial key issues</td>
<td>Friday</td>
<td></td>
</tr>
</tbody>
</table>

Writeshop Programme

<table>
<thead>
<tr>
<th>Friday</th>
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<tbody>
<tr>
<td>Assess Education and Information requirements</td>
</tr>
<tr>
<td>Preparation of LGU SWM Plan Presentations</td>
</tr>
<tr>
<td>Each LGU to make brief presentations of their findings</td>
</tr>
</tbody>
</table>

Development of Waste Management Plans

- Policy & Goals of the LGU
- Objectives & Timescales for implementation
- Administrative and operational structures for SWM within the LGU
- Related local regulations or ordinances and relationship to national laws, etc.
- Background data (economy, population & households, industry/commerce including employment, transportation, geography/geology)
Development of Waste Management Plans

- Detailed appraisal of past, current and projected waste generation data (by waste type), as related to population and other socio-economic factors
- Detailed review (including maps of locations) of current facilities & practices covering waste collection, treatment and disposal (including a review of types and nature of contracts with third parties and impacts on any other LGUs or facilities outside of the LGU boundary)

Development of Waste Management Plans: Additional Information

- Detailed appraisal of factors that will affect future SWM within the LGU (e.g. through legislative developments; due to lack of suitable SWM facility locations or capacity; potential linkages with other LGUs for SWM services/facilities)
- Detailed technical, financial and environmental assessment of proposed options (& alternatives) for the future collection, treatment and disposal of each classification of Solid Wastes generated within the LGU

Development of Waste Management Plans

- Selected Plan: Reasoned arguments for the proposed choice from initial option(s), covering all parts of the services for each type of waste
- Selected Plan: Proposed methods by which the chosen plan will be delivered, including implementation time scales for each part of the service/facilities, and details (where applicable) of proposed third party contracting
- MEET DIVERSION RATES/GOALS

Development of Waste Management Plans: Additional Information

- proposed personnel training programs;
- explanation of public participation in the SWM planning process, and for future awareness raising programs
- proposed details on how waste generator charging will be introduced (RA 9003 Section 47) to cover part/whole costs for services

Development of Waste Management Plans: Additional Information

- proposed incentives to exceed required targets for diversion of wastes from landfill, and/or for waste avoidance initiatives
- penal charges to be levied for failure to meet laws, regulations or standards, and/or for contractor failure to deliver against the 10-year plan to time and quality.
Waste Disposal Planning

The Transition

Regulatory Requirements

Practical Implications

MMLA Solid Waste Timeline

- San Mateo Landfill Opening
- Carmona Landfill Opening
- Smokey Mountain Closure
- Carmona Landfill Closure
- San Mateo Landfill Closure
- Passage of RA 9003
- Closure of controlled Dumps

1991-1993

- 1993
- 1998
- 2000
- 2001
- 2003
- 2006

Moving from this......

Current Dumpsite Practices

- Dumpsites everywhere
- Lack of planning
- Lack of engineering design
- Lack of environmental controls
- Lack of public protection
- Lack of adequate funding

... through this ....

Controlled dumpsite in mountainous areas
Controlled dumpsite in a flat coastal area

Sanitary Landfill

On going construction of a leachate pond
For a sanitary landfill in Luzon

GUIDELINES FOR SOLID WASTE FACILITIES
DAO 98 49
Technical Guidelines for Municipal Solid Waste Disposal

DAO 98 50
Adopting the Landfill Site Identification and Screening Criteria for Municipal Solid Waste Disposal Facilities

RA 9003 & IRR
The Ecological Solid Waste Management Act of 2000” and “Implementing Rules and Regulations

Regulatory Implementation
Step 1: Implement Controlled Dumpsite Program
Phase out uncontrolled dumpsites
Phase in controlled dumpsites
Progressively improve conditions to meet basic dumpsite regulations
Continue to strengthen enforcement mechanisms

Regulatory Implementation
Step 2: Implement Sanitary Landfill Program
Phase out controlled dumpsites
Phase in sanitary landfills
Continue to strengthen enforcement mechanisms
Practical Implications
SWM Plans MUST

Accurately define disposal needs
(including waste volume, type, collection)

Accurately define plans for
  Short-Term Controlled Dumpsites
  Longer-Term Landfills (From 2006)
Demonstrate how the needs and
regulatory requirements will be met
WELCOME LGUS!

In Alphabetical Order:
- Makati City
- Malabon
- Manila
- Muntinlupa
- Navotas
- Pasig City
- Quezon City
- Valenzuela

DISPOSAL PLANNING – PRELIMINARY PROPOSALS

ASSESS CURRENT SITUATION

DISCUSS PLAN REQUIREMENTS

COMMIT TO PLAN DEVELOPMENT

CURRENT WASTE DISPOSAL SITUATION

6 LGU’s Operate Dumpsites
11 LGU’s Outsource
Rodriguez MMDA Managed
Additional “Private” Dumpsites
Unaccounted for Dumping at Illegal Sites

LGU SUMMARY

Group A: LGUs Operating Own Dumpsites
- Quezon City - Payatas
- Malabon - Catmon
- Valenzuela - Lingunan

Group B: LGUs Contracting Out Disposal
- Pasig City - Rodriguez and Others
- City of Manila - Tanza and Rodriguez
- Makati City - Rodriguez and Others
- Muntinlupa - Rodriguez and Others
- Navotas - Tanza, Navotas

GROUP A – QUEZON CITY (PAYATAS DUMPSITE)
GROUP B - RODRIGUEZ DUMPSITE

GROUP B - TANZA DUMPSITE

GROUP B
LOADING AT NAVOTAS TRANSFER STATION

GROUP B - TANZA DUMPSITE

GROUP B
WASTE-FILLED BARGE BOUND FOR TANZA DUMPSITE

LUPANG ARENDA DUMPSITE
LUPANG ARENDA DUMPSITE

RECAP

Group A: LGUs Operating Own Dumpsites
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- Muntinlupa Rodriguez and Others
- Navotas Tanza, Navotas

PHASE 1 - OBJECTIVES

- Ensure Adequate Controlled Dumpsite Disposal Capacity
- Ensure Controlled Dumpsites Conform to Regulations and Reduce Impacts
- Eliminate Illicit Dumping

PHASE 1 STRATEGY

- Step 1 - Calculate Disposal Demand
- Step 2 - Calculate Available Dumpsite Capacity (Life)
- Step 3 - Confirm Additional Dumpsite Capacity
- Step 4 - Implement Dumpsite Improvement Program
- Plus - Implement Illicit Dumping Prohibition Program

PHASING

Divide Plan into Two Phases;
- Phase 1 – Controlled Dumpsite Phase Until 2006; and
- Phase 2 – Sanitary Landfill Phase Beyond 2006

STEP 1 – CALCULATE DEMAND

- Estimate Utilizing Existing Data
- Refine Utilizing Waste Characterization Results
STEP 2 – CALCULATE REMAINING CAPACITY

- Topographic Survey of Existing Site
- Define Completed Surface Profile
- Calculate Volume

STEP 3 – CONFIRM ALTERNATIVE DISPOSAL CAPACITY

- Confirm Alternative Additional Disposal Arrangements Preferably In Formal Agreements
- Develop Additional Controlled Dumpsites

STEP 4 – IMPLEMENT DUMPSITE IMPROVEMENT PROGRAM

- Implement Dumpsite Improvement Program to Achieve Regulatory Standards
- Coordinate Activities with NSWMC Secretariat and Other Agencies

PLUS – ILLICIT DUMPING PROHIBITION PROGRAM

- Implement Program to Identify, Phase Out and Remediate Uncontrolled Dumpsites
- Develop IEC Campaign to Prohibit Illicit Dumping Practices within LGU

TARGETS – LATE APRIL 2003

Step 1 DISPOSAL DEMAND
Estimate Completed

Step 2 AVAILABLE DUMPSITE CAPACITY
Estimate Completed

Step 3 ALTERNATIVE DISPOSAL NEEDS
Formal Agreement

Step 4 DUMPSITE IMPROVEMENT PROGRAM
Detailed Proposals and Resource Commitment

Plus ILLICIT DUMPING PROHIBITION PROGRAM
Outline Strategy and Resource Commitment

WORKSHOP COMMITMENT

- Assign Lead Person and Commit Resources
- Commit to Attempt to Reach Targets by April 2003
- Meet Early May 2003 To Write Plan Sections
PHASE 2
SANITARY LANDFILL FACILITIES

- SLFs Take Years to Develop
- Identified Only One SLF Currently Being Developed
- Many Attempts – Stalled
- Disposal Cost Increases
- Technical Complexity

PHASE 2
ISSUES FOR LGUs

- Affordability
- “Own and Operate” or “Contract Out” or “Utilize Private Site” or …
- LGU Facility or Share Regional Facility

PHASE 2
TEN YEAR PLANNING

- Outline the Challenge
- Discuss the Options
- Indicate the Currently Preferred Option
- Outline Indicative Targets to be Accomplished
Waste Disposal Options

The Need
Disposal Options
Cost Implications

Need For Adequate Disposal
- Two million tonnes per year of Metro Manila waste is deposited into dumpsites
- Dumpsites threaten human receptors and the environment;
  - Contaminated liquids (leachate)
  - Contaminated gases (from decomposition)
  - Contaminated gases (from waste burning)
  - Contaminated waste exposure
  - Others (noise, dust, slope instability, social issues)

Leachate Contamination

Leachate Impacts
California analyzed 544 dumpsites;
- 392 (72 percent) - confirmed leachate emission
- 276 (51 percent) - concentrations above "regulatory levels"
- 33 (6 percent) - concentrations at hazardous levels
- Old facilities are still leaking (30 years and above)

Metro Manila Dumpsite

Waste Disposal Options

The Need
Disposal Options
Cost Implications
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Metro Manila Dumpsite

Gas Contamination

Leachate Contamination

Public Health Risks
Disposal Options

Sanitary Landfill Facilities

Thermal Treatment Options

Sanitary Landfill Facilities

- Modern sanitary landfill technology;
  - Leachate production is reduced
  - Leachate is contained and treated
  - Landfill gas is contained and treated

Eagle Mountain Sanitary Landfill

Landfill Sequencing

Existing Topography
Eagle Mountain Sanitary Landfill

Surface Grading

Landfill Sequencing

Sanitary Landfills
Part of the Solution

Example:
State of California estimates that;
- Yearly generation of 56 million tons
- On the way to 50 percent recycling efficiency
- In 1999, California reached 33 percent
- Sanitary landfills continue to take residual waste

Metro Manila;
- With effort, can achieve similar efficiencies
- Still requires treatment and disposal

Liner and Cover Design

Cost Implications
- Highly variable parameters;
  - Size
  - Engineering complexity
  - Location
  - Environmental protection
  - Regulatory compliance
  - Mitigation measures
  - Cross subsidy
- California “tipping fees” (2000) per ton of compacted waste
  - Median (US$ 36), low (US$ 3), high (US$ 85)
Cost Implications

**Implications for Metro Manila.**
- Most likely will be less than US$ 35 per ton
- Possibly nearer US$ 20 per ton
- Additional costs: collection and transfer
- Possibly US$ 25 to 30 per ton total
- Costs would be spread across commercial and other sectors
- The LGU SWM Plans will need to define potential costs

Thermal Treatment Options

- Incineration
- Waste To Energy
  - Mass Burn
  - Pyrolysis
  - Gasification

Summary

- Time for Change
- Dumpsite Practices – Phase Out
- Modern Disposal Practices – Phase In
- Method of Choice – Landfills
- Regulations in Place
- Time of ACTION !!

Thermal Treatment – Philippine Constraints

- Regulation – Clean Air Act
- Public Opposition (Uncertainty)
- Cost
- Emerging Technology
- Need Sanitary Landfill (Hazardous)
- Complexity
Metro Manila Solid Waste Management Project

SWM Financial Plan

Agnes R. Palacio

Solid Waste Management Plan

- Technical Aspect
- Financial Aspect

Importance of a Multi-Year Financial Plan
- To serve as basis for annual budgeting.
- To ensure continuity of program activities.
- To facilitate monitoring of performance relative to objectives.
- To establish implications of the program in funds and cash flow.

Possible Approaches to Planning

Approach 1
- Do the technical plans considering demand for the technology and needs of the community.
- Prioritize depending on availability of funds.

Approach 2
- Determine financial capability.
- Consider the appropriate technology.

What goes into a SWM Financial Plan?

Expenditures
- Investment or Capital Outlays
- Operating Cost
- Maintenance Cost
- Personnel Services
- Debt Service Requirements
- IEC Expenses
**Investment or Capital Cost**

- Civil Works
  - Development of Disposal Site
  - Construction of buildings and other structures
  - Construction of transfer stations
- Equipment
  - Dump trucks
  - Compactor trucks
  - Bulldozers
  - Biodigester, shredder, etc.
- Land Acquisition

---

**Operational Cost**

- Operating Costs
  - Fuel and Oil
  - Spare parts
  - Utilities
  - Tipping Fee
  - Hauling Contractors
  - IEC Cost
- Maintenance Costs
  - Maintenance of equipment
  - Maintenance of buildings and other facilities
- Personnel Services
  - Salaries and wages
  - Other benefits

---

**Sources of Financing**

- Locally-generated Income
- Taxes and fees
- Sale of Assets
- Fines and Penalties
- Cost Recovery Schemes
- Tipping fees
- Garbage fees
- National Grants
- Internal Revenue Allotment
- Congressional Fund
- Incentives
- Domestic Credit Finance Instruments
- Loans from GIs
- Bond flotation
- Lease financing
- Foreign-funded Loans/Grants
- Private Sector Participation
- NSWMF
- NSWMF

---

**Important Considerations**

- Proper matching of technical and financial plans.
- Solid waste operation as a separate cost center of the LGU.
- Garbage fees should be based on real costs of operation, at least for business and industrial establishments.
- Minimal fees should be collected from residential/domestic solid waste generators.
- Mainstream the utilization of new funding sources and employ cost-effective approaches.
- Feasibility and sustainability study should be undertaken for projects such as MRFs.

---

**Table:** Collection of Garbage Fees as to Total Local Income, 2001 (P'000)

<table>
<thead>
<tr>
<th>LGU</th>
<th>Garbage Fees</th>
<th>Local Income</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caloocan</td>
<td>20.714</td>
<td>657,435</td>
<td>3.2%</td>
</tr>
<tr>
<td>Las Piñas</td>
<td>12.820</td>
<td>414,004</td>
<td>3.1%</td>
</tr>
<tr>
<td>Mandaluyong</td>
<td>n.a.</td>
<td>n.a.</td>
<td>-</td>
</tr>
<tr>
<td>Malabon</td>
<td>5.777</td>
<td>136,081</td>
<td>2.8%</td>
</tr>
<tr>
<td>Valenzuela</td>
<td>10.427</td>
<td>429,423</td>
<td>2.4%</td>
</tr>
<tr>
<td>Quezon City</td>
<td>56.107</td>
<td>2,368,986</td>
<td>2.4%</td>
</tr>
<tr>
<td>Manila</td>
<td>57.599</td>
<td>2,615,984</td>
<td>2.1%</td>
</tr>
<tr>
<td>Navotas</td>
<td>1.809</td>
<td>34,290</td>
<td>2.0%</td>
</tr>
<tr>
<td>Pateros</td>
<td>406</td>
<td>22,551</td>
<td>1.8%</td>
</tr>
<tr>
<td>Marikina</td>
<td>7.053</td>
<td>460,673</td>
<td>1.8%</td>
</tr>
<tr>
<td>Taguig</td>
<td>4.644</td>
<td>275,560</td>
<td>1.7%</td>
</tr>
<tr>
<td>Mandaluyong</td>
<td>n.a.</td>
<td>n.a.</td>
<td>-</td>
</tr>
<tr>
<td>Mandaluyong</td>
<td>n.a.</td>
<td>n.a.</td>
<td>-</td>
</tr>
<tr>
<td>Mandaluyong</td>
<td>n.a.</td>
<td>n.a.</td>
<td>-</td>
</tr>
</tbody>
</table>

---

**Sources of Financing**

Solid waste management programs of local government units may be sourced from one or a combination of any of the following financing schemes.

- Locally-generated Income
- Cost-Recovery Schemes
- National Grant/Subsidies
- Domestic Credit Finance Instruments
- Foreign-funded loans/grants
- Private Sector Participation
- National Solid Waste Management Fund
### Table: Collection of Garbage Fees as to Total Local Income

<table>
<thead>
<tr>
<th>LGUs</th>
<th>Garbage Fees</th>
<th>SWM Expenses</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valenzuela</td>
<td>10,426</td>
<td>42,716</td>
<td>24%</td>
</tr>
<tr>
<td>Malabon</td>
<td>3,777</td>
<td>22,087</td>
<td>17%</td>
</tr>
<tr>
<td>Manila</td>
<td>7,053</td>
<td>52,804</td>
<td>13%</td>
</tr>
<tr>
<td>Muntinlupa</td>
<td>7,612</td>
<td>57,900</td>
<td>16%</td>
</tr>
<tr>
<td>Quezon City</td>
<td>94,128</td>
<td>44,677</td>
<td>21%</td>
</tr>
<tr>
<td>Navotas</td>
<td>83,974</td>
<td>292,836</td>
<td>15%</td>
</tr>
<tr>
<td>Manila</td>
<td>418,377</td>
<td>3,275,998</td>
<td>8%</td>
</tr>
<tr>
<td>Marikina</td>
<td>52,804</td>
<td>778,479</td>
<td>7%</td>
</tr>
<tr>
<td>Malabon</td>
<td>23,687</td>
<td>348,850</td>
<td>6%</td>
</tr>
<tr>
<td>Taguig</td>
<td>42,716</td>
<td>734,606</td>
<td>6%</td>
</tr>
<tr>
<td>Pasay</td>
<td>4,040</td>
<td>120,949</td>
<td>3%</td>
</tr>
<tr>
<td>Caloocan</td>
<td>20,714</td>
<td>n.a.</td>
<td>-</td>
</tr>
<tr>
<td>Las Pinas</td>
<td>12,411</td>
<td>n.a.</td>
<td>-</td>
</tr>
<tr>
<td>Pasig</td>
<td>11,614</td>
<td>n.a.</td>
<td>-</td>
</tr>
<tr>
<td>San Juan</td>
<td>1,927</td>
<td>n.a.</td>
<td>-</td>
</tr>
<tr>
<td>Pateros</td>
<td>506</td>
<td>n.a.</td>
<td>-</td>
</tr>
<tr>
<td>Mandaluyong</td>
<td>n.a.</td>
<td>1,591,883</td>
<td>-</td>
</tr>
<tr>
<td>Mandaluyong</td>
<td>n.a.</td>
<td>1,129,801</td>
<td>-</td>
</tr>
<tr>
<td>Mandaluyong</td>
<td>n.a.</td>
<td>389,000</td>
<td>-</td>
</tr>
<tr>
<td>Mandaluyong</td>
<td>n.a.</td>
<td>430,373</td>
<td>-</td>
</tr>
<tr>
<td>Mandaluyong</td>
<td>n.a.</td>
<td>62,186</td>
<td>-</td>
</tr>
</tbody>
</table>

### Table: SWM Expenses as to Total LGU Expenses, 2001 (P'000)

<table>
<thead>
<tr>
<th>LGUs</th>
<th>SWM Expenses 1</th>
<th>Total Expenses 2</th>
<th>Percentage 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taguig</td>
<td>120,949</td>
<td>545,442</td>
<td>22%</td>
</tr>
<tr>
<td>Quezon City</td>
<td>94,128</td>
<td>4,467,316</td>
<td>21%</td>
</tr>
<tr>
<td>Pasay</td>
<td>243,507</td>
<td>1,213,353</td>
<td>20%</td>
</tr>
<tr>
<td>Navotas</td>
<td>43,974</td>
<td>292,836</td>
<td>15%</td>
</tr>
<tr>
<td>Mandaluyong</td>
<td>183,693</td>
<td>1,886,644</td>
<td>13%</td>
</tr>
<tr>
<td>Manila</td>
<td>574,990</td>
<td>4,556,818</td>
<td>13%</td>
</tr>
<tr>
<td>Muntinlupa</td>
<td>91,377</td>
<td>1,059,651</td>
<td>9%</td>
</tr>
<tr>
<td>Mandaluyong</td>
<td>418,377</td>
<td>9,273,998</td>
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<td>734,606</td>
<td>6%</td>
</tr>
<tr>
<td>Pasig</td>
<td>n.a.</td>
<td>2,100,613</td>
<td>-</td>
</tr>
<tr>
<td>Mandaluyong</td>
<td>n.a.</td>
<td>1,129,801</td>
<td>-</td>
</tr>
<tr>
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<td>n.a.</td>
<td>389,000</td>
<td>-</td>
</tr>
<tr>
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<td>n.a.</td>
<td>430,373</td>
<td>-</td>
</tr>
<tr>
<td>Mandaluyong</td>
<td>n.a.</td>
<td>62,186</td>
<td>-</td>
</tr>
</tbody>
</table>

### Table: SWM Expense as to Total LGU Expense (2001)

<table>
<thead>
<tr>
<th>LGUs</th>
<th>SWM Expenses 1</th>
<th>Total Expenses 2</th>
<th>Percentage 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taguig</td>
<td>120,949</td>
<td>545,442</td>
<td>22%</td>
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<tr>
<td>Quezon City</td>
<td>94,128</td>
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</tr>
<tr>
<td>Pasay</td>
<td>243,507</td>
<td>1,213,353</td>
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<td>Navotas</td>
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<tr>
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<td>n.a.</td>
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<td>-</td>
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<tr>
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<td>n.a.</td>
<td>389,000</td>
<td>-</td>
</tr>
<tr>
<td>Mandaluyong</td>
<td>n.a.</td>
<td>430,373</td>
<td>-</td>
</tr>
<tr>
<td>Mandaluyong</td>
<td>n.a.</td>
<td>62,186</td>
<td>-</td>
</tr>
</tbody>
</table>

### Table: Per Capita SWM Cost, 2001

<table>
<thead>
<tr>
<th>LGUs</th>
<th>SWM Expenses 1</th>
<th>Total Population 2</th>
<th>Percentage 3</th>
<th>Per Capita Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Makati</td>
<td>418,577</td>
<td>455,366</td>
<td>80%</td>
<td>1,149.01</td>
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<tr>
<td>Pasay</td>
<td>243,807</td>
<td>363,284</td>
<td>100%</td>
<td>671.12</td>
</tr>
<tr>
<td>Quezon City</td>
<td>941,828</td>
<td>2,228,313</td>
<td>100%</td>
<td>423.27</td>
</tr>
<tr>
<td>Mandaluyong</td>
<td>192,993</td>
<td>540,427</td>
<td>100%</td>
<td>355.28</td>
</tr>
<tr>
<td>Mandaluyong</td>
<td>23,687</td>
<td>348,850</td>
<td>100%</td>
<td>63.62</td>
</tr>
<tr>
<td>Mandaluyong</td>
<td>42,716</td>
<td>496,889</td>
<td>80%</td>
<td>107.46</td>
</tr>
<tr>
<td>Mandaluyong</td>
<td>3,127</td>
<td>416,877</td>
<td>100%</td>
<td>781.88</td>
</tr>
<tr>
<td>Mandaluyong</td>
<td>1,927</td>
<td>416,877</td>
<td>100%</td>
<td>471.88</td>
</tr>
</tbody>
</table>
Per Capita SWM Cost

Fiscal Incentives
- Tax and duty exemption on imported capital equipment and vehicles
- Tax credit on domestic capital equipment
- Tax and duty exemption of donations, legacies and gifts
- Financial assistance program

Incentives
- Incentives shall be provided for the purpose of encouraging LGUs, enterprises, private sector and civil society to develop or undertake socially acceptable, effective and efficient SWM and/or actively participate in any program for the promotion thereof, as provided for in the Act.

Kinds of Incentives
- Rewards
- Grants
- Fiscal Incentives
- Non-Fiscal Incentives
- Private Sector Participation

Non-Fiscal Incentives
- Enhanced procedure for importation
- Enhanced procedure for exportation
- Enhanced certification, permitting and licensing processes
- Knowledge and skills exchange
- Employment of foreign nationals
<table>
<thead>
<tr>
<th>Base Year</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
<th>Year 6</th>
<th>Year 7</th>
<th>Year 8</th>
<th>Year 9</th>
<th>Year 10</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CASH INFLOW</strong>&lt;br&gt;Operating Income&lt;br&gt;- Tipping Fee&lt;br&gt;- Garbage Fee&lt;br&gt;- Fines and Penalties&lt;br&gt;- Sale of Recyclable Materials&lt;br&gt;- Sale of Composted Materials&lt;br&gt;- Income from Leased Properties&lt;br&gt;- Others&lt;br&gt;- Sub-Total&lt;br&gt;- General Fund Appropriation&lt;br&gt;- Grants/Subsidy&lt;br&gt;- Local Equity&lt;br&gt;- Loan Proceeds&lt;br&gt;- Total Cash Inflow</td>
<td>&lt;br&gt;</td>
<td>&lt;br&gt;</td>
<td>&lt;br&gt;</td>
<td>&lt;br&gt;</td>
<td>&lt;br&gt;</td>
<td>&lt;br&gt;</td>
<td>&lt;br&gt;</td>
<td>&lt;br&gt;</td>
<td>&lt;br&gt;</td>
<td>&lt;br&gt;</td>
</tr>
<tr>
<td><strong>NET CASH FLOW</strong></td>
<td>&lt;br&gt;</td>
<td>&lt;br&gt;</td>
<td>&lt;br&gt;</td>
<td>&lt;br&gt;</td>
<td>&lt;br&gt;</td>
<td>&lt;br&gt;</td>
<td>&lt;br&gt;</td>
<td>&lt;br&gt;</td>
<td>&lt;br&gt;</td>
<td>&lt;br&gt;</td>
</tr>
</tbody>
</table>
Metro Manila Solid Waste Management Project

Education and Public Information

Linda Eggerth
Grace Favila

- **Year SWMP Requirements –**
  - Describe how the LGU will educate and inform its citizens
    - Source reduction
    - Recycling programs
    - Composting programs
    - Waste collection services
    - Waste management (disposal)
    - Related health and environmental concerns

---

10-Year SWMP Requirements – RA 9003 Section 17(i)

- Wide dissemination among public
  - Print media
  - Broadcast media
  - Other govt. agencies in municipality
- Curriculum in schools
  - Primary, secondary and college students
  - Role of DECS and Commission on Higher Education

---

Important Considerations

- Integration with infrastructure
- Coordinated/uniform message
- Continuous effort/sustainability
- Well-conceived plan
- Realistic strategies
- Offering alternatives to current situation

---

Preparation of IEC Plan

1. Research on previous/existing IEC activities
   - Types, subject, audience, number/frequency
   - Effectiveness
   - Discussions with community groups
   - Best approaches for each audience

2. Development of strategy
   - Problems/issues
   - Need (purpose of IEC activity)
     - Information dissemination
     - Education
     - Motivation
     - Advocacy
   - Target audiences
     - Specific
     - Message may vary by sector
Preparation of IEC Plan

2. Development of strategy
   − Approach
     • Positive
     • Negative
   − Subject of message
     • Straightforward, simple
     • Coordinated with other agencies
     • Evolving over time

Preparation of IEC Plan

2. Development of strategy
   − Method/Medium
     • Selected based on purpose, audience, and message
     • Part of a well-conceived plan
     • Avoidance of a scattered approach
     • Use of innovative approaches

Preparation of IEC Plan

3. Preparation of plan document:
   − Introduction
   − Matrix of planned activities
     • Purpose
     • Target audience
     • Subject of message
     • Method
     • Responsible party
     • Monitoring plan
   − Schedule
   − Cost

Key Issues

- Focused approach – need, purpose, audience, message, strategy
- Integration with infrastructure
- Implementable
DEPARTMENT OF HEALTH
Office of the Secretary
Health Emergency Management Unit
Health Policy, Development & Planning Bureau
Health Regulation
External Affairs
Health Operations
Bureau of Health Facilities and Services
Bureau of Health Devices and Technology
Bureau of Quarantine and International Health Surveillance
Bureau of Health Development
National Epidemiology Center
National Center for Disease Prevention & Control
National Center for Health Promotion
National Center for Health Facility Development
Special Hospitals
Regional Hospitals, Medical Centers and Sanitaria
DEPARTMENT OF HEALTH
BUREAU OF HEALTH FACILITIES AND SERVICES
➢ Require health care establishments to develop health care waste management plan/program as requisite in the renewal or application of license to operate

DEPARTMENT OF HEALTH
NATIONAL CENTER FOR DISEASE PREVENTION AND CONTROL
Environmental and Occupational Health Office
Health Care Waste and Toxic Hazardous Division
➢ Development and evaluation of policies, programs, plans and projects related to waste management

DEPARTMENT OF HEALTH
NATIONAL CENTER FOR HEALTH FACILITY AND DEVELOPMENT
Infrastructure and Equipment Division
➢ Formulation of policies, programs and plans on health facilities, design, operation and management
➢ Development of technical guidelines and training program on health care/medical waste facility design, planning operation and maintenance

DEPARTMENT OF HEALTH
CENTER FOR HEALTH DEVELOPMENT
National Capital Region
Hospital and Health Facilities Development Cluster
Monitors the following health facilities
➢ Las Pinas District Hospital
➢ Valenzuela District Hospital
➢ Taguig-Pateros Hospital
➢ San Lorenzo Ruiz Women’s Hospital, Malabon

DEPARTMENT OF HEALTH
CENTER FOR HEALTH DEVELOPMENT
National Capital Region
Licensing, Regulation and Enforcement Division
➢ Responsible for the renewal of license to operate
➢ Inspection of the facility
Environmental Violation Receipt
MMDA Regulation No. 98-008
Ordinance No. 16S, 1991

Notice: The following persons have violated the provisions of METROPOLITAN MANILA DEVELOPMENT AUTHORITY Ordinance number 16S of 1991 and MMDA Regulation No. 98-008.

NATURE OF OFFENSE:
01. Non-segregation of Hazardous Infectious Waste
02. Waste Color coding Violation
03. No Pre-treatment employed on Infectious /Hazardous Waste
04. Improper Storage System
05. Improper Disposal System for Infectious /Hazardous Waste
06. Improper Disposal System for Non-infectious Waste
07. Non-labelling of name of institution and date of sealing of bin
08. Others

Environmental Violation Receipt
MMDA Regulation No. 98-009

Notice: This is hereby served that you have violated the provisions of METROPOLITAN MANILA DEVELOPMENT AUTHORITY Regulation No. 98-009.

NATURE OF OFFENSE:
01. Non-segregation of Hazardous Infectious Waste
02. Waste Color coding Violation
03. No Pre-treatment employed on Infectious /Hazardous Waste
04. Improper Storage System
05. Improper Disposal System for Infectious /Hazardous Waste
06. Improper Disposal System for Non-infectious Waste
07. Non-labelling of name of institution and date of sealing of bin
08. Others

METROPOLITAN MANILA DEVELOPMENT AUTHORITY HEALTH OPERATIONS CENTER

Metro Manila Authority Ordinance No 16 - August 16, 1991
Regulation of health care waste management and collection

METROPOLITAN MANILA DEVELOPMENT AUTHORITY HEALTH OPERATIONS CENTER

MMDA Regulation No 98-008
“to intensify the Authority’s objectives and campaign on the prevention of hospital acquired infections, protection of public health and maintenance of the ecological balance of the metropolis through discipline on sanitation and proper disposal of hospital waste”

METROPOLITAN MANILA DEVELOPMENT AUTHORITY HEALTH OPERATIONS CENTER

- Staffing: 41 personnel
- 431 Deputized Personnel
- EVR
- Proposed Transfer of functions to Center for Health Development NCR
ISSUES

➢ Will the NCR be in a position to carry-out the responsibility?
➢ Personnel
➢ Capability-building
PROVISIONS OF RA 9003

SECTION 12
- Formation of Solid Waste Management Boards

SECTION 10
- Formation of Barangay Ecological Solid Waste Management Committee

SECTION 16
- Formation of a Solid Waste Management Plan
  Is there an outline Plan?

SECTION 20
- Mandatory SW diversion of 25% by 2006 to be increased every three (3) years
  - How will this be monitored?
  - There should be a strategy on how goal should be achieved
PROVISIONS OF RA 9003
SECTION 21
- Mandatory segregation at source
  - Composting
  - Recycling
  - Segregation requirements as contained in RA 9003

PROVISIONS OF RA 9003
SECTION 32
- Establishment of MRFs
  - Design guidelines

PROVISIONS OF RA 9003
SECTION 37
- Conversion of open dumps into controlled dumpsites
  - Conversion guidelines as contained in the Law
  - Controlled landfills by 2005

PROVISIONS OF RA 9003
SECTION 34
- Establishment of MRFs
  - Design guidelines

PROVISIONS OF RA 9003
SECTION 37
- Conversion of open dumps into controlled dumpsites
  - Conversion guidelines as contained in the Law
  - Controlled landfills by 2005

PROVISIONS OF RA 9003
SECTION 41
- Requirements in establishment of sanitary landfills
  - Sanitary landfills by 2007

PROVISIONS OF RA 9003
SECTION 49
- Enforcement and administrative procedures. Role Playing
  - Who files them?
  - How are complaints filed?
  - What are the responsibilities of the barangay, the City/ Municipality, the MMDA Board?
Barangay Ecological Solid Waste Management Committee

Section 10

COMPOSITION
1. Barangay Captain - Chairman
2. Barangay Kagawad - Chairman on Envi. Protection and/or Health and Sanitation
3. SK Chairperson
4. President Homeowners Association
5. Public/Private School Principal or Representative
6. Public School PTA President or Representative
7. Religious Organizations Representative
8. President or representative from the Association of Business Community (Commercial or Industrial Sector)
9. NGO Representative
10. President of the Market Vendors Association and Junkyard Owners, if any

FUNCTIONS
1. Formulate a Community Solid Waste Management Plan
2. Collection of Segregated Waste
3. MRF
4. Funding
5. Organize Training Core (Street Coordinators)
6. Integrate BSWMP into Barangay Development Plan
7. Alternative Sources of Funds

City Municipal Solid Waste Management Board

Section 12

COMPOSITION
1. Mayor - Head
2. Sangguniang Representative (Committee on Environmental Health)
3. ABC President
4. SK Chairperson
5. NGO Representative
6. Recycling Industry Representative
7. Manufacturing or Packaging Industry Representative
8. Government Agency Representative (technical and marketing expertise)
9. Other Government Agencies as necessary

FUNCTIONS
1. Develop Solid Waste Management Plan
2. Adapt Measures effective implementation
3. Monitor NGO and Private Sector
4. Revenue Generation Measures
5. Convene Regular Meetings
6. Oversee Plan Implementation
7. Review Every 2 Years or as the Need Arises
**FUNCTIONS**

8. Develop Mechanics and Guidelines
9. Recommend Measures or Proposal for Franchise or BOT (RA 6957)
10. Recommend Measures and Safeguards Against Pollution
11. Coordinate Efforts of the Barangays in Plan Implementation

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**Environmental Services Department**

**Solid Waste Management Division**

**City of Makati**

**ORGANIZATIONAL CHART**

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**Solid Waste Management Division**

**Organization Structure**

---

**SOLID WASTE MANAGEMENT OFFICE VALENZUELA**

---

**MMDA Solid Waste Management Board**

**Section 11**

**COMPOSITION**

1. All Mayors
2. NGO Representative
3. Recycling Industry Representative
4. Manufacturing or Packaging Industry Representative
FUNCTIONS and RESPONSIBILITIES

1. Develop Solid Waste Management Plan
   City/Municipal SWM Board Plans
   Review and Integrate
   Submit to the Commission for Approval
2. Provide Logistical and Operational Support – Section 17 of RA 7160
3. Recommend Measures and Safeguards
4. Recommend Revenue Generating Measures

POWERS and FUNCTIONS

1. Prepare Solid Waste Management Framework
2. Approve Plans
3. Review and Monitor Plan Implementation
4. Coordinate SW Boards Operations
5. Assist in Plan Preparation, Modification, Implementation
6. Develop Model Provincial, City, Municipal SWM Plan

FUNCTIONS and RESPONSIBILITIES

5. Identify Areas with Common SW Management Problems
6. Coordinate Efforts
7. Incentive Scheme
8. Convene Joint Meetings Every Quarter
9. Represent Cities and Municipalities
10. Oversee Implementation
11. Review Plan Every 2 Years
12. Allow Clustering of LGUs

POWERS and FUNCTIONS

7. Technical and Capability Building Assistance
8. Market Identification
9. Mechanism for Imposition of Sanctions
10. Manage SW Management Funds
11. Procedures for Issuance of Permits and Licenses
12. Reviews Incentives Scheme

National Solid Waste Management Commission

COMPOSITION

1. DENR
2. DILG
3. DOH
4. DOST
5. DPWH
6. DTI
7. DA
8. MMDA
9. League of Provincial Governors
10. League of City Mayors
11. ABC

POWERS and FUNCTIONS

13. Education Promotion and Information Campaign Strategies
14. Establish Standards, Criteria, Guidelines, and Formula for Tipping Charges
15. Develop Safety Nets and Alternative Livelihood Programs
16. Formulate List of Non-Environmentally Accepted Materials
17. Encourage Private Sector Initiatives, Community Participation and Livelihood Programs
18. Encourage LGUs to Patronize Products
19. Propose and Adopt Regulations Requiring Source Separation

POWERS and FUNCTIONS

INSTITUTIONAL LINKAGES
CITY/MUNICIPAL PROFILE

1. City/Municipality
2. Barangays
3. Population Projection of each barangay for 10 years
4. Inventory of existing solid waste facilities and capacities

6. Present Solid Waste Generation
   - Residential
   - Market
   - Commercial
   - Street waste
   - Industrial
   - Agricultural
   - Institutional
   - Other waste
   - Construction/demolition debris

7. Projected Solid Waste Generation for 10 years

5. Maps
   - Residential
   - Commercial
   - Industrial
   - Agricultural
   - Dumpsites
   - Landfills
   - Other Solid Waste Facilities
   - Proposed Disposal
   - Proposed Solid Waste Facilities
The Management of Health Care Wastes

L.F. Diaz and L.L. Eggerth

Contents

- Introduction
- Definitions
- Opportunities for Reduction and Recycling
- Destruction of Infectious Organisms
- Overview of International Practices
- Conclusions

Introduction

- Every facility in provision of health care produces some type of residue
- Quantity and characteristics vary depending upon type of facility
- Increased public concern about management of health care wastes
- Concern associated with transmission of blood-born diseases
- Lack of understanding of the modes of transmission has led to additional regulation

Definitions

- No standard definitions universally accepted
- Lack of standardization leads to confusion
- Health care waste
- Medical waste
- Infectious waste
- Radioactive waste
- Pharmaceutical waste
- Hazardous waste

Opportunities for Reduction and Recycling

- There are several opportunities for waste reduction and recycling:
  - change in purchasing habits
  - recycling of items that do not come in contact with patients
- Untreated medical waste is potentially hazardous and offensive
- Treatment must meet key objectives:
  - proper monitoring and recording systems
  - ease or difficulty in operation
  - need for skilled operators
  - applicability to local conditions
  - cost
  - importance of load standardization
  - controls to make sure that all medical waste undergoes treatment
  - meet all relevant occupational health and safety requirements
  - avoids direct contact with the waste by operators
  - controls all types of emissions (gases, liquids, and solids)

Destruction of Infectious Organisms

- Sterilization vs. disinfection
- Levels by US CDC:
  - high-level disinfection
  - intermediate
  - low-level
Treatment and Disposal Options

- Aim of treatment and disposal – limit public health and environment impacts by:
  - transforming waste into non-hazardous residues by treatment
  - containing waste/residues to avoid human exposure
  - containing waste/residues to avoid dispersion into the environment

Criteria for Choice of Options

- Prevailing regulations
- Available options in the region
- Quantities of generated waste categories
- Availability of qualified personnel
- Technologies available on the market
- Available options for final disposal
- Environmental aspects
- Available space on hospital premises
- Related cost

Treatment Options for Waste

- Size reduction
- Chemical disinfection
- Autoclaving
- Incineration
- Encapsulation
- Microwave irradiation
- Other

India - Size Reduction of Some Health Care Wastes

Simple Chemical Disinfection

- Treatment by contact to commonly used products for surface disinfection:
  - requires shredding of waste
  - may introduce strong chemicals into environment
  - efficiency depends on operational conditions
  - only the surface is disinfected
  - human tissue should usually not be disinfected
  - special disposal required to avoid pollution of environment

Commercial Chemical Disinfection Systems

- Several self-contained, fully-automatic systems are available on the market, containing options such as:
  - shredding of the waste
  - chemical treatment
  - Encapsulation
- Possible advantages:
  - landfilling of residues
  - environmentally friendly
  - easy to operate
- Possible disadvantages:
  - requires specialized operators for maintenance
  - may be expensive
Wet Thermal Treatment Systems

- Exposes waste to steam under pressure
- Examples: autoclaving, larger offsite treatment facilities
- Characteristics:
  - relatively low investment/operating costs for simple apparatus
  - environmentally friendly
  - not appropriate for tissue or carcasses
  - trained operatives required

Screw Feed Technology

- Continuous dry thermal process:
  - waste is shred to particle size of 25 mm first
  - waste rotates through hot auger:
    - oil circulates in central shaft at 110º to 140º
    - 20 minutes’ retention in system
  - waste reduction:
    - 80% volume, 30% weight
    - air and water emissions must be treated

Time-Temperature Relationship for Steam Sterilization

Autoclaves
Incineration

- Reduces organic and combustible waste to inorganic incombustible waste (ashes)
- Significantly reduces waste volume and weight
- Residues are transferred to final disposal site
- Treatment efficiency depends on incineration temperature and type of incinerator
- Not all wastes can be incinerated
- Investment and operation costs vary greatly, according to type of incinerator
- Produces combustion gases
- Not a viable option in the Philippines due to the Clean Air Act

Philippines Health Care Incineration

Peru – “Incinerators”

South Africa - Small-Scale Incinerator
South Africa - Small-Scale Incinerator

Disposal Options for Waste
- Municipal landfill
- Burying inside premises
- Discharge into sewer
- Other

Microwave Irradiation
- Waste is shredded
- Waste is humidified for homogeneous heating
- Microwaves rapidly heat the waste
- Microbiological inactivation by heat conduction and radiation
- Routine microbiological testing required
- Waste is compacted for landfill

Disposal to Land
- Not recommended for untreated hazardous waste
- Minimum requirements for land disposal:
  - no deposit on open dumps
  - a degree of management control is exercised
  - engineered to avoid leaching to water bodies and to retain waste onsite
  - rapid burial of HCW onsite to isolate from animal or human contact

Landfilling in Municipal Landfills
- In case hazardous health care waste cannot be treated or disposed elsewhere:
  - within the site, establish a designated place for hazardous HCW
  - limit access to the place
  - bury the waste rapidly to avoid human or animal contact
  - investigate more suitable treatment methods
Burying Inside Hospital Premises

- For remote locations and temporary encampments
- Apply the following rules:
  - access to site restricted and controlled
  - site lined with low permeable material
  - only hazardous HCW to be buried
  - each deposit covered with soil
  - groundwater pollution must be avoided

Disposal to Land by Encapsulation

- Fill metal or plastic containers to ¾ with waste and fill up with:
  - plastic foam
  - bituminous sand
  - cement mortar
  - clay material
- When dry, seal containers and landfill to restrict access to and reduce mobilization of hazardous substances
- May be used for sharps, chemicals, drugs, etc.

Recommendations

- Efficacy of process
- Appropriate level of automation
- “Track” record of company providing the system:
  - company background
  - service support
- Sufficient data to obtain reliable O&M costs
- Sound integration with solid waste stream

Conclusions

- Currently, there seems to be an increased concern about the proper management of health care waste in most countries
- Concern about proper management has led to closure and ban of incineration facilities. Some of these countries have not been able to reach consensus on viable and affordable alternatives.
- All processes must be preceded by a comprehensive waste reduction and segregation program

Currently, there seems to be an increased concern about the proper management of health care waste in most countries. Concern about proper management has led to closure and ban of incineration facilities. Some of these countries have not been able to reach consensus on viable and affordable alternatives.

All processes must be preceded by a comprehensive waste reduction and segregation program.
MATERIALS RECOVERY FACILITY

DEFINITION OF MRF UNDER RA 9003
Includes a solid waste transfer station or sorting station, drop-off center, a composting facility, and recycling facility.

SECTION 32. Establishment of LGU Materials Recovery Facility. – There shall be established a Materials Recovery Facility (MRF) in every barangay or cluster of barangays. The facility shall be established in a barangay-owned or leased land or any suitable open space to be determined by barangay through its Sanggunian. For this purpose, the barangay or cluster of barangays shall allocate a certain parcel of land for the MRF. The determination of site and actual establishment of the facility shall likewise be subject to the guidelines and criteria set pursuant to this Act. The MRF shall receive mixed waste for final sorting, segregation, composting and recycling. The resulting residual wastes shall be transferred to a long-term storage or disposal facility or sanitary landfill.

- Materials Recovery Facilities shall be designed to receive, sort, process and store compostable and recyclable material efficiently and in an environmentally sound manner. The facility shall address the following considerations:
  a) The building and/or land layout and equipment must be designed to accommodate efficient and safe materials processing, movement and storage; and
  b) The building must be designed to allow efficient and safe external access and to accommodate internal flow.

BARANGAY PHILAM

Population - 3,197
Household - 505
HH Served - 80%

Facilities:
Waste Sorting - 50 sq. m.
Storage Area - 100 sq. m.
Lot Area - approximately 1,000 sq.m.

Equipment:
- Rotating drums: 4 2-tonner
- Hammer Mill: 1
- Shredding Machine: 1
- Weighing Scale: 2
- Dumptruck: 1
- Personnel: 3 workers with salary
- Biodegradable Materials: 2,000 kg/wk
- Segregated wastes are brought to the center by HH
- Non-Biodegradable - Recyclables are collected by the Eco-aides
- Residual wastes are collected by the City

- Compost - Stocked used in subdivision
- Recyclables - Bought/picked up by dealers (paper, plastic, tin cans, metal, glass)

Costs:
Capital Expend. - P 700,000.00 Brgy. Fund
Building 1 - P 400,000.00 Brgy. Fund
Building 2 - P 1,000,000.00 CDF
Processing – RA 9003

✓ Identify methods and facilities required to process solid waste
✓ Identify intermediate treatment facilities
✓ Other conversion technologies may be considered provided that such technologies:
  ✓ Conform with internationally acceptable standards
  ✓ Conform with other standards established in other laws and regulations
✓ Identify program and implementation schedule to meet waste diversion requirements

Other Conversion Technologies

✓ Must conform with:
  ✓ Internationally acceptable standards
  ✓ Other standards established in other laws and regulations

Program and Implementation Schedule

✓ Initial diversion requirement:
  ▪ at least 25% of all solid waste from waste disposal facilities
  ▪ within 5 years after effectivity of RA 9003
✓ Ongoing diversion requirement:
  ▪ increase every three years thereafter

Methods and Facilities Required

✓ Quantities
✓ Composition
✓ Existing facilities and programs
  ▪ Amounts processed
  ▪ Potential for expansion
✓ Markets/uses
✓ Availability of land
✓ Political/community support
✓ Possibility of income generation
✓ Budgets

Intermediate Treatment

✓ Composting
✓ Recycling
✓ Other conversion technologies
Issues

- 25% -- volume or weight
- Base year
- Methodology for inventory
- waste reduction – donations, home composting
- recycling by informal sector
SEMINAR / WORKSHOP
ON SWM PLAN

RA 9003: ECOLOGICAL SOLID WASTE MANAGEMENT ACT OF 2000

Engr. Jose E. Sta. Ana

Section 3. Definition of Terms
For the purposes of this Act

Material Recovery Facility (MRF) – includes a solid waste transfer station or sorting station, drop-off center, a composting facility, and recycling facility.

Recycling – shall refer to the meaning of used or waste materials through a process of making them suitable for beneficial use and for other purposes, and includes any process by which solid waste materials are transferred into new products, in such manner that the original may lose their identity, and which may be used as raw materials for the production of other goods or services. Provided, that the collection, segregation, and reuse of previously used packaging material shall be deemed recycling under this Act.

Composting – refers to the controlled decomposition of organic matter by micro-organisms, mainly bacteria and fungi, into a humus like product.

Section 10. Role of LGU in SWM

"Segregation and collection of solid waste shall be conducted at the barangay level specifically for biodegradable, compostable and reusable wastes: Provided, that the collection of non-recyclable materials and special waste shall be the responsibility of the municipality or city."

Section 17. Components of the Local Government SWM Plan

Collection and Transfer. The plan shall take into account the geographic subdivisions to define the coverage of the solid waste collection area in every barangay.

Guidance on Source Separation System for Metro Manila

- Organic "wet" kitchen waste fractions will be significant, as will garden waste, for those with bird feeders and those who do not practice home composting. There should be closed containers for storing the fractions before collection.
- There is a wide range of dry recyclables such as paper, glass, metals, textiles, and plastics that can be stored in a further container. This can be stored in the Barangay MRF.
- Daily or alternate day collection can be done for the fraction, dry fraction can be collected weekly or fortnightly.
- A container for residual mixed and contaminated waste fractions with collection to be done weekly.
- For communities where housing is largely provided through large apartments, there should be centralized collection for each above waste category to be collected separately at the minimum frequencies.

Types of materials to be recycled or composted
- the methods of determining the categories of wastes to diverted
- new facilities and expansion of existing facilities

It shall include recommended revisions to the building ordinances requiring newly constructed buildings and building undergoing alterations to contain storage space devices or mechanism that facilitate source separation and storage of recyclable materials.

In the case of composting, it shall describe methods for developing markets for the compostable material.
Guidance for MSW Collection for Metro Manila

- Source separation should be encouraged and adopted by all LGUs and Barangays. Without the participation of some LGUs and Barangays, residual for landfill will be more and limited.
- Very close attention should be given to the widely differing types of domestic properties when developing source-separated collection systems and especially for the many densely populated areas.
- To achieve extensive household waste recycling, service providers will require commitment to extensive additional resources, and redistribution of cost savings obtained from diversion of wastes from landfill must be redirected to collection and recovery.
- LGUs should increasingly address and support systems for recycling and recovery of materials from other waste sources, and these, other than the MSW fractions currently collected, in seeking to meet the requirement of RA 9003.
- The local collection plans must ensure that all waste generators entitled to services do receive a regular and comprehensive service.

Consideration should be given as to whether collection service can be reduced from daily collection to once or twice a week, partly to ensure highly efficient use of collection service personnel and equipment, partly to reduce cost for waste collection services.

- Local collection plans should ensure that service to non-household waste generators, if the LGU/Barangay are required to collect waste, is part of the regulatory requirements.
- In determining the overall quantities and types of waste to be collected, the plan should identify the number and types of waste collection equipment needed for the future, and the overall costs for the entire services.
- All services to be provided should be fully set out in a document (Service Delivery Plan) that will form part of a contract. This plan should include all details of technical systems and environmental control measures that will be provided, including details of equipment maintenance and replacement schedules, disaster options, collection routes, time and frequency, personnel and administrative needs.
- Each LGU and Barangay should provide a comprehensive monitoring to ensure that the service provider fully complies with the specifications and requirements set out in the contract and provides a rapid response to complaints and queries from all generators.
Solid Waste Management Planning Seminar/Workshop
ADB TA 3848-PHE
March 11 to 14, 2003

Recycling

L.F. Diaz, and L.L. Eggerth

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General Methods to Improve and Promote Diversion

- stimulate market demand for recovered materials
- target specific sectors of waste generation and types of waste
- intensive public education
- adequate recycling staff resources
- efficient collection and processing systems -- minimize cost so that cost/benefit favors recycling and overcomes disposal ethic

---

Ecological Solid Waste Management Hierarchy

- source reduction, minimization
- resource recovery, recycling, reuse
- collection, transfer, transport
- residuals management

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Overall Approach to Divert Waste from Disposal

1. Determine quantity and composition
2. Identify markets for components
3. Define available approaches:
   - waste reduction
   - source separation
   - drop off
   - curbside
   - other programs
4. Plan for disposal
5. Select optimal system

---

Key Elements of Recycling Program Design and Flexibility

- waste characteristics:
  - sources
  - quantities
  - composition
  - other properties (chemical, etc.)
- recovered product specifications and demand:
  - set by marketplace
  - product quality/allowable contamination
  - form of product (granulated, baled, etc.)

---

Recycling

- collection:
  - separate collection
  - co-collection
  - split (dual) compartment
  - incentives
- processing:
  - MRFs
  - composting
  - special waste categories
Key Elements of Recycling Program Design and Flexibility (cont.)

- Technology:
  - low technology
  - high technology
- Finances:
  - capital
  - operating
  - revenues
  - cost recovery method
- Environmental control:
  - identify pollutant streams
  - regulatory requirements
  - good practice

Materials Processing Equipment

- Size reduction devices:
  - shredders/grinders
  - crushers
- Screens (particle size classification):
  - trommel
  - vibratory flatbed
  - Disc
- Air classifiers:
  - organics/inorganics
  - combustible/non-combustible
  - contamination removal
  - vertical
  - horizontal

Commercial Paper Recycling System

- Magnetic separation:
  - belt
  - drum
- Non-ferrous metal (aluminum) separators:
  - eddy current
- Densification devices:
  - balers
  - pellet mills
  - briquetters
Keys to Success of Diversion Programs

- commitment of the public and public officials
- extensive planning
- convenience to the generator
- multi-faceted system and programs
- continued community involvement
Source Reduction

Definition of Source Reduction – RA 9003
- Reduction of solid waste before it enters the solid waste stream by methods such as:
  - Product design
  - Materials substitution
  - Materials re-use
  - Packaging restrictions

Definition of Source Reduction -- USA EPA
- The reduction or elimination of waste at the source, usually within a process. Measures include process modifications, feedstock substitutions, improvements in feedstock purity, improvements in housekeeping and management practices, increases in the efficiency of machinery, and recycling within a process. Source reduction implies any action that reduces the amount of waste exiting from a process. Source reduction is waste avoidance.

Important Considerations
- At the top of the solid waste hierarchy world-wide
- Leads to savings in collection, transportation, processing, and disposal
- Extends lifespan of disposal sites
- Importance of education and motivation
- Spans all sectors: households, businesses, industry, schools
- Difficult to monitor/measure

Source Reduction and the Product Lifecycle

Source Reduction at the Household -- Examples
- Cloth shopping bags vs. plastic shopping bags
- Reusable containers vs. one-use containers
- Cloth diapers vs. disposable diapers
- Repair of clothing and household items instead of replacement
- Careful planning of meals
Source Reduction in Businesses -- Examples
- Double-sided copying
- Use of back side of discarded paper
- Electronic messaging
- Reusable cups and utensils
- Refilling of toner cartridges
- Reuse of cardboard boxes

Source Reduction in Schools -- Examples
- Use of both sides of paper
- Use of reusable packaging for lunches
- On-site composting of food waste and green waste
- Electronic transfer of assignments (university)

Source Reduction in Industry -- Examples
- Avoidance of over-runs
- Participation in waste exchange
- Lightweighting of packaging
- Reuse of shipping containers and pallets
- Substitution of process materials

Key Issues
- Motivational strategies (options)
  - Social responsibility
  - Economic incentives
  - Legal mandates to businesses and industry
- Impact
  - Local capability
  - Economic viability
  - Technical requirements
  - Social concerns

Some Disposable Household Goods and their Reusable Substitutes
<table>
<thead>
<tr>
<th>Disposable Item</th>
<th>Reusable Item</th>
<th>Infrastructure Needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper and plastic wrap</td>
<td>Cloth wipes and napkins</td>
<td>Change of consumer habits</td>
</tr>
<tr>
<td>Pens</td>
<td>Refillable pens</td>
<td>Ready availability of refills</td>
</tr>
<tr>
<td>Razors</td>
<td>Replacement blades</td>
<td>Proper availability of blades</td>
</tr>
<tr>
<td>Throwaway appliances</td>
<td>Durable appliances</td>
<td>Proper availability of repair services</td>
</tr>
</tbody>
</table>
### Policies to Stimulate the Use of Reusables

<table>
<thead>
<tr>
<th>Design and Manufacture</th>
<th>Purchase</th>
<th>Service/Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic incentives from the public and government and corporate support manufacturers to produce more reusable goods</td>
<td>Incentives to purchase more reusable products and reuse services can be provided by raising the cost of disposal to waste generators</td>
<td>Incentives to purchase more reusable products and reuse services can be provided by raising the cost of disposal to waste generators</td>
</tr>
</tbody>
</table>

### Policies to Stimulate the Use of Reusables (cont.)

<table>
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<tr>
<th>Design and Manufacture</th>
<th>Purchase</th>
<th>Service/Repair</th>
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<tbody>
<tr>
<td>Educational and promotional campaigns can convince consumers of the environmental, civic, or economic value of choosing reusables over disposables</td>
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### Policies to Stimulate the Use of Reusables (cont.)

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<th>Service/Repair</th>
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<tr>
<td>Mandating minimum lengths for service warranties gives manufacturers an incentive to extend the useful lives of products</td>
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### Obstacles to Waste Minimization

#### Sources

- **Economic Barriers**
  - Financial liability
  - Technical barriers
- **Regulatory Barriers**
  - Need to obtain TSD permit
  - Perceived stigma of managing hazardous waste
  - Revisions to other environmental permits

#### Solutions

- **Ease of Reduction**
  - Financial incentives
  - Research and development
- **Direct Recycling**
  - Improved collection systems
  - Improved separation and sorting
- **Indirect Recycling**
  - Improved design practices
  - Improved manufacturing processes

<table>
<thead>
<tr>
<th>Disincentives</th>
<th>Economic Barriers</th>
<th>Regulatory Barriers</th>
<th>Technical Barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source REDUCE</td>
<td>Direct Recycling</td>
<td>Indirect Recycling</td>
<td>Ease of Reduction</td>
</tr>
<tr>
<td>Reduces</td>
<td>√</td>
<td>√</td>
<td>√</td>
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<tr>
<td>Financial liability</td>
<td>√</td>
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<td>Technical barriers</td>
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<td>Process changes</td>
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<tr>
<td>Technical quality</td>
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</tbody>
</table>

Taken from EPA's Report to Congress on Minimization of Hazardous Waste, Executive Summary and Fact Sheet, October 1988.
Integrated Waste Management - Metro Manila

Special Waste
Manjit Kahlon
March 2003

Workshop organized within the framework of ADB’s ‘Metro Manila Solid Waste Management Project’ (TA3848-PHI)

Solid Waste (Definition)

- ‘All discarded household, commercial waste, non hazardous institutional and industrial waste, street sweepings, construction debris, agricultural waste, and other non-hazardous/non-toxic solid waste’

Solid Waste Excludes:

- Infectious Waste from Hospitals - (such as equipment, instruments, utensils, and formites of a disposable nature from patients who are suspected of communicable diseases and thus must be isolated – this includes laboratory pathological specimens – (i.e. all tissues, specimens of blood elements, excreta and secretions from patients of laboratory animals)

- Infectious Waste from Hospitals - Contd
  - This also includes formites that may harbor or transmit pathogenic organisms, and surgical operating room pathologic specimens and disposable materials from outpatient areas and emergency rooms

Solid Waste Excludes:

- Hazardous Waste listed or identified - (solid, liquid, containing gaseous or semi-solid form which may cause or contribute to an increase in mortality, reversible illness or acute/chronic effect on health of persons and other organisms)

Special Waste

- Household Hazardous Waste
  - E.g. paints, thinners, household batteries, lead acid batteries, spray canisters
  - Includes wastes from residential & commercial sources that comprise of wastes, consumer electronics, white goods, yard wastes that are collected separately, batteries, oils and tyres
  - Usually collected separately from other residential and commercial wastes
Special Waste (Continued)

- **White Goods**
  - large worn out or broken household, commercial and industrial appliances e.g. stoves, refrigerators, dishwashers and clothes machines and dryers collected separately.
  - Usually dismantled for recycling of materials (e.g. copper, aluminium, etc)

- **Yard Waste**
  - wood, small or chipped branches, leaves, grass clippings, garden debris, vegetable residue (recognised as part of plant or vegetable and other materials identified by the Commission).

Special Waste Options

- **Household Hazardous Waste**
  - Specialist treatment and disposal sites
  - Recycling/reuse of paints
  - Recovery of solvents
  - Battery Processing

- **White Goods**
  - Usually dismantled for recycling of materials (e.g. copper, aluminium, etc)
  - Recovery of components and recycling
  - Regeneration of pumps

- **Yard Waste**
  - Large trees and stumps etc are frequently used for fuel
  - Smaller fractions are usually composted
Integrated Waste Management - Metro Manila

SWM Planning
Manjit Kahlon
March 2003

Workshop organized within the framework of ADB’s ‘Metro Manila Solid Waste Management Project’ (TA3848-PHI)

Planning Aspects

- Predictive Tools for Planning
- Provides Guidance only
- Quality of Data Inputs Critical
- Application of local knowledge key in assessing outputs
- Understanding of limitations in interpretation
- Key Decisions on implementation to be taken by persons not models

Data Requirements

- Most models assess over a 20 year period due to capital costs depreciation requirement.
- Models will calculate the number of waste management facilities required to handle a given waste input
- The quality of the input data will determine the quality and usefulness of the output information.

Technologies Modelled

- Materials Recovery Facilities (MRF) - for the processing of dry recyclables (paper, cans, plastics etc collected from households, commercial or other premises.
- Windrow Composting - for processing green (garden) waste collected or delivered to central collection facility for composting

Model Aims

‘To determine, as far as is reasonably practicable, a profile of waste management facilities required for a given (input) profile of (municipal solid) waste tonnages.’

Technologies Modelled

- Biowaste (In vessel) Composting - for processing kitchen/market/restaurant food wastes (and macerated green waste) collected from the above generators
- Energy from Waste (EfW) – if this is appropriate for the processing of residual (not recycled) material
Technologies Modelled

- **Mechanical Biological Treatment (MBT)** – for the processing of residual (not recycled) material – in Europe required for residual biologically active waste before landfill.
- **New Technology** – e.g. anaerobic digestion plants (currently considered within and as a direct alternative to in-vessel composting).

Waste Composition & Distribution

- Total amount of waste streams determined and hence the residual tonnages after accounting for recyclables.
- Distribution between the urban, semi-rural and rural centres estimation/input. This data is used to determine the distribution of facilities between the various centres and the proportions of waste also disposed in the centres.

Operational Capacities

- Can specify and vary the actual processing time for the facility and rejection rates of material.
- Data is used to calculate number of facilities required dependant upon operational throughput.
- Can vary current and planned operational capacities.
- Data on available landfill, lifespan, rate of closure, average throughput of existing landfill, costs of closure & aftercare.

Development Period & Cost Data

- Development Times (i.e. time taken to get the facilities operational). Assumptions are made on typical lead times.
- Estimation of ‘gate fees’ for various facilities – used to calculate the (revenue) cost to a LGU.
- Costs for collection of waste and preliminary capital cost data for technologies (MRF, Windrow Composting etc) required as an input.

Waste Composition & Distribution

- Data on composition of MSW (from typical MM Waste Characterisation Analysis) and determination of quantity recycled.
- Data used to determine biodegradability of MSW arisings and disposal tonnages.
- Determination of distribution of MSW between kerbside MSW, commerce and industry collected (i.e. MSW collected by LGUs) and from other known collections.

Outputs

- Gross processing capacity
- Net Capacity
- Cumulative total Numbers of Facilities
- Number of New Facilities
- Facility Contracts required
- Facility Build and Planning
- Capital Cost profile
- LGU Revenue Costs
Vision

- The desired end of a plan
- The plan is like the road map, the vision is the final destination

Define your vision

- Look at and analyze the present situation. Project into the future. Dream! MANGARAP!
- What elements of the current situation do you like? How can you strengthen them?
- What elements don’t you like? How do you eliminate or diminish them?
- State your vision in very clear, concise sentences. Communicate this Vision Statement to all concerned:

Example of a Vision Statement

- After 10 years, Malinis City will have clean streets, esteros, parks and other public places. Most people will have the habit of waste segregation at source. The recycling industry will be well established, with collection points in strategic locations. Some people will do composting in their homes or in their neighborhoods. The city will have a well-managed disposal facility.

Goals

- Goals are specific elements of the vision. (state or condition, nouns)
- Examples
  - High level of SWM awareness and commitment among the city residents, officials, students, etc.
  - Efficient and effective SWM system in the LGU with an adequate infrastructure to receive the different kinds of wastes

Objectives

- Actions to be done to reach the goals (action words, verb)

Examples

- To raise awareness and understanding of proper SWM
- To set up an adequate SWM system, including provisions for segregated collection, recycling facilities, and proper disposal site.

Strategies and Specific Targets

- The strategies will be addressed by the other components of the Plan
- The Specific targets of the strategies should be measurable that can progressively add up to the goals

Examples

- 10% reduction of residual waste by Dec 2003
- 18% by Dec 2004
- 25% by Dec 2005, etc.
Now you’re set.

Good luck!
Annex 2b Solid Waste Management Seminar/Workshop

March 11-14, 2003

Workshop handouts
CBSWM Promotion: CO Component

Objective
effective and sustainable waste segregation at source, collection of segregated waste, and MRF operation.
Capacity Building for Local Government Units Report No: 8

User Factories/Recyclers

Barangay Inst. Support

CBSWM PO

HH

ECO-AIDES

Junkshops

Segregation @ Source

Collection of Segregated Waste

BRGY MRF Operation

Recycling

Composting

Common Marketing Facility

Federation
CO Activities/Steps

- CO Worker’s Preparation
- Community Familiarization
- Social Preparation & Mobilization
- Formal Organizational Work
- Organizational Strengthening
**CO Workers Preparation**

- Orientation/Skills Training
- Self-Preparedness
- Action Plan

**Community Entry Familiarization**

- Consultations with Barangay Officials
- Groundwork with informal leaders (street/purok/zone)
- Social Investigation: Rapid appraisal/in-depth

**Social Preparation & Mobilization**

- Conduct of Info Campaign/Groundwork
- Formation of Core Group (CG)
- Organizational Planning:
  1. Plan of CG Activities (recruitment, meetings, etc)
  2. Proposed organizational structure/operation
  3. Project conceptualization: CBSWM/MRF undertakings

[Note: Items agreed during the planning exercises will be carried into the on-going groundwork and membership recruitment campaign to give the prospective members clear idea as what the organization would be all about.]
Formal Organizational Work

- Orientation meeting/workshop with prospective members
  1. CBSWM/MRF concerns
  2. Nature of the envisioned organization (may start as association)
  3. Members’ duties & responsibilities/rights & privileges
  4. Project undertakings: responsibility & benefit-sharing

- Drafting of organization charter and enlistment of members

- Formal organizational meetings:
  1. Ratification of charter
  2. Election of Officers
  3. Creation of Committees
  4. Adoption of Organizations Program of Work
  5. Adoption of enabling resolutions (for registration matters, opening of bank account, committee work, task force assignments, etc)
  6. Fund generation/documentation
  7. Formal registration (SEC)
Organizational Strengthening

- Adoption/enforcement of policies, systems & procedures (PSP)
- Hands-on and formal training on:
  1. Routine organizational matters (e.g. conduct of meeting, etc)
  2. Business and financial management
  3. Leadership and Value enhancement
  4. Technical skills
- Assets and resources build-up thru:
  1. MRF operation
  2. Livelihood projects
  3. Fund-sourcing initiatives (fund-raising, donation, grants, etc)
- Organizational linkages and networking
  1. Marketing tie-up
  2. Formation of cooperatives (among co-CBSWM PO’s) & Federation
  3. Expanded scale of operation/tie-ups
# CONTROLLED DUMPSITE INSPECTION REPORT

## DRAFT

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<tr>
<th>SITE NAME</th>
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<tbody>
<tr>
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<td>OPERATOR</td>
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<td>INSPECTION PERSONNEL;</td>
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<td>➢ OWNER OR OPERATOR</td>
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### COMPLIANCE SUMMARY

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<td>12. Environmental Monitoring</td>
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<td>3. Site Drainage</td>
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<td>14. Protection of Local Amenities</td>
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<td>4. Odor Control</td>
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<td>15. Waste Picking</td>
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<td>6. Site Management</td>
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<td>10. Access Road Maintenance</td>
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<td>11. Other Site Infrastructure</td>
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V = Violation – Serious compliance deficiency requiring immediate action  
C = Conditional – Partial compliance deficiency requiring action  
A = Acceptable – Currently meeting acceptable standards  
NA = Not Applicable

### DESCRIPTION OF DEFICIENCY AND REQUIRED ACTION

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Please fill in the table with relevant data.
## Inspection Personnel Signatories

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<tr>
<th>Name and Title</th>
<th>Organization, Address</th>
<th>Signature</th>
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</table>
Section 39 (RA 9003) and / or Rule 13, Section 2 (Implementing Rules and Regulations)
The following minimum requirements shall be applied in siting, designing and operation of controlled dumpsites;

<table>
<thead>
<tr>
<th>Section</th>
<th>Requirement</th>
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<tbody>
<tr>
<td>1. Site Availability</td>
<td>Daylight hours only where feasible and consistent with waste collection and waste transfer operations. Avoid nighttime hours which are the most sensitive with respect to noise and artificial light, unless the site is remote from sensitive receivers. 06.00-18.00, 365 days per year. If nighttime working required, restrict working times to discrete periods (for example, mid evening and around daybreak).</td>
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<td>2. Daily and Intermediate Cover</td>
<td>a) Daily cover consisting of inert materials or soil of at least 6 inches in thickness shall be applied at the end of the working day; where there is a lack of onsite soil material, other alternative materials may be used subject to the prior written approval of the enforcement authority and the Department; Grade slopes to promote surface run-off. Completed parts of the site should be seeded and planted with native species of grass as soon as possible in order to reduce the potential for soil erosion. Intermediate cover, 150 mm thick, placed on temporarily completed areas of waste. Grade to drain clean water.</td>
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<tr>
<td>3. Site Drainage</td>
<td>b) Drainage and runoff control shall be designed and managed such that storm water does not come in contact with waste and that discharge of sediments into the receiving body of water is minimized. Appropriate erosion protection shall be installed at storm discharge outfalls; Isolate surface water and storm water flows from deposited waste in order to avoid potential wash-out. Surface water interception ditches to drain slopes up-gradient of the area being filled. Minimize size of active area.</td>
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<tr>
<td>4. Odor Control</td>
<td>c) Provision for aerobic and anaerobic decomposition shall be instituted to control odor</td>
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<tr>
<td>5. Waste Placement</td>
<td>d) Working areas shall be minimized and kept at no more than a ratio of 1.5 square meter (sqm) or less per ton/day (tpd) of waste received on a daily basis, e.g. 30 sqm working area for a 20 tpd facility; Key issues in waste emplacement are as follows: - Minimize active filling area to exert maximum environmental control; - Minimize potential for environmental nuisance and impact to local amenity; and - Maximize available void space. Supervision of waste deposition by trained staff. Restriction of active waste deposition area to c. 2 Ha. And two faces. Compaction of waste by mobile plant to crush large hollow items and a minimum number of 3 passes of mobile plant. Limit layer thickness to a maximum of 0.75 m.</td>
</tr>
</tbody>
</table>
## Site Management

### Particular responsibilities with regard to:
- Securing resource requirements;
- Recruitment and appropriate training of staff, and
- Enforcement of site operational practices

Experienced Operations Manager with drive and commitment
Forward planning of site operations and efficient utilization of available void space.

## Site Control

Access to site regulated.

Waste pickers on site controlled by site management according to agreed rules and procedures (e.g. no setting fire to waste).

## Fencing, Litter Control

- Security fencing shall be provided to prevent illegal entries, trespassing and large animal entries. Large animals shall include but not limited to adult domesticated or feral animals such as dogs, cats, cattle, pigs, carabaos and horses. Provisions for litter control including the use of litter fences and daily picking of litter shall be included;

## Record Keeping

- Basic record keeping including volume of waste received daily, special occurrences such as fires, accidents, spills, unauthorized loads (maintain record of unauthorized and rejected loads, name and address of hauler and generator of such unauthorized waste), and daily waste inspection logs;

## Access Road Maintenance

- Provision of maintained all-weather access roads;

## Other Site Infrastructure

Site support facilities to provide minimum levels of environmental control.

Provisions may include the following:
- Services (electricity, water, etc.); and
- Small site office

---

Capacity Building for Local Government Units Report No: 8  AEA Technology plc  Annex 2b
### 12. Environmental Monitoring

Monitoring of the groundwater.

Monitor existing water wells using approved water quality monitoring methods to determine and record the baseline quality of the groundwater while open dumping was resorted to.

Regular monitoring thereafter to establish how controlled dump is affecting the quality of the groundwater.

### 13. Maintenance

Efficient functioning of the following components should be maintained:

- Site roads;
- Drainage works; and
- Any mobile plant.

Regular daily and weekly servicing of mobile plant by qualified mechanic / fitter.

Supply of spare parts of key items and components held on site.

Maintenance of drainage works in advance of rainy season.

Maintenance of site roads as and when required, at least quarterly. In wet weather re-grade as required.

### 14. Protection of Local Amenities

Reduce impacts of site activities upon developments adjacent to the site to minimum levels.

Key measures are:

- Use of litter fences;
- Daily liner patrols within and beyond site boundary;
- Elimination of smoke from waste on fire;
- Control of pests and vermin; and
- Reduction in persistent odors through the application of cover.

### 15. Waste Picking

h) Controlled waste picking and trading, if allowed by owner/operator, in order to facilitate daily covering and compliance to Subsections (a) through (e) above;

### 16. Closure and Post Closure

i) Provision of at least 0.60 m final soil cover at closure, and post-closure maintenance of cover, drainage and vegetation; Post-closure maintenance shall be for a period of ten (10) years;

Upon completion of the controlled dump the site should be returned to some form of productive use. Public open space, recreational use, grazing and some other forms of agriculture (with suitable depth of soil) are compatible after uses. Building works are not recommended.

Site restored progressively upon completion of filling in any particular phase.

Cover layer - minimum thickness for public open space is 600 mm (300 mm for drainage and 300 mm for soil).

Grade slopes to promote surface run-off.

Completed parts of the site should be seeded and planted.
with native species of grass as soon as possible in order to reduce the potential for soil erosion.

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<td><strong>17. Hydrogeology</strong></td>
<td>j) Site shall not be located in flood plains and areas subject to periodic flooding and it shall be hydro-geologically suitable, i.e., adequate separation or clearance between waste and underlying groundwater and any surface body of water shall be provided. Engineering controls shall be provided otherwise.</td>
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<tr>
<td><strong>Prohibited Acts</strong></td>
<td>Section 48 (RA 9003) The following acts are prohibited;</td>
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<tr>
<td><strong>18. Open Burning</strong></td>
<td>(3) The open burning of solid waste.</td>
<td></td>
</tr>
<tr>
<td><strong>20. Unauthorized Dumping</strong></td>
<td>(13) Transport and dumping in bulk of collected domestic, industrial, commercial and institutional wastes in areas other than centers of facilities prescribed under this Act</td>
<td></td>
</tr>
<tr>
<td><strong>21. Vicinity Development</strong></td>
<td>(15) The construction of any establishment within two hundred (200) meters from open dumps or controlled dumps or sanitary landfills</td>
<td></td>
</tr>
<tr>
<td><strong>22. Surface and Groundwater Resource Proximity</strong></td>
<td>(16) The construction or operation of landfills or any waste disposal facility on any aquifer, groundwater reservoir or watershed area and or any portions thereof</td>
<td></td>
</tr>
</tbody>
</table>
MATERIALS RECOVERY FACILITY

DEFINITION OF MRF UNDER RA 9003

Includes a solid waste transfer station or sorting station, drop-off center, a composting facility, and recycling facility.

SECTION 32. Establishment of LGU Materials Recovery Facility. – There shall be established a Materials Recovery Facility (MRF) in every barangay or cluster of barangays. The facility shall be established in a barangay-owned or leased land or any suitable open space to be determined by the barangay through its Sanggunian. For this purpose, the barangay or cluster of barangays shall allocate a certain parcel of land for the MRF. The determination of site and actual establishment of the facility shall likewise be subject to the guidelines and criteria set pursuant to this Act. The MRF shall receive mixed waste for final sorting, segregation, composting and recycling. The resulting residual wastes shall be transferred to a long-term storage or disposal facility or sanitary landfill.
SECTION 33. Guidelines for Establishment of Materials Recovery Facility.- Materials Recovery Facilities shall be designed to receive, sort, process and store compostable and recyclable material efficiently and in an environmentally sound manner. The facility shall address the following considerations:

a) The building and/or land layout and equipment must be designed to accommodate efficient and safe materials processing, movement and storage; and

b) The building must be designed to allow efficient and safe external access and to accommodate internal flow.

---

Barrangay Philam

Population - 3,197  
Household – 595  
HH Served- 80%

Facilities:

Waste Sorting – 50 sq. m.

Storage Area - 100 sq. m.

Lot Area – approximately 1,000 sq.m.

Equipment:

Rotating drums 4 2-tonner  
Hammer Mill 1  
Shredding Machine 1  
Weighing Scale 2  
Dumptruck 1
Personnel

3 workers with salary

Biodegradable Materials 2,000 kg/wk
  Segregated wastes are brought to the center by HH

Non-biodegradable - Recyclables are collected by the Eco-aides

Residual wastes are collected by the City

Products:

Compost - Stocked used in subdivision

Recyclables – Bought/picked up by dealers (paper, plastic, tin cans, metal, glass)

Costs

Capital Expend. – P 700,000.00 Brgy. Fund
Building 1 - P 400,000.00 Brgy. Fund
Building 2 - P 1,000,000.00 CDF
OUTLINE OF THE SOLID WASTE MANAGEMENT PLAN

Vision/Goal

Objective(s)

Chapter 1 - City/Municipal Profile
  1.1 Population
    1.1.1 Present
    1.1.2 Projection
  1.2 City/Municipal Map
    1.1.3 Land-use Map
    1.1.4 Road Map
    1.1.5 Solid Waste Management Map
  1.3 Organizational Structure

Chapter 2 - Waste Generation/Characterization
  2.1 Present
  2.2 Projection
  2.3 Quantity
  2.4 Composition
  2.5 Density
  2.6 Per Capita

Chapter 3 - Collection and Transfer
  3.1 Coverage
  3.2 Type of Collection
  3.3 Collection Route Map
  3.4 Equipment
  3.5 Transfer Station
  3.6 Design of Containers
  3.7 Segregation Schemes
  3.8 Barangay Collection

Chapter 4 - Processing
  4.1 Material Recovery Facility
  4.2 Other Methods and Facilities

Chapter 5 - Source Reduction
  5.1 Strategies for waste reduction
Chapter 6 - Recycling
    6.1 Strategies and resources required for 25% reduction
    6.2 Types of recyclables materials
    6.3 Facilities required

Chapter 7 - Composting
    7.1 Backyard/Mass composting
    7.2 Types of composting
    7.3 Facilities required

Chapter 8 - Disposal
    8.1 Existing and proposed sites
    8.2 Capacity
    8.3 Life of the facility
    8.4 Type

Chapter 9 - Information and Educational Campaign
    9.1 Existing IEC Programs
    9.2 Folk Media
    9.3 IT

Chapter 10 - Special Waste
    10.1 Bulky Waste
    10.2 Medical Waste
    10.3 Toxic and Hazardous Wastes

Chapter 11 - Institutional / Legal Requirements
    11.1 Organizational Structure Required
    11.2 Personnel
    11.3 Legal Laws Needed

Chapter 12 - Financial Requirement
    12.1 Past Year Actual Income
    12.2 Projected Budget
        12.2.1 Capital Expenditure
        12.2.2 Personnel Services
        12.2.3 Maintenance and Operation
    12.3 Sources of Funds

Annex 1 - 10-Year Development Plan (Matrix)
Annex 2 - Guidelines in Waste Characterization
Annex 3 - National Laws Affecting SWM
Annex 4 - Local Laws Affecting SWM
Annex 5 - Rules, regulations, regulations and administrative orders
### PROCUREMENT PLAN

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<td>Actual load capacity is less than</td>
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<td>3) CT-8</td>
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</table>
LGU Solid Waste Management Plan  
(LGSWMP)

Recycling Component  
[Dr. Rogelio M. Lopez]

Per RA 9003 & IRR, SWM Plan must:

- Show methods to reduce waste

- Describe the following:
  1. Materials to be recycled
  2. Methods for determining categories of SW to be diverted for recycling
  3. New facilities & expansion of existing ones to implement recycling

- Describe methods to develop market for recycled materials

- Take into account the persons engaged in the recycling business or are providing recycling services in the formulation of the Five-Year Recycling Strategy

- Evaluate existing recycling programs and relevant regulatory measures (e.g. zoning & building ordinances) and recommend improvements to facilitate/promote recycling
LGSWMP Recycling Component

Rationale and Objectives

The rational & objectives of the component’s plan are:

- Waste reduction
  &
- Sustainable recycling operation
LGWMP Recycling Component

Strategy

The strategy to achieve the objectives are:

- Strengthen the recycling system
- Support private sector initiative
- Promote community-based recycling
LGUSWMP Recycling Component

A. To strengthen the recycling system

Approach

To strengthen the recycling, the approaches are:

- Produce “quality” recyclable materials (to enhance profitability & global competitiveness)

- Promote proper waste segregation at source (households & establishments) thru suitable information campaign, coordinated city collection scheme, and law enforcement

- Promote effective collection and marketing of properly segregated materials through a system of extending reasonable incentive to concerned individuals, households and establishments.
LGUSWMP Recycling Component

B. To support private sector initiative

Approach

To support private sector private sector initiative, the approaches are:

- Encourage private sector participation and ease management burden on part of government

- Provide incentive to persons and establishments engaged in recycling business or providing recycling services

- Provide technical & skills development assistance

- Provide research & technology development support

- Provide institutional linkages support (e.g. marketing tie-up for recyclable and recycled products)
LGUSWMP Recycling Component

C. To promote community-based recycling

Approach

To promote community-based recycling, the approaches are:

- Encourage community participation and thus facilitate info campaign & law enforcement at the community level

- To achieve equitable distribution of economic opportunities generated by recycling and thus enhance its sustainability at the community level

- Extend adequate government support through CO and assistance in establishing the system in the community, together with the needed facilities and institutional linkages support

- Promote the diffusion of suitable recycling techniques and practices as are tested and demonstrated in various CBSWM sites in Metro Manila

- Strengthen NGO initiatives and involvement in promoting CBSWM undertakings in Metro Manila
LGUSWMP Recycling Component

Projects
(Possible Project Line-Up)

Possible projects to translate strategies to action:

A. Projects to promote production of “quality” Recyclable materials:

- Info campaign on proper waste segregation at source
- Law enforcement/Coordinated City Collection
- Incentive scheme

B. Projects to support private sector initiative:

- Incentive scheme
- Research & technology development support
- Institutional linkages support (for marketing & financing needs)

C. Projects to promote community-based recycling:

- Community Organizing (CO)
- Facilities establishment (Buy-Back Centers/MRF)
- Technology diffusion of suitable CBSWM techniques
- Strengthen NGO capabilities for involvement

[Note: Individual project targets, schedule and system of implementation, and budgetary requirements to be determined accordingly by respective LGU.]
<table>
<thead>
<tr>
<th>CITY</th>
<th>VISION</th>
<th>GOALS</th>
<th>OBJECTIVES</th>
<th>TARGET</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manila</td>
<td>Clean, garbage-free city with no dumpsite and with sustainable SWM</td>
<td>No dumpsite in city, No litter in public places</td>
<td>to raise public awareness and participation</td>
<td>a). Posting of 10 billboards/district by Y1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>b) A door-to-door distribution of flyers by Y1Q1</td>
</tr>
<tr>
<td>Valenzuela</td>
<td>Clean, prosperous and peaceful city with nationalistic, united, pro-environment and god-fearing citizenry</td>
<td>Committed &amp; participative community with proper waste disposal</td>
<td>To enhance public awareness, commitment and participation on proper waste disposal</td>
<td>a). 4 ESWM for a/month</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>b) production /distribution of flyers. 50,000 copies for by Y1Q2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>c) .32 Billboards on SWM Y1Q2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>a) 50%palerostrainedY1Q2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>b) 100%palerostrainedY1Q</td>
</tr>
<tr>
<td>Navotas</td>
<td>Premier city, empowered, healthy, accountable people</td>
<td>Organized structure for recyclables in each Barangay, Markets for recyclables</td>
<td>1. To create high-level of awareness and concern among the barangays</td>
<td>a) Massive IEC campaign for 14 barangays in waste segregation and recycling</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>b) Construct 1 central MRF in the mun. to accommodate recyclables from all bgys</td>
</tr>
</tbody>
</table>

Capacity Building for Local Government Units Report No: 8
Annex 2b
| Malabon | Ecologically balanced (water, air & land) environment, reflective of God-inspiring vision, nurtured and supported by the citizenry with awareness of proper solid waste mgmt | 1. MRF’s  
2. LGU-private sector partnership in MRF op.  
3. Sustainable, effective SWM system  
4. Local ordinances | 4.1 To check existing ordinances if they conform/support RA 9003  
4.2 Inform executive and legislative officials of the need to enact ordinances supportive of RA 9003  
4.3 Lobby for enactment of local ordinances supportive of RA 9003  
4.4 Draft/Pass/ enact ordinances supportive of RA 9003. | a) master list of existing ordinances vis-à-vis needed ordinances to support /localize RA 9003 by Y1Q1  
b.) Exec./legislative officials are informed appreciative of RA 9003 by YIQ1 to Q2  
c.) Concerned citizens are lobbying the sanggunian for local ordinances byYIQ1 to Q2.  
d.) Ordinances localizing RA 9003 by YIQ3 onwards. |

| Makati | Cleanest and healthiest city with morally upright citizenry with enhanced community awareness.  
SWM dept: service-oriented, pro-active, eco-balanced, technically capable staff with vast and efficient service | 1. Clean city  
2. Knowledgeable (SWM) citizens | 1.1 To systematically set up an effective and sustainable resource-recovery intervention citywide. | a. Segregation at source in 15 barangays for Y1-3  
Deployment of environmental Police at ration of 1:5000 by Y3 |
<table>
<thead>
<tr>
<th>Location</th>
<th>Description</th>
<th>Objective</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q.C.</td>
<td>Model of efficient governance, responsible leadership, quality community working together</td>
<td>1. Effective, comprehensive SWM system</td>
<td>1.1 to develop large-scale MRF for city that is economically sustainable</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>a) suitable land purchased by Y1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>b) Equipment purchased by Y2Q2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>c) Staff trained by Y2</td>
</tr>
<tr>
<td>Muntinlupa</td>
<td>Well-planned, clean and green, healthy city improving quality of life, peace-loving, and business friendly citizenry committed to the conservation of the env.</td>
<td>1. Awareness &amp; coordination of citizenry</td>
<td>1.1 to conduct massive campaign on waste segregation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>a) 2 pilot schools by Y1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>b) 2 billboards/Barangay by Y1Q2</td>
</tr>
<tr>
<td>Pasig</td>
<td>A model city with integrated SWM system</td>
<td>1. Enhanced ecological balance through sustainable and integrated waste management</td>
<td>1.1 To minimize generation of solid waste</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>a. mechanisms established for segregation and recycling</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>b. operationalization of the MRF</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.2 To maximize possible resource recovery, recycling and utilization</td>
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<td></td>
<td></td>
<td></td>
<td>1.3 To optimize the use of goods</td>
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</table>
WORKSHOP EXERCISE #1

1. Make a 10-year waste a projection plan using the following data:
   
   a. present population is 2 million with a growth rate of 2.6 per annum
   
   b. waste per capita generation is 0.60 kgs/person/day

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<th>YEAR</th>
<th>RECYCLING RATE</th>
<th>COMPOSTING RATE</th>
<th>MRF</th>
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<td>0.10</td>
<td>0.06</td>
<td>0.06</td>
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<td>2005</td>
<td>0.12</td>
<td>0.08</td>
<td>0.08</td>
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<td>2006</td>
<td>0.14</td>
<td>0.10</td>
<td>0.10</td>
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<tr>
<td>2007</td>
<td>0.16</td>
<td>0.12</td>
<td>0.12</td>
</tr>
<tr>
<td>2008</td>
<td>0.18</td>
<td>0.14</td>
<td>0.14</td>
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<td>2009</td>
<td>0.20</td>
<td>0.16</td>
<td>0.16</td>
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<tr>
<td>2010</td>
<td>0.22</td>
<td>0.18</td>
<td>0.18</td>
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<td>2011</td>
<td>0.24</td>
<td>0.20</td>
<td>0.20</td>
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<tr>
<td>2012</td>
<td>0.26</td>
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<td>2013</td>
<td>0.28</td>
<td>0.24</td>
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WORKSHOP EXERCISE #2

2. From the above projection, determine the required area of landfill that would accommodate the volume of waste.

   Given: Compaction density = 1000 kg/cu.m

   Waste density = 300 kg/ cu.m.
   Height of fill = 10 m
SOLUTION TO EXERCISE #2

Volume = 3,353,258 cu.m.

Get the area by dividing the volume of waste by the height of the fill.

\[
A = \frac{3,353,258 \text{ cu.m.}}{10} \]

\[
= 335,326 \text{ sq.m.} \]

\[
= 34. \text{ has} \]
WORKSHOP EXERCISE # 3:

Presently, the LGU is generating 2,000 tons every day. Generation increases at 2% per year. By 2004 generation would be 2,040 tons; CY 2005, 2,081 tons; CY 2006, 2,122 tons; CY 2007, 2,165 tons; CY 2008, 2,208 tons; CY 2009, 2,252 tons; CY 2010, 2,297 tons; CY 2011, 2,343 tons; CY 2012, 2,390 tons, and CY 2013, 2,438. The present equipment fleet of the LGU are as follows: Assume service life of 10 for the equipment.

1) 15 16-cu.m Dumptrucks procured in 1995
2) 20 8-cu. m Dumptrucks procured in 1999
3) 15 8-cu. m Compactor trucks procured in 2002
4) 16 16-cu.m Compactor trucks procured in 2002

Density of DT is 400 kg/cu. m.
Density of CT is 800 kg/cu.m.

The collection trucks make two trips per day per shift. There are two shifts everyday.

Required: Investigate the capability of the LGU in collecting the garbage. Make an equipment procurement plan.
## WORKSHOP: WASTE PROJECTION

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<th>YEAR</th>
<th>POPULATION</th>
<th>PER CAPITA</th>
<th>ANNUAL</th>
<th>RECYCLING VOLUME</th>
<th>NET VOLUME</th>
<th>SOIL COVER VOLUME</th>
<th>TOTAL VOLUME</th>
<th>CUMULATIVE VOLUME</th>
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<td>1,314,000</td>
<td>0.10</td>
<td>131,400</td>
<td>1,182,600</td>
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<td>3,922,329.95</td>
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<td>1,210,112</td>
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<td>1,576,106</td>
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<td>394,027</td>
<td>1,182,080</td>
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<tr>
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## WORKSHOP: WASTE PROJECTION

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<th>PER CAPITA</th>
<th>ANNUAL</th>
<th>RECYCLING VOLUME</th>
<th>NET VOLUME</th>
<th>SOIL COVER VOLUME</th>
<th>TOTAL VOLUME</th>
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</thead>
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<tr>
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<td>394,200</td>
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<td>39,420</td>
<td>354,780</td>
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Annex 3 Example of Draft LGU Solid Waste Management Plan (Makati)
MAKATI CITY
10 YEAR SOLID WASTE MANAGEMENT PLAN
2003-2013

Prepared by
Solid Waste Management Division
City Government of Makati
October 2003
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MAKATI CITY 10-YEAR SOLID WASTE MANAGEMENT PLAN

1. Introduction

1.1 Purpose

Emboldened on its vision to make the city environmentally balanced, the city government believes that an ecological balance is needed to attain optimum benefits and to sustain the growth and development the city is experiencing. The direction and course of the city’s environment related activities are based from the said goal.

The rapid acceleration of economic activities in the City has also resulted to high waste generation rate. In 2001, the City Government collected a total of 1,252,423 cu.m. of waste or an average of 3,431.3 cu.m. per day. Residential waste constituted almost half of the total waste generated followed by commercial waste. Collection efficiency was placed at 90-95%, which means that the balance is either recycled or dumped in canals and waterways. As a result, flooding in low-lying areas of the City is aggravated due to indiscriminate dumping or garbage in the drainage system causing water pollution and clogged canals.

One of the causes associated with uncollected garbage is the indifference of residents in the community who do not observe the time of discharging waste nor the provision of RA 9003 to segregate their wastes. Collection time is between 6:00 a.m. to 8:00 a.m. during the first shift, while the second shift begins at 4:00 p.m. until 8 in the evening depending on the turn-around time of collection trucks coming from the dumpsite. As a standard, garbage and other refuse shall be brought out only during the arrival of collection trucks.

Over the years, garbage collection efficiency has greatly improved. The new “Clean-up” scheme in garbage collection (from the former truck load basis), proved beneficial both to the community and the City Government. This was further maximized by reducing the minimum volume of wastes to be collected by the contractors as well as the cost of collection. A minimum of 5 percent reduction was done from the based volume of 3,035 m³.

To further support the target 5 percent reduction of volume of garbage generated, the Waste-Segregation Scheme was continuously implemented. For 2002, the number of pilot streets has been increased from 124 to 128 with 6,128 households. A total of 5,515 households have already been practicing waste segregation, resulting to compliance rate of 90% within pilot areas. The collection of wet, compostable and biodegradable wastes has been scheduled every Monday, Wednesday and Friday, while dry, recyclable and non-biodegradable wastes are collected every Tuesday, Thursday and Saturday.

For 2003, the City Government intensified its drive to enforce the provisions of the law by mobilizing the different barangays and providing them with the technical assistance to encourage them to develop programs for ecological solid waste management. The City also lined up activities that will push the barangays to enforce segregation and install resource recovery program at their jurisdiction.
Street Cleaning and Beautification is being conducted to further encourage the residents to work in close coordination with the SWMD team in promoting cleanliness within their own vicinity. The projects include street sweeping, painting of gutters and blank walls and collection of garbage, debris and soil mounds. Stricter policies were likewise implemented resulting to the apprehension of 961 violators, which is 10.5% more than the apprehended violators last year. Sixty-five (65) of these violators are transient or non-Makati residents. The amount of P8, 000.00 was generated from appropriated penalties while 217 violators attended the required seminar on proper waste disposal.

Through the continuous campaign of its Enforcement/Information, Education and Communication (E/IEC), “ANGELS” or Agents of the New Generation of Environment Lovers and Saviors was organized. ANGELS is composed of Boy and Girl Scouts from Makati’s 36 public schools and has been tasked to spearhead the implementation of the Waste Segregation Scheme, recycling and various tree-planting projects in their respective schools. The result of this project is very successful since the amount of waste collected in schools dropped by 50%. This project is beneficial to the students as they develop awareness on taking care of the environment.

Another part of the E/IEC campaign is the deployment of “Datu Basureros” of waste inspectors to ensure that waste reduction would be achieved. Fifty (50) “Datu Basureros” and representatives from the barangays were trained on the proper way to ecologically manage/process the waste being collected as mandated by R.A. 9003 or the Ecological Solid Waste Management Act. “Trained Basureros” have been tasked to disseminate the same information to the residents of their respective barangays because of the no collection policy on unsegregated garbage being implemented by the SWMD.

However, the City still faces the problem on permanent dumpsite. At present, Makati City is utilizing the Montalban dumpsite, which is quite inaccessible considering the estimated travel time from collection point to dumpsite of four (4) hours due to worsening traffic condition and the queuing garbage trucks awaiting their turn at the dumpsite.

Laxity on the part of the community to comply with the enforcement of ordinances on illegal dumping coupled with the lack of cooperation among the residents on the proper way of disposal aggravates the problem of uncollected garbage in the City.

The Ecological Solid waste Management Act of 2000, Republic Act 9002 approved last January 26, 2001, which refers to the systematic administration of activities that provide segregation at source, segregated transportation, storage, transfer, processing, treatment and disposal of Solid Waste and all other waste management activities which do not harm the environment was enacted to finally solve the unceasing problems on waste management.
The City Government of Makati was identified as one of the 8 Local Government Units of the Asian Development Bank for the Technical Assistance project on the preparation of the 10-year solid waste management plan. Through the project, the Solid Waste Management Division was able to start on the preparation of the plan.

Using the capacity building approach use for development planning, the Solid Waste Management Division with its different Section Heads and District Managers and Division Head conducted a planning workshop that identified the different programs and priority projects. The participants used the barangay profile compiled by the IEC Section, the initial results of the WACS, and the enormous amount of stock data on the problems and situations of the city based on the participants' daily operations.
2. City Profile

2.1 History

In the pre-Spanish era, Lakan Tagkan and his wife Bouan ruled Makati. The area was then predominated by swamps and cogon grass overlooking the banks of the Pasig River. It was Don Miguel Lopez de Legaspi, the founder of Manila and first governor-general of the Philippines, who first spotted the area. Legaspi asked the name of the place and because of language barrier, the natives misinterpreted this. Thus, pointing to the receding tide of the Pasig River, the native answered “Makati na, Kumati na” meaning “ebbing tide”.

Between the years from 1578 to 1670, Makati was a “visita” or a district of Santa Ana de Sapa under the jurisdiction of a Franciscan priest named Pedro de Alfaro. Its second name was San Pedro de Makati, which was derived in honor of its patron saint. At times, the town was called “Sampiro”, a corruption of its name San Pedro. In 1890, San Pedro de Makati was decreed a public town of Manila.

After the signing of the peace treaty of 1900, which ended the Filipino-American War, Makati was governed by a municipal president.

The Philippine Commonwealth Act No. 137 dated June 11, 1901 incorporated San Pedro de Makati into the province of Rizal. Two years later, a town administrator was created to supervise the affairs of the community.

After the turn of the century, Makati remained a third class agricultural community wherein the means of livelihood came from cultivated rice and horse fodder.

In 1914, the Philippine Legislature Act No. 2390 changed the name of San Pedro de Makati to Makati, which has remained as its official name. In the year 1962, a new municipal building was constructed for the local administration of Makati. It was erected on a two-hectare lot donated by the Ayala Securities Corporation.

This was the time when Makati began to be characterized into three areas: the new town of Makati; the old communities not previously nor presently owned by the Ayala Corporation; and the Fort Bonifacio.

The new town of Makati was attributed to the Ayalas who adhered to their master plan of developing Makati into the most modern community in the country. It was forty years ago when the first of its modern communities, Forbes Park, was opened to attract affluent families, foreign capitalists, business tycoons and industrial titans. Now, it boasts of six (6) affluent villages with defined residential zones, steel and concrete avenues, first class facilities and services, ultra-modern skyscrapers, and convenient commercial and recreational facilities. More than one third of the total land area of the city is located in the new Makati.

Beyond the fences of the affluent villages, however, the old town of Makati was found. It was a typical urban center composed of 17 crowded barangays where the remnants of history were still visible in a hodge-podge of factories, establishments, century-old schools, and modern churches.

These two extreme contrasts of the Makati community, compelled a writer to describe it as an “artificially inseminated society because it was never left alone to conceive itself”.

As of October 2, 2003
The area of Fort Bonifacio, on the other hand, was composed of barangays Cembo, South Cembo, Comembo, East Rembo, Pembo, Pitogo, Post Proper North, Post Proper South, Rizal, and West Rembo. It has a total land area of 5.4436 square kilometers with 4.4027 square kilometers presently being used by the military.

During the last years of the Marcos Administration, Makati became the familiar ground for numerous protest rallies and marches of the various opposition groups. It was in Makati, particularly the stretch of Ayala, where the confetti revolution started. Major rallies held in Makati were greeted by confetti made of shredded yellow pages directory. Ugarte Field replaced Plaza Miranda as the frequent venue of many public rallies to express the people’s indignation against the late President Marcos and the Martial Law Regime.

After the February Revolution, President Corazon C. Aquino appointed Atty. Jejomar C. Binay to take the reins of the Makati government. Considered as a human rights advocate, Mayor Binay started the rehabilitation and restructuring of the local government set-up to improve the delivery of services to the community. The impact of his initial measures earned him the mandate of the people. Mayor Binay was duly elected as the town’s 16th administrator on the local election of January 1988. In the May 1992 elections, he was re-elected as the town’s local chief executive.

The year 1995 marked as one of the significant periods for the administration of Mayor Binay and the local populace of Makati. It was in this year that the conversion of the Municipality of Makati into a highly urbanized city took effect with the signing of Republic Act 7854 by President Fidel V. Ramos on January 2, 1995 followed by the overwhelming approval of the residents in a plebiscite held on February 4, 1995.

As provided by the City Charter, Makati is now divided into two congressional districts which correspond to the two existing districts created by Republic Act No. 7166 as implemented by the Commission on Elections, except that barangays Magallanes, Forbes Park and Dasmariñas are now in District I in lieu of barangay Guadalupe Viejo which became part of District II.

The 1991 Local Government Code limits the term of all elected local government officials to only three consecutive terms. This provision did not hamper the continuance of public service of Mayor Jejomar Binay. Thus, the 1998 election gave way to his wife, Elenita S. Binay, M.D., to enter into politics and was overwhelmingly elected by the local populace to become the 17th Mayor and the 'First Woman Chief Executive' of Makati City. It was during her administration when the city won the Philippine Quality Award (PQA) Commitment to Quality for exemplary organizational performance. Makati was the only LGU who won the award in year 2000.

The mayoral election held on May 2001 gave another opportunity for Mayor Jejomar C. Binay to continue his leadership as the city’s top public official. The Mayor has committed to continue his wife’s legacy and surpass the accomplishment of the previous administration.
2.2 Physical Characteristics

2.2.1 Location

Makati is located within the quadrangle of 12º 01’ latitude North and 14º 33’ longitude East. It is bounded on the north by the Pasig River facing the City of Mandaluyong, on the northeast by the City of Pasig, on the east by the Municipality of Pateros, on the southeast by Municipality of Taguig, on the south and southwest by the City of Pasay and on the northwest by the City of Manila. The City of Makati is one of the thirteen (13) cities of the National Capital Region (NCR), which also include four (4) municipalities (See Figure 1).

2.2.2 Land Area

Makati has a total land area of 27.36 square kilometers or 2,736 hectares. It constitutes 4.3 percent of NCR’s total land area and is bigger than the neighboring cities of Pasay and Mandaluyong. The following table shows the different land areas of the seventeen (17) cities and municipalities of NCR.

<table>
<thead>
<tr>
<th>Location</th>
<th>Land Area (sq. km.)</th>
<th>% Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cities:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Kalookan</td>
<td>53.33</td>
<td>8.38</td>
</tr>
<tr>
<td>2. Las Piñas</td>
<td>41.50</td>
<td>6.53</td>
</tr>
<tr>
<td>3. Makati</td>
<td><strong>27.36</strong></td>
<td><strong>4.30</strong></td>
</tr>
<tr>
<td>4. Mandaluyong</td>
<td>26.00</td>
<td>4.09</td>
</tr>
<tr>
<td>5. Manila</td>
<td>38.30</td>
<td>6.02</td>
</tr>
<tr>
<td>6. Marikina</td>
<td>38.90</td>
<td>6.12</td>
</tr>
<tr>
<td>7. Muntinlupa</td>
<td>46.70</td>
<td>7.34</td>
</tr>
<tr>
<td>8. Paranaque</td>
<td>38.30</td>
<td>6.02</td>
</tr>
<tr>
<td>9. Pasay</td>
<td>13.90</td>
<td>2.19</td>
</tr>
<tr>
<td>10. Pasig</td>
<td>13.00</td>
<td>2.04</td>
</tr>
<tr>
<td>11. Quezon City</td>
<td>166.20</td>
<td>26.13</td>
</tr>
<tr>
<td>12. Valenzuela</td>
<td>47.00</td>
<td>7.39</td>
</tr>
<tr>
<td>13. Malabon</td>
<td>23.04</td>
<td>3.68</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>636.00</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

Source: Philippine Cities Quick Facts, League of Cities, July 2001

The city is composed of two (2) districts further subdivided into 33 barangays (See Figure 2). The biggest barangay is the Forbes Park with 2.5266 square kilometers while the smallest is Kasilawan with only 0.0922 square kilometers. The following table shows the different land areas of the barangays of Makati City.
Table 2: Land Area of Makati by Barangay

<table>
<thead>
<tr>
<th>Barangay</th>
<th>Land Area (sq. km.)</th>
<th>% Share</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>District I:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Bangkal</td>
<td>0.7446</td>
<td>2.72</td>
</tr>
<tr>
<td>2. Bel-Air</td>
<td>1.7057</td>
<td>6.24</td>
</tr>
<tr>
<td>3. Carmona</td>
<td>0.3387</td>
<td>1.24</td>
</tr>
<tr>
<td>4. Dasmariñas</td>
<td>1.9048</td>
<td>6.96</td>
</tr>
<tr>
<td>5. Forbes Park</td>
<td>2.5266</td>
<td>9.24</td>
</tr>
<tr>
<td>6. Kasilawan</td>
<td>0.0922</td>
<td>0.34</td>
</tr>
<tr>
<td>7. La Paz</td>
<td>0.3181</td>
<td>1.16</td>
</tr>
<tr>
<td>8. Magallanes</td>
<td>1.1982</td>
<td>4.38</td>
</tr>
<tr>
<td>9. Olympia</td>
<td>0.4438</td>
<td>1.62</td>
</tr>
<tr>
<td>10. Palanan</td>
<td>0.6538</td>
<td>2.39</td>
</tr>
<tr>
<td>11. Pio del Pilar</td>
<td>1.1982</td>
<td>4.38</td>
</tr>
<tr>
<td>12. Poblacion</td>
<td>1.0352</td>
<td>3.78</td>
</tr>
<tr>
<td>13. San Antonio</td>
<td>0.8913</td>
<td>3.26</td>
</tr>
<tr>
<td>14. San Isidro</td>
<td>0.5008</td>
<td>1.83</td>
</tr>
<tr>
<td>15. San Lorenzo</td>
<td>2.0936</td>
<td>7.65</td>
</tr>
<tr>
<td>16. Sta. Cruz</td>
<td>0.4734</td>
<td>1.73</td>
</tr>
<tr>
<td>17. Singkamas</td>
<td>0.1260</td>
<td>0.46</td>
</tr>
<tr>
<td>18. Tejeros</td>
<td>0.2865</td>
<td>1.05</td>
</tr>
<tr>
<td>19. Urdaneta</td>
<td>0.7376</td>
<td>2.70</td>
</tr>
<tr>
<td>20. Valenzuela</td>
<td>0.2399</td>
<td>0.88</td>
</tr>
<tr>
<td><strong>Sub-Total</strong></td>
<td><strong>17.5090</strong></td>
<td><strong>64.0</strong></td>
</tr>
<tr>
<td><strong>District II:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Cembo</td>
<td>0.2150</td>
<td>0.79</td>
</tr>
<tr>
<td>2. Comembo</td>
<td>0.2688</td>
<td>0.98</td>
</tr>
<tr>
<td>3. East Rembo</td>
<td>0.4384</td>
<td>1.60</td>
</tr>
<tr>
<td>4. Guadalupe Nuevo</td>
<td>0.5749</td>
<td>2.10</td>
</tr>
<tr>
<td>5. Guadalupe Viejo</td>
<td>0.6209</td>
<td>2.27</td>
</tr>
<tr>
<td>6. Pembo &amp; Rizal</td>
<td>1.2308</td>
<td>4.50</td>
</tr>
<tr>
<td>7. Pinagkaisahan</td>
<td>0.1586</td>
<td>0.58</td>
</tr>
<tr>
<td>8. Pitogo</td>
<td>0.1404</td>
<td>0.51</td>
</tr>
<tr>
<td>9. Post Proper North*</td>
<td>0.4500</td>
<td>1.64</td>
</tr>
<tr>
<td>10. Post Proper South*</td>
<td>0.6000</td>
<td>2.19</td>
</tr>
<tr>
<td>11. South Cembo</td>
<td>0.1987</td>
<td>0.73</td>
</tr>
<tr>
<td>12. West Rembo</td>
<td>0.5471</td>
<td>1.10</td>
</tr>
<tr>
<td><strong>Sub-Total</strong></td>
<td><strong>5.4436</strong></td>
<td><strong>19.9</strong></td>
</tr>
<tr>
<td><strong>Military Reserve</strong></td>
<td><strong>4.4027</strong></td>
<td><strong>16.1</strong></td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td><strong>27.3553</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Source: 1994 Cadastral Map, Department of Engineering and Public Works, Land Management Bureau
Figure 1
Vicinity Map of Makati
2.2.3 Topography and Slope

The westernmost part of Makati City (Barangays Bangkal, La Paz, Palanan, Pio del Pilar, San Antonio, San Isidro, Singkamas, and Tejeros) is composed of former tidal flats. The rest of the city rests on solid, undulating plain.

The City generally has a flat topography. About 75% of its land area has a slope of 0-3%, about 20% lies in the 3-12% slope category, while the remainder, located in the Fort Bonifacio area has a slope that is higher than 12% (See Figure 3).

2.2.4 Elevation

The elevation of the city ranges from 0-36 meters above the mean sea level. Areas with low elevations are at the western, northern, and eastern peripheries of the city. These areas are close to the river boundaries. The highest elevations are found adjacent to the Fort Bonifacio ridge. Majority of the city, however, lies in the 4-20 meter elevation category (See Figure 4).

2.2.5 Waterways and Drainage

Makati has sixteen (16) rivers, creeks, and canals through which rainwater is drained. Pasig River spans the northern boundary while a stream traverses through Guadalupe Viejo, Pitogo and Pinagkaisahan. Another stream passes through barangays Bangkal, San Lorenzo, Bel-Air, Urdaneta, and Forbes Park. The following table shows the rivers, creeks, and canals that can be found in the City of Makati.
Table 3: Rivers, Creeks, Canals in Makati City, 2001

<table>
<thead>
<tr>
<th>River, Creek, Canal</th>
<th>Location</th>
<th>Length (meters)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pasig River</td>
<td>Delpan to Napindan Flood Gate E. Rembo</td>
<td>3,900</td>
</tr>
<tr>
<td>Tripa de Gallina</td>
<td>Zobel Roxas to A. Bonifacio</td>
<td>3,250</td>
</tr>
<tr>
<td>Santa Clara</td>
<td>A. P. Reyes to Delpan</td>
<td>620</td>
</tr>
<tr>
<td>Sanzibar</td>
<td>M. South Diversion Riverside Rd. to Ayala</td>
<td>380</td>
</tr>
<tr>
<td>Calatagan</td>
<td>Tripa de Gallena to Ayala Extn.</td>
<td>1,840</td>
</tr>
<tr>
<td>Bangkal</td>
<td>Tripa de Gallena to South Superhighway</td>
<td>550</td>
</tr>
<tr>
<td>Amorsolo</td>
<td>Bagtikan to San Lorenzo Creek</td>
<td>2,000</td>
</tr>
<tr>
<td>PNR Creek</td>
<td>Zobel Roxas to Maricaban Creek</td>
<td>4,700</td>
</tr>
<tr>
<td>San Lorenzo</td>
<td>EDSA to PNR Creek</td>
<td>1,100</td>
</tr>
<tr>
<td>Maricaban</td>
<td>Transversing from EDSA to Victoria St. then Crossing EDSA passing thru between Dasmarinas and Southside ending at McKinley Road</td>
<td>5,900</td>
</tr>
<tr>
<td>Makati Diversion Channel</td>
<td>Metropolitan Avenue to EDSA</td>
<td>1,500</td>
</tr>
<tr>
<td>Balisampan</td>
<td>Gen. Quingua to Pasig River</td>
<td>1,660</td>
</tr>
<tr>
<td>C5 Creek</td>
<td>Aranay Village to Pateros Makati Creek</td>
<td>850</td>
</tr>
<tr>
<td>Maya Creek</td>
<td>C5 to Pateros Creek</td>
<td>350</td>
</tr>
<tr>
<td>Pateros – Makati Creek</td>
<td>Napindan Flood Gate to Makati – Pateros Boundary</td>
<td>4,650</td>
</tr>
<tr>
<td>San Jose Creek</td>
<td>Pasig River to Pitogo</td>
<td>1,320</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>34,570</strong></td>
</tr>
</tbody>
</table>

Source: Makati City Department of Engineering and Public Works
Figure 4
Elevation Map of Makati
2.3 Land Use

2.3.1 Existing Land Use

The following table shows the distribution of land uses in Makati City. Based on land area and excluding roads, the three major lands uses in Makati are residential, institutional, and commercial/mixed use.

Table 4: Land Use, Makati City, 1986 and 1998

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Area (Hectares)</td>
<td>%</td>
<td>Area (Hectares)</td>
</tr>
<tr>
<td>Residential</td>
<td>880.58</td>
<td>32.19</td>
<td>1,030.95</td>
</tr>
<tr>
<td>Commercial/Mixed</td>
<td>202.98</td>
<td>7.42</td>
<td>416.41</td>
</tr>
<tr>
<td>Institutional</td>
<td>686.63</td>
<td>25.10</td>
<td>389.66</td>
</tr>
<tr>
<td>Industrial</td>
<td>114.62</td>
<td>4.19</td>
<td>38.61</td>
</tr>
<tr>
<td>Open Space</td>
<td>48.69</td>
<td>1.78</td>
<td>34.22</td>
</tr>
<tr>
<td>Recreational</td>
<td>140.06</td>
<td>5.12</td>
<td>157.88</td>
</tr>
<tr>
<td>Agricultural</td>
<td>81.25</td>
<td>2.97</td>
<td>0.00</td>
</tr>
<tr>
<td>Not Classified</td>
<td>1.37</td>
<td>0.05</td>
<td>0.00</td>
</tr>
<tr>
<td>Roads</td>
<td>579.39</td>
<td>21.18</td>
<td>667.83</td>
</tr>
<tr>
<td>Total</td>
<td>2,735.56</td>
<td>100.00</td>
<td>2,735.56</td>
</tr>
</tbody>
</table>

Source: NAMRIA and Makati City Urban Development Department (UDD) Maps

As of 1998, residential areas comprise the single largest land use in Makati City accounting for more than one-third (37.69%) of the total land area. Roads occupy the second largest or 24.41% of the city’s land area. Commercial and institutional uses rank next at 15.22% and 14.24%, respectively. The rest of Makati’s land area is shared by recreational, industrial, and open space uses (See Figures 5 and 6).

2.3.2 Land Use Trends

The following are several land use trends observed in the City of Makati:

- **Large increase in commercial areas**

Since 1986, the amount of land designated for commercial/mixed land uses more than doubled, from 203.10 to 415.87 hectares. Most of the increase resulted from the conversion of a large part of the Fort Bonifacio area from a military base into a mixed-use development and the conversion of industrial, utility, and some residential areas (e.g. Rockwell Center, Kalayaan industrial sites, etc.) into commercial land. The linear expansion of commercial developments from the CBD is evident along Gil Puyat Avenue, Pasong Tamo, and Makati Avenue.
• **Large decrease in institutional areas**

Corresponding to the large increase in commercial land area is the decrease in the land occupied by institutional areas. This is attributed to the sale of over 200 hectares of Fort Bonifacio, a military base, to a private development corporation.

• **Conversion of agricultural to residential land**

Residential areas increased by over 100 hectares. A large part of these new residential areas came from the land in the Pembo area that was previously designated as agricultural but has since been built-up.

• **Decreasing industrial areas**

Along with the disappearance of agricultural land, industrial land has likewise been decreasing. About 80 hectares of land previously designated as industrial were converted into other uses. This represents a 68% reduction in the city's industrial land inventory. As a whole, the decrease in industrial and agricultural lands reflects the dominance of the service sector in Makati.

• **Decreasing open spaces**

Some areas that were classified and used as open spaces in 1986 were already built-up by 1998. Many of these built-up open spaces were small parcels that were scattered among residential areas in the eastern peripheral barangays of the city.

• **Increasing recreational spaces**

While open spaces have decreased, recreational areas have increased. This increase is explained by the net gain in recreational area caused by the opening of a new golf course and surrounding open areas in Fort Bonifacio after the old golf course was converted into commercial land.

• **Increasing mix of land uses**

This trend is especially evident in the peripheral barangays of the city where pockets of commercial developments have sprouted throughout local residential communities.

• **Increasing densities**

Densities have been increasing throughout Makati City most particularly the residential areas in peripheral barangays. It is most noticeable in the CBD where an estimated 600,000 square meters of office space have been added since 1993. Commercial areas along or around Guadalupe, Makati Avenue, JP Rizal, and Pasong Tamo display similar increases in density.

As a whole, the existing land use trends reflect changes in a city that is increasingly relying on the service sector as its main economic activity. Given the limited supply of undeveloped land in the city, land values and densities are increasing as the demand for space increases. The CBD remains the primary influence in the use and value of land in the city.

As of October 2, 2003
2.3.3 Road Network

Five major roads – EDSA, C-5, South Expressway, J.P. Rizal Avenue, and Gil Puyat Avenue Extension link Makati City with the rest of Metro Manila (See Figure 7). EDSA and South Expressway are the busiest thoroughfares, linking the city with the northern and southern parts of the greater Metro Manila region, respectively, including the rising urban and industrial areas of CALABARZON. EDSA carries up to 200,000 pcus (passenger car units) between Guadalupe and Gil Puyat Avenue while the South Expressway carries about 150,000 pcus along its approach to the city. It is estimated that traffic volumes along these two routes exceed design capacity by 25% to 50%.

The Makati Central Business District (CBD) is the major traffic generator in the city. It accounts for the huge vehicular traffic along the southern part of EDSA and the northern part of the South Expressway. Based on a survey conducted in 1997, about 400,000 vehicle trips are generated daily by the Makati CBD. This number is about 11.4% of the 3.5 million vehicle trips estimated for Metro Manila in 1996, and it takes place in an area that accounts for less than one third of one percent of Metro Manila’s land area.

Several road projects have improved or are expected to improve access to and from Makati City. These include the Edsa-Ayala-Pasay Road Interchange, the Kalayaan Flyover, and the Metro Manila Southern Skyway. Other key road projects that have been identified but have not yet been scheduled for implementation are the Pasig River Expressway and the completion of the C-3 link through Makati between Gil Puyat Avenue and Araneta Avenue.

2.3.4 Road Traffic

Buses, jeepneys, taxicabs, and tamaraw FXs provide the means of conveyance along most major corridors in Makati. Bus routes along EDSA can be classified into three categories. The first category serves the Central Business District by way of Ayala and Buendia. The other two merely pass through EDSA on the way to southern or northern part of Metro Manila.

The city has forty-nine (49) major and twenty-four (24) minor intersections. Tricycle terminals, on the other hand, provide the short distance transport particularly in the ten (10) barangays within the eastern section of Fort Bonifacio.

The bulk of the traffic flow in the city consists of privately owned cars and jeepneys. Traffic volume is observed in several sections especially during the peak hour periods (7 a.m. to 7 p.m.). From the nighttime vehicle count of 356,000, the volume increases to 1,407,438 during daytime (Source: Makati Medium Term Development Plan 2000-2004). EDSA and South Expressway are the busiest thoroughfares. They link the city with the northern and southern parts of the greater Metro Manila region, respectively, including the rising urban and industrial areas of CALABARZON. EDSA carries up to 200,000 pcus between Guadalupe and Gil Puyat Avenue while the South Expressway carries about 150,000 pcus along its approach to the city. It is estimated that traffic volumes along these two routes exceed capacity by 25% to 50%.
Figure 7
Makati’s Link to Metro Manila Area
2.3.5 Educational Institutions

The City of Makati has 36 preparatory schools, 29 public elementary schools grouped into six districts and 7 secondary schools. Of the 36 preparatory schools, 23 are located in the different public elementary schools. The only public higher educational institution is the University of Makati, which is owned and operated by the city government.

On the other hand, there are 36 private schools offering either preparatory only or preparatory/elementary classes. The 13 secondary schools are offering preparatory/secondary, secondary only or preparatory/elementary/secondary. The City has also 21 vocational, technical, and special schools and 16 private institutions of higher learning which include the Asian Institute of Management, Ateneo de Manila University, and De La Salle University that offer quality post graduate courses.

Table 5: Distribution of Schools by Level of Education, 2001

<table>
<thead>
<tr>
<th>Level</th>
<th>Private</th>
<th>Public</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparatory</td>
<td>20</td>
<td>36</td>
</tr>
<tr>
<td>Preparatory/Elementary</td>
<td>16</td>
<td>-</td>
</tr>
<tr>
<td>Preparatory/Secondary</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Elementary</td>
<td>-</td>
<td>29</td>
</tr>
<tr>
<td>Secondary</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Preparatory/Elementary/Secondary</td>
<td>11</td>
<td>-</td>
</tr>
<tr>
<td>Higher Educational Institutions</td>
<td>16</td>
<td>2</td>
</tr>
<tr>
<td>Vocational, Technical, and Special Schools</td>
<td>21</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>86</strong></td>
<td><strong>74</strong></td>
</tr>
</tbody>
</table>

Source: DepEd-Makati, CHED

2.3.6 Health Facilities

The city has a total of thirty (30) public health centers including the City Employees’ Clinic. These health centers are distributed in the two (2) districts in 18 barangays. These health centers offer various comprehensive health care services, which include medical and dental services, maternal and child health care, family planning, and communicable disease control.

Presently, there are five (5) hospitals, two (2) of which are public while three (3) are private. The two (2) government hospitals are the Army General Hospital with 750 beds and the Ospital ng Makati (OSMAK) with 204 beds. The three (3) private hospitals are the Makati Medical Center (MMC) with 616 beds, Saint Claire’s Hospital with 75 beds, and Maria Lourdes Hospital with 20 beds.

Three (3) government lying-in clinics are operating in barangays Bangkal, Comembo, and Guadalupe Nuevo. Private lying-in clinics totaled to five (5). To fully respond to the medical needs of the constituents, the city government maintains 14 nutrition centers in the different barangays. A Social Hygiene Clinic and a Family Planning Clinic are located at the City Hall.
Table 6: Health Facilities in Makati, 2001

<table>
<thead>
<tr>
<th>Classification</th>
<th>Private</th>
<th>Public</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospitals</td>
<td>3</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Health Centers/Medical Clinics</td>
<td>113</td>
<td>29</td>
<td>142</td>
</tr>
<tr>
<td>Lying-In/Maternity Clinics</td>
<td>5</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Dental Clinics</td>
<td>70</td>
<td>29</td>
<td>99</td>
</tr>
<tr>
<td>Social Hygiene Clinics</td>
<td>-</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Family Planning Clinics</td>
<td>-</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Reflexology/Massage Clinic/Spa</td>
<td>20</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>EENT/Optical/Eye Clinic</td>
<td>10</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Skin Clinic</td>
<td>25</td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>Funeral Parlors</td>
<td>4</td>
<td></td>
<td>4</td>
</tr>
</tbody>
</table>

Source: Makati Health Department
2.4 Economic Profile

2.4.1 Number and Nature of Business Establishments

The structure and type of business establishments indicate the predominant economic activities in Makati and its economic role in the NCR. At the same time, it reveals the most potential sector in terms of business and employment opportunities, which Makati must harness.

The greatest economic force in Makati is the stretch of commercial establishments in the Ayala-owned district where headquarters or main offices of almost 40% of companies listed in the top 1,000 corporations are located. These big corporations generate almost 100,000 jobs through its horizontal linkage in addition to the income it provides to the City Government.

Last year, the Rockwell Center in Barangay Poblacion was formally opened to house new commercial and business activities in the city.

As the premiere and financial center of the country, Makati easily attracts investors as shown by the increasing trend of business establishments in the city from only 46,824 in 1999 to 56,523 in 2001. For 2002-2013, the projected increase in the number of establishments has an annual average growth rate of .101.

Table 7: Number of Business Establishments by Nature, 1999-2001

<table>
<thead>
<tr>
<th>Nature of Business</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advertisement/Sign/Billboard</td>
<td>9</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>Amusement Place</td>
<td>291</td>
<td>307</td>
<td>370</td>
</tr>
<tr>
<td>Bank</td>
<td>434</td>
<td>443</td>
<td>453</td>
</tr>
<tr>
<td>Dealer in Securities</td>
<td>160</td>
<td>165</td>
<td>165</td>
</tr>
<tr>
<td>Exporter</td>
<td>812</td>
<td>835</td>
<td>861</td>
</tr>
<tr>
<td>Restaurants/ Carinderia</td>
<td>2,548</td>
<td>2,890</td>
<td>3,152</td>
</tr>
<tr>
<td>Foreign Exchange/Moneyshops</td>
<td>400</td>
<td>412</td>
<td>423</td>
</tr>
<tr>
<td>Fixed Tax</td>
<td>88</td>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td>Financial/Lending Investor</td>
<td>1,341</td>
<td>1,521</td>
<td>1,668</td>
</tr>
<tr>
<td>Hotel</td>
<td>33</td>
<td>44</td>
<td>48</td>
</tr>
<tr>
<td>Importer</td>
<td>1,329</td>
<td>1,390</td>
<td>1,449</td>
</tr>
<tr>
<td>Insurance/ Pre-Need</td>
<td>165</td>
<td>183</td>
<td>195</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>1,332</td>
<td>1,432</td>
<td>1,443</td>
</tr>
<tr>
<td>Office Space</td>
<td>2,030</td>
<td>2,204</td>
<td>2,435</td>
</tr>
<tr>
<td>Pawnshop</td>
<td>171</td>
<td>186</td>
<td>195</td>
</tr>
<tr>
<td>Real Estate</td>
<td>5,301</td>
<td>5,708</td>
<td>6,234</td>
</tr>
<tr>
<td>Sari-Sari Store (Retailer)</td>
<td>3,456</td>
<td>3,789</td>
<td>4,103</td>
</tr>
<tr>
<td>Services</td>
<td>14,781</td>
<td>15,032</td>
<td>18,169</td>
</tr>
<tr>
<td>Shopping Centers/ Market</td>
<td>26</td>
<td>93</td>
<td>36</td>
</tr>
<tr>
<td>General Merchandise</td>
<td>12,117</td>
<td>13,357</td>
<td>15,022</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>46,824</td>
<td>50,090</td>
<td>56,523</td>
</tr>
</tbody>
</table>

Source: Business Permit Division, Makati City

As of October 2, 2003
2.4.2 Service-Related Establishments

Generally, Makati’s economy is service-oriented. Service establishments in the city have been categorized into:

- General building contractors, building maintenance contractors, garbage disposal contractors, electric light or gas system installers, demolition, proprietors of heavy equipment, landscaping contractors, interior decorating services, janitorial services, towing services and installation of water system;

- Advertising agencies, booking offices for films exchange, booking offices for transportation, business management service, film owners/lessors/ distributors, commercial or immigration services, consultancy services, insurance agencies, mercantile agencies, messengerial service, real estate appraisers/brokerages, shipping agencies and travel agencies;

- Service stations of motor vehicles, motor repair and painting shops;

- Steam laundry, ordinary laundry shops, perma press and dyeing establishments;

- Photographic studio, rental of video tapes, furniture and sound system;

- Funeral services, medical and dental laboratories, veterinary clinics and animal hospitals;

- Tailor shops, dress shops, beauty parlors and dress shops;

- Upholstery shops, vulcanizing shops and tire recapping plants;

- Escort services, recruitment or job placement services;

- Watch repair shops, vaciador shops, silk-screen of T-shirt, recopying or duplicating services;

- Parking area, warehouses or bodegas and stable for horse races;

- Gold and silversmiths, plating establishments and lathe machines;

- Slendering and body-building saloons, massage and therapeutic clinics;

- Stock markets and stock brokers;

- Real estate developers;

- Business agent;

- Plant maintenance or rent-a-plant;

- Wood carving shops, sculptor shops, etc.
2.4.3 Tourist Spots

Makati, being the financial hub and center of commercial establishments that offer local and international goods and services in addition to its accessibility to the Ninoy Aquino International Airport, ranks high in terms of tourism potential.

Distinguishing landmarks include five star hotels, the Ayala Museum, Museo ng Makati, Libingan ng Bayani, American Cemetery, shopping centers and cinemas, art galleries, restaurants serving the local and international gourmet, golf courses, and the famous Guadalupe Ruins.

2.4.4 Tourist Facilities

- Hotels

There are six (6) deluxe hotels operating in Makati. These are the Hotel Intercontinental which is the first hotel built in Makati in 1969 with 338 rooms, the Manila Mandarin Oriental with 448 rooms, the Dusit Hotel Nikko with 542 rooms, the Makati Shangri-la Hotel with 703 rooms, the Manila Peninsula Hotel with 498 rooms, and the New World Hotel with 611 rooms.

- Embassies and Consulates

There are fifty-four (54) embassies situated in the City of Makati. These include embassies of countries such as Argentina, Australia, Brunei, Korea, France, etc. On the other hand, there are thirty-five (35) consulates located within the area.

- International Organization

There are twelve (12) international organizations located in the Central Business District of the City. Majority of these organizations are the United Nation Agencies and the well-known International Labor Organizations.
2.5 Population

2.5.1 Population Size, Annual Growth Rate and Household Population

Based on the 2000 Census of Population, the City of Makati has a population of 471,379, which is 2.6% lower than the 1995 population of 484,176. Among cities and municipalities in the National Capital Region, Makati ranks 7th in population with 4.73% share.

The City of Makati has a total of 103,981 households with an average household size of 4.5. From the 1995 figure of 100,922 households, the number of households in the city increased by 3,059.

Table 8: Total Population, Number of Households, Average Household Size and Growth Rate for All Cities/Municipalities in NCR, 2000

<table>
<thead>
<tr>
<th>City/Municipality</th>
<th>Total Population</th>
<th>Growth Rate</th>
<th>Number of Households</th>
<th>Average Household Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caloocan</td>
<td>1,177,604</td>
<td>4.43</td>
<td>249,567</td>
<td>4.71</td>
</tr>
<tr>
<td>Las Piñas</td>
<td>472,780</td>
<td>4.75</td>
<td>97,962</td>
<td>4.80</td>
</tr>
<tr>
<td><strong>Makati</strong></td>
<td><strong>471,379</strong></td>
<td><strong>-0.5</strong></td>
<td><strong>103,981</strong></td>
<td><strong>4.53</strong></td>
</tr>
<tr>
<td>Mandaluyong</td>
<td>278,474</td>
<td>1.16</td>
<td>59,682</td>
<td>4.61</td>
</tr>
<tr>
<td>Manila</td>
<td>1,581,082</td>
<td>-0.13</td>
<td>333,547</td>
<td>4.70</td>
</tr>
<tr>
<td>Marikina</td>
<td>391,170</td>
<td>2.34</td>
<td>80,160</td>
<td>4.86</td>
</tr>
<tr>
<td>Muntinlupa</td>
<td>379,310</td>
<td>3.14</td>
<td>78,016</td>
<td>4.75</td>
</tr>
<tr>
<td>Paranaque</td>
<td>449,811</td>
<td>3.85</td>
<td>94,109</td>
<td>4.75</td>
</tr>
<tr>
<td>Pasay</td>
<td>354,908</td>
<td>-0.37</td>
<td>78,180</td>
<td>4.53</td>
</tr>
<tr>
<td>Pasig</td>
<td>505,058</td>
<td>2.42</td>
<td>107,835</td>
<td>4.66</td>
</tr>
<tr>
<td>Quezon City</td>
<td>2,173,831</td>
<td>2.67</td>
<td>480,624</td>
<td>4.49</td>
</tr>
<tr>
<td>Valenzuela</td>
<td>485,433</td>
<td>3.62</td>
<td>106,382</td>
<td>4.52</td>
</tr>
<tr>
<td>Malabon</td>
<td>338,855</td>
<td>1.92</td>
<td>74,137</td>
<td>4.54</td>
</tr>
<tr>
<td>Navotas</td>
<td>230,403</td>
<td>2.08</td>
<td>49,450</td>
<td>4.65</td>
</tr>
<tr>
<td>Pateros</td>
<td>57,407</td>
<td>1.11</td>
<td>12,029</td>
<td>4.75</td>
</tr>
<tr>
<td>San Juan</td>
<td>117,680</td>
<td>-0.75</td>
<td>24,605</td>
<td>4.77</td>
</tr>
<tr>
<td>Taguig</td>
<td>467,375</td>
<td>5.77</td>
<td>102,723</td>
<td>4.50</td>
</tr>
<tr>
<td>NCR</td>
<td>9,932,560</td>
<td>2.25</td>
<td>2,132,989</td>
<td>4.62</td>
</tr>
</tbody>
</table>

* Includes counts for disputed barangays Post Proper Northside (1,475 persons) and Post Proper Southside (25,037)

Source: NSO

Makati’s population based on the 2000 Census is 178 times its population count in the first census held in 1903. It was during the period 1960-1970 that population tremendously increased as a result of massive migration when Makati became the center of business and commercial activities. Annual growth rates, however, continue to decline from 8.86% in 1970 to 1.25% in 1995 and –0.5% in 2000.
### Table 9: Makati Population and Intercensal Annual Growth Rate, 1903-2000

<table>
<thead>
<tr>
<th>Census Date</th>
<th>Population</th>
<th>Intercensal Increase/Decrease</th>
<th>% Increase/Decrease</th>
<th>Annual Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 2, 1903</td>
<td>2,700</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>December 31, 1918</td>
<td>12,612</td>
<td>9,912</td>
<td>367</td>
<td>10.82</td>
</tr>
<tr>
<td>January 1, 1939</td>
<td>33,530</td>
<td>20,918</td>
<td>66</td>
<td>4.77</td>
</tr>
<tr>
<td>October 1, 1948</td>
<td>41,335</td>
<td>7,805</td>
<td>23</td>
<td>2.35</td>
</tr>
<tr>
<td>February 15, 1960</td>
<td>114,540</td>
<td>73,205</td>
<td>177</td>
<td>8.86</td>
</tr>
<tr>
<td>May 6, 1970</td>
<td>264,918</td>
<td>150,378</td>
<td>131</td>
<td>8.75</td>
</tr>
<tr>
<td>May 1, 1975</td>
<td>334,448</td>
<td>69,530</td>
<td>26</td>
<td>4.77</td>
</tr>
<tr>
<td>May 1, 1980</td>
<td>372,631</td>
<td>38,183</td>
<td>11</td>
<td>2.19</td>
</tr>
<tr>
<td>May 1, 1990</td>
<td>452,734</td>
<td>80,103</td>
<td>21</td>
<td>1.98</td>
</tr>
<tr>
<td>September 1, 1995</td>
<td>484,176</td>
<td>31,442</td>
<td>7</td>
<td>1.25</td>
</tr>
<tr>
<td>May 1, 2000</td>
<td>471,379</td>
<td>-12,797</td>
<td>-3</td>
<td>-0.5</td>
</tr>
</tbody>
</table>

Source: NSO

The annual population growth rate of Makati City from 1995 to 2000 is -0.5% which means that the population is decreasing at this rate. Based on the NSO survey, the major contributory factors for the sudden decline of Makati’s population are the decrease in the number of births, increase in the number of deaths, transfer of the informal settlers located along Pasig River to nearby areas in 2000, increase in the number of direct employment in economic zones from 1995 to 2000, and increase in the number of establishments in Makati reporting retrenchment or termination due to economic reasons.

#### 2.5.2 Population Distribution and Density

The City of Makati recorded a 3% decline in population density (persons/sq.km.). Likewise, Manila, Mandaluyong, San Juan, Malabon, Muntinlupa and Pasay City registered decreasing density in year 2000.

### Table 10: NCR Population and Density, 1995-2000

<table>
<thead>
<tr>
<th>National Capital Region</th>
<th>Population</th>
<th>Population Density</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1995</td>
<td>2000</td>
</tr>
<tr>
<td></td>
<td>1995</td>
<td>2000</td>
</tr>
<tr>
<td>Manila</td>
<td>1,654,761</td>
<td>1,581,082</td>
</tr>
<tr>
<td></td>
<td>43,205</td>
<td>41,282</td>
</tr>
<tr>
<td>Mandaluyong</td>
<td>286,870</td>
<td>278,474</td>
</tr>
<tr>
<td></td>
<td>11,033</td>
<td>10,711</td>
</tr>
<tr>
<td>Marikina</td>
<td>357,231</td>
<td>391,170</td>
</tr>
<tr>
<td></td>
<td>9,183</td>
<td>10,056</td>
</tr>
<tr>
<td>Pasig</td>
<td>471,075</td>
<td>505,058</td>
</tr>
<tr>
<td></td>
<td>36,237</td>
<td>38,851</td>
</tr>
<tr>
<td>Quezon City</td>
<td>1,989,419</td>
<td>2,173,831</td>
</tr>
<tr>
<td></td>
<td>11,970</td>
<td>13,080</td>
</tr>
<tr>
<td>San Juan</td>
<td>124,187</td>
<td>117,680</td>
</tr>
<tr>
<td></td>
<td>11,941</td>
<td>11,315</td>
</tr>
<tr>
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Source: 2000 Philippine Statistical Yearbook, NSO
Table 11: Total Population, Growth Rate, and Density per Barangay, 1995 vs. 2000

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* Included in Barangay Pembo
** Population Density of Barangays Pembo and Rizal

As of October 2, 2003
2.5.3 Projection of Barangay Population and Business Establishments

- Projection of Barangay Population 2003-2013

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*AAGR – Average Annual Growth Rate
### Makati City 10 Year Solid Waste Management Plan

As of October 2, 2003

**BARANGAY** | **AAGR** | **2002** | **2003** | **2004** | **2005** | **2006** | **2007** | **2008** | **2009** | **2010** | **2011** | **2012** | **2013**
---|---|---|---|---|---|---|---|---|---|---|---|---|---
**DISTRICT II** | | |
Cembo | -0.00792 | 25610 | 25407 | 25206 | 25006 | 24808 | 24612 | 24417 | 24223 | 24031 | 23841 | 23652 | 23464 |
Comembo | -0.018 | 25610 | 25407 | 25206 | 25006 | 24808 | 24612 | 24417 | 24223 | 24031 | 23841 | 23652 | 23464 |
East Rembo | 0.008 | 25610 | 25407 | 25206 | 25006 | 24808 | 24612 | 24417 | 24223 | 24031 | 23841 | 23652 | 23464 |
Guad. Nuevo | -0.019 | 25610 | 25407 | 25206 | 25006 | 24808 | 24612 | 24417 | 24223 | 24031 | 23841 | 23652 | 23464 |
Guad. Viejo | 0.006 | 25610 | 25407 | 25206 | 25006 | 24808 | 24612 | 24417 | 24223 | 24031 | 23841 | 23652 | 23464 |
Pembo | 0.032 | 25610 | 25407 | 25206 | 25006 | 24808 | 24612 | 24417 | 24223 | 24031 | 23841 | 23652 | 23464 |
Rizal | |
Pinagkaisahan | -0.041 | 25610 | 25407 | 25206 | 25006 | 24808 | 24612 | 24417 | 24223 | 24031 | 23841 | 23652 | 23464 |
Pitogo | -0.001 | 25610 | 25407 | 25206 | 25006 | 24808 | 24612 | 24417 | 24223 | 24031 | 23841 | 23652 | 23464 |
Post Proper North | -0.157 | 25610 | 25407 | 25206 | 25006 | 24808 | 24612 | 24417 | 24223 | 24031 | 23841 | 23652 | 23464 |
Post Proper South | 0.104 | 25610 | 25407 | 25206 | 25006 | 24808 | 24612 | 24417 | 24223 | 24031 | 23841 | 23652 | 23464 |
South Cembo | 0.003 | 25610 | 25407 | 25206 | 25006 | 24808 | 24612 | 24417 | 24223 | 24031 | 23841 | 23652 | 23464 |
West Rembo | -0.008 | 25610 | 25407 | 25206 | 25006 | 24808 | 24612 | 24417 | 24223 | 24031 | 23841 | 23652 | 23464 |
**Subtotal** | **0.006** | **262067** | **263545** | **265031** | **266526** | **268029** | **269541** | **271061** | **272589** | **274127** | **275673** | **277227** | **278791** |
**Grand Total** | **-0.005** | **468887** | **466409** | **463943** | **461491** | **459051** | **456625** | **454211** | **451810** | **449422** | **447046** | **444683** | **442332**

*AAGR* – Average Annual Growth Rate
Projection of Number of Business Establishments in Makati City 2003-2013

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<td>465</td>
<td>472</td>
<td>479</td>
<td>486</td>
<td>494</td>
<td>501</td>
<td>508</td>
<td>516</td>
<td>524</td>
<td>532</td>
<td>540</td>
<td>548</td>
</tr>
<tr>
<td>Dealer in Securities</td>
<td>0.01</td>
<td>165</td>
<td>167</td>
<td>168</td>
<td>170</td>
<td>172</td>
<td>173</td>
<td>175</td>
<td>177</td>
<td>179</td>
<td>180</td>
<td>182</td>
<td>184</td>
</tr>
<tr>
<td>Exporter</td>
<td>0.034</td>
<td>895</td>
<td>925</td>
<td>957</td>
<td>989</td>
<td>1023</td>
<td>1058</td>
<td>1094</td>
<td>1131</td>
<td>1169</td>
<td>1209</td>
<td>1250</td>
<td>1293</td>
</tr>
<tr>
<td>Restaurant/Carinderia</td>
<td>0.126</td>
<td>3512</td>
<td>3955</td>
<td>4453</td>
<td>5014</td>
<td>5646</td>
<td>6357</td>
<td>7158</td>
<td>8060</td>
<td>9075</td>
<td>10219</td>
<td>11506</td>
<td>12956</td>
</tr>
<tr>
<td>Foreign Exchange/Money Shops</td>
<td>0.033</td>
<td>440</td>
<td>455</td>
<td>470</td>
<td>485</td>
<td>501</td>
<td>518</td>
<td>535</td>
<td>552</td>
<td>570</td>
<td>589</td>
<td>609</td>
<td>629</td>
</tr>
<tr>
<td>Fixed Tax</td>
<td>0.015</td>
<td>92</td>
<td>93</td>
<td>95</td>
<td>98</td>
<td>99</td>
<td>101</td>
<td>102</td>
<td>104</td>
<td>105</td>
<td>107</td>
<td>108</td>
<td></td>
</tr>
<tr>
<td>Financial/Lending Investor</td>
<td>0.12</td>
<td>1824</td>
<td>2043</td>
<td>2288</td>
<td>2563</td>
<td>2870</td>
<td>3215</td>
<td>3600</td>
<td>4032</td>
<td>4516</td>
<td>5058</td>
<td>5665</td>
<td>6345</td>
</tr>
<tr>
<td>Hotel</td>
<td>0.18</td>
<td>51</td>
<td>60</td>
<td>71</td>
<td>84</td>
<td>99</td>
<td>117</td>
<td>138</td>
<td>162</td>
<td>192</td>
<td>226</td>
<td>267</td>
<td>315</td>
</tr>
<tr>
<td>Importer</td>
<td>0.043</td>
<td>1500</td>
<td>1565</td>
<td>1632</td>
<td>1702</td>
<td>1775</td>
<td>1851</td>
<td>1931</td>
<td>2014</td>
<td>2101</td>
<td>2191</td>
<td>2285</td>
<td>2384</td>
</tr>
<tr>
<td>Insurance/Pre-need</td>
<td>0.065</td>
<td>197</td>
<td>210</td>
<td>223</td>
<td>238</td>
<td>253</td>
<td>270</td>
<td>287</td>
<td>306</td>
<td>326</td>
<td>347</td>
<td>370</td>
<td>394</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>0.047</td>
<td>1519</td>
<td>1590</td>
<td>1665</td>
<td>1743</td>
<td>1825</td>
<td>1911</td>
<td>2001</td>
<td>2095</td>
<td>2193</td>
<td>2297</td>
<td>2404</td>
<td>2518</td>
</tr>
<tr>
<td>Office Space</td>
<td>0.113</td>
<td>2721</td>
<td>3028</td>
<td>3371</td>
<td>3752</td>
<td>4176</td>
<td>4647</td>
<td>5172</td>
<td>5757</td>
<td>6408</td>
<td>7132</td>
<td>7937</td>
<td>8834</td>
</tr>
<tr>
<td>Pawnshop</td>
<td>0.072</td>
<td>208</td>
<td>223</td>
<td>239</td>
<td>256</td>
<td>275</td>
<td>294</td>
<td>316</td>
<td>338</td>
<td>363</td>
<td>389</td>
<td>417</td>
<td>447</td>
</tr>
<tr>
<td>Real Estate</td>
<td>0.087</td>
<td>6691</td>
<td>7273</td>
<td>7906</td>
<td>8594</td>
<td>9341</td>
<td>10154</td>
<td>11037</td>
<td>11998</td>
<td>13041</td>
<td>14176</td>
<td>15409</td>
<td>16750</td>
</tr>
<tr>
<td>Sari-sari Store (Retailer)</td>
<td>0.079</td>
<td>4282</td>
<td>4620</td>
<td>4985</td>
<td>5379</td>
<td>5804</td>
<td>6263</td>
<td>6757</td>
<td>7291</td>
<td>7867</td>
<td>8489</td>
<td>9159</td>
<td>9883</td>
</tr>
<tr>
<td>Services</td>
<td>0.11</td>
<td>19658</td>
<td>2182</td>
<td>0</td>
<td>24221</td>
<td>26885</td>
<td>29842</td>
<td>33125</td>
<td>36769</td>
<td>40813</td>
<td>45303</td>
<td>50286</td>
<td>55817</td>
</tr>
<tr>
<td>Shopping Centers/Markets</td>
<td>0.24</td>
<td>45</td>
<td>56</td>
<td>69</td>
<td>86</td>
<td>106</td>
<td>132</td>
<td>164</td>
<td>203</td>
<td>252</td>
<td>312</td>
<td>387</td>
<td>480</td>
</tr>
<tr>
<td>General Merchandise</td>
<td>0.115</td>
<td>16295</td>
<td>1816</td>
<td>9</td>
<td>20258</td>
<td>22588</td>
<td>25186</td>
<td>28082</td>
<td>31311</td>
<td>34912</td>
<td>38927</td>
<td>43404</td>
<td>48395</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>0.101</td>
<td>60997</td>
<td>67158</td>
<td>73941</td>
<td>81409</td>
<td>89631</td>
<td>98684</td>
<td>108651</td>
<td>119624</td>
<td>131706</td>
<td>145009</td>
<td>159655</td>
<td>175780</td>
</tr>
</tbody>
</table>
3. **Current Solid Waste Management Conditions**

3.1 **Institutional Arrangements**

3.1.1 **Roles and Responsibilities of the Solid Waste Management Division (SWMD)**

The **SWMD** of the City Government of Makati has mandates to:

- Collect garbage and other wastes in the City;
- Enforce city ordinances concerning waste management;
- Coordinate with other City-National Government Departments including residential subdivisions in the management and disposition of garbage and other wastes;
- Manage, operate, and maintain solid waste equipment and other facilities owned by the City of Makati; and
- Plan and implement Public Education Program on solid waste management and public sanitation responsibilities of city residents.

The SWMD organizational structure (See Figure 8) headed by the **Division Head** is in charge to:

- Supervise all activities related to street cleaning, refuse collection, and waste disposal within the city as well as the enforcement of all laws and ordinances pertaining to cleanliness and beautification;
- Act on matters involving utmost trust and competent decision-making;
- Sign all official documents and communications within the scope of his responsibility; and
- Attend seminars with the local and national agencies on matters affecting cleanliness and beautification.

SWMD is divided into three (3) offices – **Support Services Office, District 1 Operations Office**, and **District 2 Operations Office**.

The **Head of Support Services Office** is tasked to:

- Supervise all activities and personnel under the Support Services Office;
- Supervise and coordinate all administrative service function;
- Exercise general supervision over personnel transaction and welfare;
- Monitor the work and activities of subordinate employees engaged in official function of the division particularly planning, clerical, property management, central records, and personnel;
- Plan and prepare work programs and decide on routine matters;
- Coordinate and maintain work relationships between and among the divisions and sections;
- Recommend administrative actions against personnel found violating orders, instructions, office rules, and regulations; and
- Assist in the development of programs of all personnel and conduct accounting research to improve office administration.
The Support Services Office is further subdivided into four (4) sections. These are the Personnel Section, Property and Supply Section, Action Line Section, and Planning and Research Section.

The Personnel Section is assigned to:

- Provide personnel services to all employees of Solid Waste Management Division;
- Assist the Support Services Office and other offices in the formulation and execution of personnel policies, rules, and regulations of HRDO; and
- Enforce Civil Service laws, rules, and regulations relative to personnel actions and the development of employees’ welfare and benefits.

The Property and Supply Section is in charge to:

- Prepare requisition and issue voucher of office and janitorial supplies, memorandum receipt, and worksheet for the Division;
- Conduct physical inventory of office equipment, furniture, and fixtures assigned to the Solid Waste Management Division; and
- Perform proper issuance/release of office supplies and equipments of Solid Waste Management Division.

The Action Line Section is appointed to:

- Receive, record, and relay to concerned personnel/office all daily waste-related complaints; and
- Assist in the monitoring of garbage collection.

The Planning and Research Section is delegated to:

- Formulate plans and programs for the Solid Waste Management Office;
- Conduct studies and researches for program development;
- Prepare comparative analysis of various solid waste-related proposals;
- Assist other section in preparation of plans;
- Coordinate with the Support Services Head in the implementation of the approved plans and programs of the Division;
- Carry out and coordinate work with other sections; and
- Collate weekly/monthly accomplishment reports from different offices and consolidate the reports.

The District Operations Offices headed by the District Managers are designated to:

- Supervise the work of subordinate personnel engaged in street cleaning, waste collection, and disposal of garbage within the district;
- Oversee the implementation and enforcement of SWMD sanitary rules and regulations;
- Recommend plans and programs to improve the existing sanitary service;
- Assist in the conduct of educational campaign on the proper storage and disposal of garbage to prevent violation of rules, regulations, and ordinances; and
- Prepare and submit performance evaluation reports.
The two (2) District Operations Offices have the same sections and consequently, the same functions. These are the **Street Cleaning and Beautification Section**, **Garbage Collection and Disposal Section**, **Information, Education, and Communication (IEC) Section**, **Enforcement Section**, and **Oplan: Tapat-Tapat (OTT) Section**.

The **Street Cleaning and Beautification Section** is in charge of maintaining the cleanliness of the city’s major thoroughfares. The maintenance of secondary and tertiary streets falls under the responsibility of the barangay and their “Tagalinis” or street sweepers.

The **Garbage Collection and Disposal Section** is responsible for the hauling/collection of wastes within the 27 barangays. The remaining six (6) barangays, all of which are affluent villages, have assigned their own private contractors to haul off their waste.

The **Information, Education, and Communication (IEC) Section** formulates strategies on public information and education. It provides opportunities for communicating with and involving the public on proper waste management and disposal. It also provides distribution of campaign materials such as posters, flyers, and comics and allows the viewing of audiovisual materials produced by the Solid Waste Management Division.

The **Enforcement Section** supervises the daily activity accomplished by the sanitation inspectors. This section implements and enforces proper waste disposal practices and apprehends violators of environmental laws and ordinances. It is also responsible for the towing of junk and dilapidated vehicles, which obstruct city streets.

The **Oplan: Tapat-Tapat Section (OTT)** is a special operations group and a component of the SWMD program that supplement other existing waste-related activities. It involves the mass deployment of Bantay-Linis that performs street sweeping, garbage collection, removal of soil mounds and debris, painting of gutters and blank walls, and mobilization of a pay loader with a theme, “Kalinisan ng Bayan sa Sariling Bakuran Simulan”.
Figure 8: SWMD Organizational Structure

Makati City 10 Year Solid Waste Management Plan

As of October 2, 2003
3.1.2 Roles and Responsibilities of Private Haulers/Garbage Collectors

Based on the Terms of Reference (TOR) for January to June 2003, the following are the basic provisions that are required of every Contractor in the implementation of the Area System for the solid waste management in the City of Makati. However, these Contractors are not limited to these requirements in their actual commitment and delivery of service to the City:

- Solid Waste Collection, Cleaning, and Disposal Services cover the collection, cleaning and disposal of solid wastes in the City of Makati on an Area System where the Contractor is given full responsibility to manage/administer and direct carry out actual collection. as the City may direct, cleaning and disposal of solid waste from various sources such as household, commercial establishments, markets, offices, schools and the like, streets, including main, secondary and tertiary roads including alleys, vacant lots or from designated collection points and transporting the same to the disposal site that is provided by the contractor.

- Cleaning the streets of litters and other visual clusters also forms part of the Contractor’s responsibility under this system. Litters are defined as products of untidy throwing and scattering of small pieces of garbage or refuse such as cigarette butts, candy wrappers, fruit and vegetable peelings and the like.

- Types of wastes to be collected under this system covers the household, commercial, market and institutional waste from government offices and schools, churches and domestic wastes and industries, as well as from street sweeping and soil mounds mixed with garbage and other visual clutters. Bulky and yard wastes are given separate collection in accordance with the guidance to be specified by the City.

- Mopping-up operation also forms part of the area system and will refer to the follow-up collection in main roads and other streets as may be necessary or required by the City even after the designate collection schedules have been carried out.

- Conduct special trips for special operations as may be deemed necessary.
3.2 Inventory of Staff and Equipment

3.2.1 SWMD Staff

SWMD has a total of 506 personnel (See Figure 8 and Table 12). The Division Head has 23 staff while the Support Services Office has 24 personnel. The Operations Office of District I employs 311 workers and the District II Operations Office has 144 staff.

Table 12: SWMD Personnel

<table>
<thead>
<tr>
<th>Office</th>
<th>Section</th>
<th>Number of Personnel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Division Head’s Office</td>
<td>Division Head</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Staff</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>24</strong></td>
</tr>
<tr>
<td>Support Services Office</td>
<td>Head</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Personnel Section</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Property and Supply Section</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Action Line Section</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Planning and Research Section</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>27</strong></td>
</tr>
<tr>
<td>District I Operations Office</td>
<td>District Manager and Staff</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Street Cleaning Section</td>
<td>215</td>
</tr>
<tr>
<td></td>
<td>Garbage Collection and Disposal Section</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>IEC Section</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Enforcement Section</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Oplan Tapat-Tapat Section</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>311</strong></td>
</tr>
<tr>
<td>District II Operations Office</td>
<td>District Manager and Staff</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Street Cleaning Section</td>
<td>69</td>
</tr>
<tr>
<td></td>
<td>Garbage Collection and Disposal Section</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>IEC Section</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Enforcement Section</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Oplan Tapat-Tapat Section</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>144</strong></td>
</tr>
</tbody>
</table>

Source: SWMD, City Government of Makati
3.2.2 Staff Training for SWMD Staff

The following table shows the trainings, seminars, and workshops attended by the SWMD personnel:

Table 13: SWMD Trainings, Seminars, and Workshops

<table>
<thead>
<tr>
<th>Date</th>
<th>Title/Theme</th>
<th>Description</th>
<th>Number of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>February 17, 1998</td>
<td>“Mamamayan Muna, Hindi Mamaya Na”</td>
<td>Conducted jointly by the City Government of Makati and the Civil Service Commission, which aims to put Public Service second to none.</td>
<td>25 Staff</td>
</tr>
<tr>
<td>September 1, 1998</td>
<td>Waste Ordinances, Provisions, and Penalties</td>
<td>Conducted by the Task Force on Solid Waste Management.</td>
<td>10 Staff</td>
</tr>
<tr>
<td>November 4, 1998</td>
<td>R.A. 8291 or the G.S.I.S. Act of 1997</td>
<td>Conducted by the Government Social Insurance System (GSIS) and the National Capital Region (NCR) for purposes of streamlining procedures in the surrender of the policy certificate of membership or its cash value upon the separation and retirement from the service by the GSIS members at any time after termination.</td>
<td>4 Staff</td>
</tr>
<tr>
<td>November 12, 1998</td>
<td>Bantay Kalikasan, Bagong Bayani ng Bayan</td>
<td>Conducted by the Environmental Movement of the Philippines.</td>
<td>1 staff</td>
</tr>
<tr>
<td>November 24, 1998</td>
<td>Basic Plant Seminar</td>
<td>Conducted by the Department of Environmental Services (DES) of the City Government of Makati.</td>
<td>5 staff</td>
</tr>
<tr>
<td>February 2000</td>
<td>Planning Workshop</td>
<td>Conducted at Loreland Resort Antipolo and participated by the Department Head, Support Services Head, and all District Managers, Section Heads, and Planning staff.</td>
<td>31 Staff</td>
</tr>
<tr>
<td>October 12, 2000</td>
<td>PET Seminar/Workshop Improving and Recovery</td>
<td>Conducted by the Metro Manila Development Authority (MMDA)</td>
<td>3 Staff</td>
</tr>
<tr>
<td>May 2003</td>
<td>OFFICE 5S Seminar</td>
<td>Conducted by the Total Quality Management (TQM) Core Group of the City Government of Makati, the seminar focused on customer satisfaction, continuous improvement, employee participation, teamwork, leadership, and recognition.</td>
<td>1 Staff</td>
</tr>
<tr>
<td>June 2003</td>
<td>Basic Customer Service Skills</td>
<td>The Associate in Rural Development – Governance and Local Democracy (ARD-GOLD) conducted this training. This was designed to develop a customer-oriented service culture in an organization.</td>
<td>1 Staff</td>
</tr>
<tr>
<td></td>
<td>Values Orientation Workshop</td>
<td>Three-day values orientation workshop conducted by the Human Resource Development Office (HRDO) of the City Government of Makati in coordination with the Civil Service Commission (CSC) which aims to develop harmonious relationship among co-employees.</td>
<td>22 Staff</td>
</tr>
</tbody>
</table>
### Training Program on English Language Proficiency

A training program for the Makati City Hall employees in order for them to use the English language effectively and with confidence in different situations. It focuses on macro skills – listening, interacting, reading and uniting with emphasis on writing communication related to employees work.  

**Number of Participants:** 6 Staff

### Computer Literacy Training

Continuing computer literacy training among city government employees conducted every week to develop IT competent city workforce, which targets the employees without basic knowledge in computer.  

**Number of Participants:** 21 Staff

### April 2003 Preparation of the 10-year Solid Waste Management Plan

Workshop conducted by the ADB-TA  

**Number of Participants:** 4 staff

### May 2003 Planning Workshop for the 10-year Solid Waste Management Plan

Workshop conducted by SWMD consultant to prepare the 10-year Solid Waste Management Plan  

**Number of Participants:** 20 personnel

### February 2003 WACS Workshop

WACS conducted with the ADB -TA  

**Number of Participants:** 50 personnel

### March 2003 Ecological Solid Waste Management Training

Conducted by the Mother Earth Foundation.  

**Number of Participants:** 20 staff

### June 9, 2003 Solid Waste Reduction Master Plan (SWARMPLAN) Workshop

Conducted by DENR and COCAP  

The objective of the workshop is to coordinate education and training efforts of various NGOs for greater efficiency and effectiveness.  

**Number of Participants:** 3 staff

---

**Source:** SWMD, City Government of Makati

### 3.2.3 Staff of Private Haulers/Garbage Collectors

The following table shows the number of employees of the two (2) private haulers contracted by the City Government of Makati to collect and dispose garbage and wastes generated by the city:

**Table 14: Employees of the Two (2) Private Contractors**

<table>
<thead>
<tr>
<th>Area</th>
<th>Name of the Contractor</th>
<th>Employee Classification</th>
<th>Number of Personnel</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>E.C. Sarrol</td>
<td>Drivers</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Maintenance</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Garbage Collectors/Paleros</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Subtotal</strong></td>
<td><strong>122</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Spare Drivers</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Garbage Collectors/Paleros</td>
<td>184</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other Employees</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Subtotal</strong></td>
<td><strong>226</strong></td>
</tr>
<tr>
<td>District II,</td>
<td>RT Machineries and Sales</td>
<td>Drivers</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Garbage Collectors/Paleros</td>
<td>82</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Subtotal</strong></td>
<td><strong>104</strong></td>
</tr>
</tbody>
</table>

**Source:** Data from the contractors
### 3.2.4 Inventory of Equipment of Private Haulers/Garbage Collectors

The following tables show the inventory of trucks and equipments used by the private contractors in their operation:

**Table 15: Trucks assigned for Makati City for collection by E. C. Sarrol, Inc.**

<table>
<thead>
<tr>
<th>Body Number</th>
<th>Plate Number</th>
<th>Capacity</th>
<th>Age (Years)</th>
<th>Present Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>001</td>
<td>UUC 792</td>
<td>10-Wheeler</td>
<td>6</td>
<td>Good condition</td>
</tr>
<tr>
<td>002</td>
<td>CRU 596</td>
<td>10-Wheeler</td>
<td>3</td>
<td>Good condition</td>
</tr>
<tr>
<td>003</td>
<td>UMB732</td>
<td>10-Wheeler</td>
<td>6</td>
<td>Good condition</td>
</tr>
<tr>
<td>004</td>
<td>UUP161</td>
<td>10-Wheeler</td>
<td>3</td>
<td>Good condition</td>
</tr>
<tr>
<td>005</td>
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Source: Department of General Services as of June 23, 2003.
### Makati City 10 Year Solid Waste Management Plan

#### Table 16: Trucks assigned for Makati City for collection by RT Machineries and Sales

<table>
<thead>
<tr>
<th>Body Number</th>
<th>Plate Number</th>
<th>Capacity</th>
<th>Age (Years)</th>
<th>Present Condition</th>
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<td>400</td>
<td>UNE-522</td>
<td>Compactors</td>
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<td>401</td>
<td>USY-846</td>
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<td>402</td>
<td>USY-842</td>
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<td>WPC - 731</td>
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</table>

Source: Department of General Services as of June 23, 2003
3.6 Waste Generation

27 Barangays (Service Areas)

Waste generation of the 27 barangays that the city provides waste collection, can be determined through the total number of collection trips provided by the private contractors. The required total minimum collection trips for January to December 2002 was 57,305 and the contractors provided 57,592 collection trips, or collecting an annual total volume of 1,158,881.2 m$^3$. The additional 287 collection trips were provided to comply with the package deal. The additional collection trips indicate the volume of wastes generated by the 27 barangays increased from the projected 3,035 m$^3$ per day.

While for January to April 2003, the required collection trips were 18,840 and the contractors provided 19,026 collection trips. The expected collection trips exceeded 186 trips for the first four months of this year. These minimum collection trips are the calculated number of collection trips each contractor must provide for each area assigned to them.

Table 17. The Minimum Number of Collection Trips Provided by Contractors for January-December 2002 and January-April 2003.

<table>
<thead>
<tr>
<th>Contractor</th>
<th>1st Q</th>
<th>2nd Q</th>
<th>3rd Q</th>
<th>4th Q</th>
<th>Total</th>
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<tbody>
<tr>
<td>Minimum</td>
<td>Provided</td>
<td>Minimum</td>
<td>Provided</td>
<td>Minimum</td>
<td>Provided</td>
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<tr>
<td>ACY</td>
<td>4717</td>
<td>4771</td>
<td>4876</td>
<td>4878</td>
<td>4876</td>
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<td>4628</td>
<td>4707</td>
<td>4784</td>
<td>4777</td>
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<td>2668</td>
<td>2687</td>
<td>2668</td>
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<td>ECS</td>
<td>2047</td>
<td>2124</td>
<td>2116</td>
<td>2172</td>
<td>2116</td>
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<td>14,219</td>
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<td>14,485</td>
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<table>
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<tr>
<th>Contractor</th>
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<td>Minimum</td>
<td>Provided</td>
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<td>ACY</td>
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<tr>
<td>Total</td>
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</table>

6 Subdivisions, Central Business District and Ayala Center

For the six (6) subdivisions or barangays and the Central Business District and Ayala Center, the data given by their barangay offices shows that the barangays are practicing mandatory segregation and have their own private contractors that collect their residual wastes. The waste generation of the 6 barangays can be seen in the table below.
For the CBD and Ayala Center the MACEA or the 13% or 45 cu.m. reduction in residual wastes is noted since the program was launched in 2001, based on monitoring of the Makati Commercial Estate Association (MACEA) and Ayala Center Association (ACA). ACA documented a reduction of its residual waste to 68.75% in 2002 from 91.31% in 2001. According to their records, a total of 3,200 tons of recyclable materials have been recovered and a total of 275 tons or 20% of compostable wastes were processed into compost through a compost processor provided by the CTM Services.

Through the monitoring system established by ACA that records the volume of segregated wastes and compliance and participation of its members, they were able to determine that the pilot buildings in the program improved its performance in terms of waste residuals. The residential buildings improved its percentage of residual to 50%. The office buildings group went down to 39%.

Table 18: Estimated Garbage Volume Generated by the Six (6) Affluent Villages, Ayala Center, and the Central Business District (CBD) for the Year 2002

<table>
<thead>
<tr>
<th>Barangay/Area</th>
<th>Accumulated Volume per Day (in cu.m.)</th>
<th>Accumulated Volume per Month (in cu.m.)</th>
</tr>
</thead>
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<tr>
<td>Barangay Magallanes</td>
<td>Dry – 16</td>
<td>480</td>
</tr>
<tr>
<td></td>
<td>Wet – 25 containers x 60 liters</td>
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</tr>
<tr>
<td>Barangay San Lorenzo</td>
<td>No exact data for volume</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 trucks</td>
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</tr>
<tr>
<td></td>
<td>Depends on operation in tree trimmings</td>
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</tr>
<tr>
<td>Barangay Urdaneta</td>
<td>16</td>
<td>480</td>
</tr>
<tr>
<td>Barangay Dasmariñas</td>
<td>35 (Dry)</td>
<td>1,410</td>
</tr>
<tr>
<td></td>
<td>12 (Wet)</td>
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<tr>
<td>Barangay Forbes Park</td>
<td>264 (Dry), 12 trips/mo.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>264 (Wet), 16 trips/mo.</td>
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<tr>
<td>Ayala Center</td>
<td>147 (Residual Waste)</td>
<td>4,410</td>
</tr>
<tr>
<td>Central Business District</td>
<td>800</td>
<td>24,000</td>
</tr>
</tbody>
</table>

Source: MACEA

3.6 Source Reduction/Waste Avoidance

3B-3K

The City Government of Makati in collaboration with the Metro Manila Authority through MMC Resolution No. 1-S92 created through Municipal Ordinance No. 93-228 the Task Force on Solid Waste Management in December of 1993. The ordinance is the legal support to the Memorandum of Agreement between the metro Manila Authority and the Municipality of Makati.

The Task Force on Solid Waste Management was able to author several ordinances that focus on the 1) proper operation of junkshops, 2) mandatory segregation of wastes at the household, commercial and office levels, 3) declaration of January as “Cleanliness
Awareness Month” for the city, and 4) anti-littering and anti-dumping practices. IEC materials were also developed and printed for the information dissemination campaign.

One IEC material developed and was used is the “3B-3K” or the

(B) Bawasan ang basura nang huwag mamroblema
(B) Balik gamitin ang pwede pang pakinabangan
(B) Baguhin and anyo nang may pagkakakitaan
(K) Para sa kalinisnag hated ay
(K) Kalusugan at
(K) Kayamanan.

The Task Force also composed a jingle that will be used to increase the awareness of its constituents on proper solid waste management practices. All barangays were mobilized and oriented on ecological solid waste management and the penalties for non-compliance. The program also included the participation of schools specially the students in segregation of wastes.

**Barangays Comembo and Bangkal**

Integration of provisions on segregation and resource recovery at the Barangay was pilot tested in Barangays Bangkal and Comembo. The City Government provided receptacle bins for two pilot barangays: Bangkal (4,868 units) and Comembo (3,026 units). The provision of receptacles is part of the Solid Waste Reduction and Resource Recovery Program for the Barangay that hopes to install an ecological solid waste management system according to the provisions of the RA. Segregated wastes are collected from the two pilot barangays since February 2003. The barangays have set a schedule for the collection of biodegradable and non-biodegradable materials.

Biodegradable wastes are collected every Mondays, Wednesdays and Fridays. Non-biodegradable wastes are collected every Tuesdays, Thursdays and Saturdays. Bulk and special wastes are collected every Sundays. Households are encouraged to place in the receptacles segregated wastes that they want to be collected by the dump trucks. This is done through continuous information dissemination and dialogues through the help of the barangay and the IEC section of the SWMD.

Wastes not collected by the dump trucks are either collected or bought by the junkshops. Biodegradable wastes particularly kitchen wastes and food wastes are collected by owners of piggeries. Non-biodegradable wastes like papers, bottles, PET plastics and rubber tires go to the junkshops.

The project also aims to document and measure the amount of wastes diverted from final disposal not to mention, monitor the progress of the project. The IEC section met with the two barangays for the installation of a monitoring system. A monitoring form where the barangay can use to measure and document the amount of segregated wastes diverted for disposal was submitted. Beside the prescribed monitoring form, the IEC sections are monitoring the number of households practicing segregation.
Maya Market

The Maya Neighborhood Cooperative launched the “Paper Bag” project wherein stallholders of the Maya Talipapa are encouraged to use paper bags instead of plastics in their everyday business transactions. The project was the product of discussions between the Solid Waste Management Division and the Maya Neighborhood MPC. The SWMD was able to obtain written pledges of support from all Maya Talipapa stallholders to use paper bags instead of plastic bags.

The children of members were taught to make paper bags out of old magazines and telephone directories. The project expanded to include the students of Rizal Elementary school and Benigno “Ninoy” Aquino Highschool. The Cooperative provided the materials and buys the finished paper bags at P4.00 per the hundred. The cooperative in turn sells the paper bags to the stallholders for P5.00 per the hundred.

The materials used for the project are collected from the residents of Barangay Rizal. The project started in June 2001 and met negative reaction from buyers of paper bags. But despite the limitations, the Maya Neighborhood MPC is still pushing the projects as their commitment to the City Government.

Plush Subdivisions

BARANGAY BEL-AIR

Bel-Air adopted the Zero Waste Management Program in 1994. Through BARANGAYAN, an interactive information program, they were able to disseminate information on how important 3R (recycling, reduction, reusing) is and how they would practice it. Barangayan is being held twice a year both for the residents and private establishment owners and managers. They extend technical assistance by means of seminars to establishment owners on handling their wet garbage recyclables and their biodegradable. From then on “We Recycle in Bel-Air” Program was heightened. After the closure of San Mateo in 2000 the whole metropolitan suffered from garbage crisis but not Brgy. Bel Air. A private dumpsite was rented by their private contractor for the disposal of their wastes.

The council also encouraged their residents to have their own composting piles in their backyards to reduce the volume of biodegradable waste to be collected. At present all residents have their own composting site. As for the Council, they have put up a monitoring team composed of three personnel responsible for the continuous visitations in every home to give tips and guidelines on proper composting and also to check up the status of their composting piles. The barangay also provided waste bins for all residents where each kind of waste has a different bin.

For collection, the barangay implements “No Segregation, No Collection” policy. The barangay stated in their Annual Report that every year their Zero Waste Management Program helped them minimized the impact of garbage crisis, in addition Barangay Bel-Air has been adjudged as the Hall of Famer as the Cleanest and Greenest Barangay in the city for seven consecutive years.
BARANGAY MAGALLANES

Magallanes implemented waste segregation last July 1, 2002. The homeowners of the barangay were the ones who took the initiative to implement the program with the back up support of the barangay council. Their information dissemination was through a “house-to-house” system. They would visit each house and provide materials on the schedule of collection, the process of segregation, list of recyclables and guidelines to follow for segregation and composting. Also they included contact numbers of the assigned collectors for their recyclables. By August 1, 2002 they strictly implemented the use of clear plastic bags for residual waste to easily identify if their waste is segregated. They implemented “no segregation, no collection” policy.

BARANGAY SAN LORENZO

San Lorenzo acquired waste bins in 2000 to start their waste segregation program. Waste bins were located around the village. As for the residents they were instructed to practice segregation at home. At present Brgy. San Lorenzo is still practicing segregation of their wet and dry waste. But unlike Bel-Air, San Lorenzo does not practice composting at home. Because according to the residents they don’t have space in their backyards for a composting pile and even the barangay cannot provide a composting site for the whole village because of limited space. As for collection the private contractors collect the wet garbage in the morning and dry garbage in late afternoon. When asked if they have any idea what happens to their segregated waste after being collected, the barangay council don’t have any idea where its being brought.

3.5 Collection

3.4.4 January to June 2003 Description of Existing Collection System

Collection of garbage will be guided according to the minimum volume and number of trips to be done in the area assigned to the Contractor. Each Contractor will follow the collection scheme prepared and implemented by the City Government shown in the diagram below.

![Collection Scheme Diagram]

As of October 2, 2003
All dump trucks will log first at the Barangay Hall for proper documentation before proceeding to the assigned routes or area. The log report or the Datu Basurero Daily Situational Report (see attachment) documents, among others, the dump trucks’:

- proper identification;
- number of collection crew and personnel;
- collection crew uniform and protective gears and equipments;

Upon completion of collection and before proceeding to the disposal site the same dispatched dump trucks shall proceed back to the Barangay Hall to report work completion and document volume of waste collected. The Barangay representative concerned should countersign daily trip tickets after accomplishing route assignment.

### 3.4.5 Collection System and Facilities

For a cost-effective and timesaving collection of waste, the city uses the package deal system. With this system, each contractor has its assigned area: for District I, contractor 1 (Pio del Pilar and Bangkal) and contractor 2 (Kasilawan, Carmona, Sta. Cruz, San Antonio, San Isidro, Olympia, La Paz, Singkamas, Tejeros and Palawan); and for District II, contractor 3 (West Rembo, East Rembo, Comembo, Pembo and Rizal) and contractor 4 (Cembo, South Cembo, Pitogo, Pinagkaisahan, Guadalupe Nuevo, Guadalupe Viejo, Poblacion, Valenzuela, Northside and Southside). These contractors collect the garbage everyday from 6:00 to 8:00 in the morning while mapping operation is from 6:00 to 8:00 in the evening. Residents and owners of establishments are required to discharge wastes in plastic bags or trash receptacles prior to the arrival of the collection trucks.

### 3.4.6 Collection Rate

#### Year 2002

The collection trips provided by the 4 contractors serving the 27 service areas of the city, shows for the last 5 quarters shows that the minimum requirement is met for January-December 2002 and January-April 2003. The required total minimum collection trips for January to December 2002 was 57,305 and the contractors provided 57,592 collection trips, or collecting an annual total volume of 1,158,881.2 m$^3$. The additional 287 collection trips were provided to comply with the package deal. The additional collection trips indicate the volume of wastes generated by the 27 barangays increased from the projected 3,035 m$^3$ per day.

While for January to April 2003, the required collection trips were 18,840 and the contractors provided 19,026 collection trips. The expected collection trips exceeded 186 trips for the first four months of this year. These minimum collection trips are the calculated number of collection trips each contractor must provided for each area assigned to them.
Compliance Rate of Contractors

The compliance rate of each contractor is based on the actual compliance to all provisions of the contract. Any violations penalized by the SWMD will be deducted from the contractor and will be used as the official weight for the computation of the compliance rate. The computation of the compliance rate is based on the percent remaining after all penalties have been deducted from the contract price or

\[
\text{Compliance Rate} = 100 - \left( \frac{\text{Penalties}}{\text{Contract Price}} \right) \times 100
\]

Table 19: Compliance Rate of Contractors from January to December 2002 and from January to April 2003.

<table>
<thead>
<tr>
<th>Contractor</th>
<th>Jan-Dec 2002</th>
<th>Jan-April 2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACY</td>
<td>99.45%</td>
<td>99.68%</td>
</tr>
<tr>
<td>REN</td>
<td>99.55%</td>
<td>99.80%</td>
</tr>
<tr>
<td>RTM</td>
<td>99.42%</td>
<td>99.63%</td>
</tr>
<tr>
<td>ECS</td>
<td>99.45%</td>
<td>99.64%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>99.47%</strong></td>
<td><strong>99.70%</strong></td>
</tr>
</tbody>
</table>

Note: Computation based on the amount of penalties taken from the original contract price.

Penalties for the non-compliance to the provisions of RA 9003 stipulated in the contracts were exacted through deductions in the monthly cost of collection and disposal services for each violating contractor. For 2002, the total penalties deducted from the solid waste collection and disposal billings was P2,152,554.64 or .53% of the suppose total cost of collection and disposal expenditure. For 2003, the total reduction due to penalties was P391,504.00 or 18% of last year’s total deduction.

Table 20: Amount of Penalties Deducted from Violating Contractor for 2002 and 2003.

<table>
<thead>
<tr>
<th>Contractor</th>
<th>2002</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACY</td>
<td>773,822.75</td>
<td>114,000.00</td>
</tr>
<tr>
<td>REN</td>
<td>615,021.46</td>
<td>114,684.00</td>
</tr>
<tr>
<td>RTM</td>
<td>445,268.65</td>
<td>93,900.00</td>
</tr>
<tr>
<td>ECS</td>
<td>318,441.78</td>
<td>68,920.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>P2,152,554.64</strong></td>
<td><strong>P391,504.00</strong></td>
</tr>
</tbody>
</table>

Source: Budget Office
3.6 Processing Facilities

**Barangay Comembo**

Barangay Comembo has an operational MRF where market wastes are shredded and made into compost. The market wastes are collected from the Apex market and Comembo talipapa. The MRF is located beside the barangay hall. The barangay has a redemption center where recyclable materials collected by the zone leaders within the barangay area are stored prior to scheduled collection of the junkshops. The recyclable materials collected by the zone leaders are bottles and PET plastics.

**Barangay San Antonio**

Barangay San Antonio purchased a composter and hammermill for their composting program. The site of the composting area is shown in the picture below. The program was stopped due to location of the composting site in an environmental critical area. The compost site is situated near the railroad area.

3.7 Final Disposal

Disposal site used by Makati City is Rodriguez Rizal Landfill located in Montalban. The Metro Manila Development Authority (MMDA) is paying a tipping fee of P600.00 per ton. Salazar Construction Company operates the whole 17 hectare-landfill.

3.8 Special Wastes

The City Government through the Solid Waste Management Division coordinates collection of wastes from special operations to the four contractors servicing the twenty-seven (27) service areas. The special operations are the done by the “Oplan Tapat-Tapat” (OTT) section and the Street Cleaning and Beautification (SC&B) section who are
tasked to regularly do street cleaning and waste collection of fire debris, street wastes, construction wastes, grass weeding and canal wastes.

The contractors do collection of the wastes from the regular operations of the two sections. Close coordination is done by the SWMD with the four contractors. For bulk wastes, the schedule for collection is every Sunday. Any bulk wastes illegally dumped are called in through the Action Line, which in turn informs the contractor to collect such wastes. Requests for collection of fire debris and canal wastes are also coursed through the SWMD office or called in at the Action Line. All such request for collection is called in to the contractors for immediate action.

The table below shows the volume of wastes collected for January to December of 2002 and January to April of 2003. These do not include the wastes collected regularly from the 27 service areas.

**Table 21: Volume of Wastes Collected from Special Operations of Oplan Tapat-Tapat (OTT) Section and Street Cleaning and Beautification (SC&B) Section for 2002**

<table>
<thead>
<tr>
<th>Section</th>
<th>1st Q</th>
<th>2nd Q</th>
<th>3rd Q</th>
<th>4th Q</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil mounds</td>
<td>918.50</td>
<td>943.00</td>
<td>1,213.90</td>
<td>757.23</td>
<td>3,832.63</td>
</tr>
<tr>
<td>Yard wastes</td>
<td>229.13</td>
<td>423.84</td>
<td>1,516.40</td>
<td>1,054.30</td>
<td>3,223.67</td>
</tr>
<tr>
<td>Debris</td>
<td>300.00</td>
<td>193.00</td>
<td>719.00</td>
<td>897.00</td>
<td>2,109.00</td>
</tr>
<tr>
<td>Fire wastes</td>
<td>45.90</td>
<td>30.90</td>
<td>218.00</td>
<td>245.00</td>
<td>539.80</td>
</tr>
<tr>
<td>Assorted wastes</td>
<td>752.00</td>
<td>1.37</td>
<td>-</td>
<td>-</td>
<td>2,129.00</td>
</tr>
<tr>
<td>SC&amp;B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil mounds</td>
<td>13,503.18</td>
<td>386.11</td>
<td>49.41</td>
<td>41.15</td>
<td>13,979.85</td>
</tr>
<tr>
<td>Yard wastes</td>
<td>2,080.61</td>
<td>813.89</td>
<td>-</td>
<td>-</td>
<td>2,894.50</td>
</tr>
<tr>
<td>Debris</td>
<td>119.00</td>
<td>61.00</td>
<td>-</td>
<td>-</td>
<td>180.00</td>
</tr>
<tr>
<td>Fire wastes</td>
<td>239.90</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>239.90</td>
</tr>
<tr>
<td>Garbage</td>
<td>1,807.32</td>
<td>1,316.75</td>
<td>-</td>
<td>-</td>
<td>3,124.07</td>
</tr>
<tr>
<td>Grass weeding</td>
<td>-</td>
<td>0.97</td>
<td>1,753.50</td>
<td>6,516.25</td>
<td>8,270.72</td>
</tr>
<tr>
<td>Total</td>
<td>19,995.54</td>
<td>5,546.46</td>
<td>5,470.21</td>
<td>9,510.93</td>
<td>40,523.14</td>
</tr>
</tbody>
</table>

Source: Solid Waste Management Division

**Table 22: Volume of Wastes Collected from Special Operations of Oplan Tapat-Tapat (OTT) and Street Cleaning and Beautification (SC&B) for January-April 2003**

<table>
<thead>
<tr>
<th>Section</th>
<th>1st Q</th>
<th>April</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil mounds</td>
<td>2,198.46</td>
<td>321.70</td>
<td>2,520.16</td>
</tr>
<tr>
<td>Yard wastes</td>
<td>1,461.13</td>
<td>829.49</td>
<td>2,290.62</td>
</tr>
<tr>
<td>Debris</td>
<td>1,098.00</td>
<td>275.50</td>
<td>1,373.50</td>
</tr>
<tr>
<td>Fire wastes</td>
<td>300.00</td>
<td>75.00</td>
<td>375.00</td>
</tr>
<tr>
<td>Assorted wastes</td>
<td>1.00</td>
<td>5.00</td>
<td>6.00</td>
</tr>
<tr>
<td>SC&amp;B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil mounds</td>
<td>157.40</td>
<td>1.52</td>
<td>158.92</td>
</tr>
<tr>
<td>Yard wastes</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Debris</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Fire wastes</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
Table 23: List of Junkshops in District I With Permit

<table>
<thead>
<tr>
<th>Name of Junkshop</th>
<th>Owner/Operator</th>
<th>Address</th>
<th>Materials Accepted</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tess Junk Shop</td>
<td>Tess Gaspe</td>
<td>0038 PNR P. Medina St., Pio del Pilar</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>Onato Enterprises &amp; Junk Shop</td>
<td>Quintin Q. Onato</td>
<td>6401 P. Medina St., Pio del Pilar</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>Medalla Scrap Dealer</td>
<td>Vilma Medalla</td>
<td>6532 E. Ramos St. cor. D. Villar St., Pio del Pilar</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>A.D. Torres Trading</td>
<td>Antonio D. Torres</td>
<td>6553 E. Ramos St., Pio del Pilar</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>Ely And Ben Trading</td>
<td>Erisheba Uy</td>
<td>6608 E. Ramos St., Pio del Pilar</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>Cabriga's Junk Shop</td>
<td>Donato Cabrigas</td>
<td>7241 J. Victor St. cor. M. Antonio St., Pio del Pilar</td>
<td>Metals, Paper, Battery</td>
<td>No data</td>
</tr>
<tr>
<td>Laber Trading</td>
<td>Ma. Luisa Benja</td>
<td>7243 J. Victor St. cor. M. Antonio St., Pio del Pilar</td>
<td>Plastics, Glass, Bottles, Paper</td>
<td>No data</td>
</tr>
<tr>
<td>Infinity Pulp Enterprises</td>
<td>Noel Andaya</td>
<td>6717 Taylo St., Pio del Pilar</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>Altecin Trading</td>
<td>Marilyn Gaspe</td>
<td>7315 J. Victor St., Pio del Pilar</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>J. Victor Scrap Shop</td>
<td>Pancho Brana</td>
<td>7360 J. Victor St., Pio del Pilar</td>
<td>Paper</td>
<td>No data</td>
</tr>
<tr>
<td>Em-Jay General Merchandise</td>
<td>Emma Co</td>
<td>7868 Mc Kinley St. cor. M. Ocampo St., Pio del Pilar</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>R.M. Reyes Jr. Commercial Trading</td>
<td>Romeo Reyes Jr.</td>
<td>6546 E. Ramos St., Pio del Pilar</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>Recuerdo Scrap Dealer</td>
<td>Burton Recuerdo</td>
<td>6488 P. Medina St., Pio del Pilar</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>Marconi Junk Shop</td>
<td>Sonia D. Sanchez</td>
<td>2338 Marconi St., Palanan</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>Selinas Treasure Junk Shop</td>
<td>Manuelito R. Cipriano</td>
<td>4529 Casino St., Palanan</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>Nemesio Jusi Enterprise</td>
<td>Nemesio Jusi</td>
<td>4714 Arellano St., Palanan</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>Cesar Camacho Junk Shop</td>
<td>Cesar Camacho</td>
<td>1136 Metropolitan Ave cor. Davila St. La Paz</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>Linda Junk Shop</td>
<td>Erlinda Sarmiento</td>
<td>150 Metropolitan St., Tejeros</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>Orodio Junk Shop</td>
<td>Vicenta Orodio</td>
<td>Kalayaan Ave., Tejeros</td>
<td>Paper</td>
<td>No data</td>
</tr>
<tr>
<td>Maring Junk Shop</td>
<td>Ma. Juanillic Nayres</td>
<td>8881 Sampiloc St., San Antonio</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>Kikoy Junk Shop</td>
<td>Nestor Cabrera</td>
<td>2728 Montejo St. cor South Ave., Olympia</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>Go Te Junk Shop</td>
<td>Leonora Pasion</td>
<td>4364 Valdez St., Poblacion</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>Chua Junk Shop</td>
<td>Wilson J. Chua</td>
<td>17-A EDSA, Bangkal</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>Myrna Junk Shop</td>
<td>Rene M. Hallig</td>
<td>2206 Marconi St., San Isidro</td>
<td>Plastics, Glass, Bottles, Metals, Paper, Battery</td>
<td>No data</td>
</tr>
</tbody>
</table>

Source: Solid Waste Management Division
## Table 24: List of Junkshops in District I without Permit

<table>
<thead>
<tr>
<th>Name of Junkshop</th>
<th>Owner/Operator</th>
<th>Address</th>
<th>Materials Accepted</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.R. Junk Shop</td>
<td>Shirley Resurreccion</td>
<td>8462 Pasong Tirad St., Tejeros</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>Rizon Junk Shop</td>
<td>Edwin Rizon</td>
<td>7686 J.B. Roxas St., Olympia</td>
<td>No data</td>
<td>No data</td>
</tr>
</tbody>
</table>

Source: Solid Waste Management Division

## Table 25: List of Junkshops in District II with Permit

<table>
<thead>
<tr>
<th>Name of Junkshop</th>
<th>Owner/Operator</th>
<th>Address</th>
<th>Materials Accepted</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>T.S. Racpan Enterprises</td>
<td>Teodoro S. Racpan</td>
<td>83-A 31&lt;sup&gt;st&lt;/sup&gt; St., West Rembo</td>
<td>Plastics, Glass, Bottles, Metals, Paper, Battery</td>
<td>No data</td>
</tr>
<tr>
<td>Pereyra Junk Shop</td>
<td>Rosemarie Pereyra</td>
<td>Blk 10 Lot 9 Sampaguita St., Pembo</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>Tejada Junk Shop</td>
<td>Anita Tejada</td>
<td>6392 Camia St., Guad. Viejo</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>N. C. Tenorio Trading</td>
<td>Nimfa Tenorio</td>
<td>32-A J.P. Rizal St., West Rembo</td>
<td>Plastics, Metals, Paper, Cartridge of Computers, Battery</td>
<td>No data</td>
</tr>
<tr>
<td>E.B.T. Merchandise</td>
<td>Ely Tulalian</td>
<td>420 Bohol cor Samar St., Pitogo</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>Gladys's Junk Shop</td>
<td>Lourdes Gladys Palinsad</td>
<td>177-G 24&lt;sup&gt;th&lt;/sup&gt; Ave., East Rembo</td>
<td>Plastics, Glass, Bottles, Metals, Paper, Battery</td>
<td>No data</td>
</tr>
</tbody>
</table>

Source: Solid Waste Management Division

## Table 26: List of Junkshops in District II Without Permit

<table>
<thead>
<tr>
<th>Name of Junkshop</th>
<th>Owner/Operator</th>
<th>Address</th>
<th>Materials Accepted</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manzano's Junk Shop</td>
<td>Mauricio Manzano</td>
<td>43-C 21&lt;sup&gt;st&lt;/sup&gt; St., West Rembo</td>
<td>Plastics, Bottles, Metals, Paper, Battery, Computer Cartridge, Others</td>
<td></td>
</tr>
<tr>
<td>LMC Junk Shop</td>
<td>William Camacho</td>
<td>1624 Camino dela Fe Guad. Nuevo</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>R.L. Barrios Trading</td>
<td>Reynaldo Barrios</td>
<td>2328 Antipolo St., Guad. Nuevo</td>
<td>No data</td>
<td>No data</td>
</tr>
</tbody>
</table>

Source: Solid Waste Management Division
### Companies that Recycle and Buy Recyclable Materials

<table>
<thead>
<tr>
<th>Name of the Company</th>
<th>Material(s) Accepted</th>
<th>Address</th>
<th>Contact Person and Contact Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>United Pulp and Paper</td>
<td>All types of cartons</td>
<td>PHINMA Bldg., 166 Salcedo St., Legaspi Village, Makati</td>
<td>Jimmy Macatangay</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tel No: 810-9526</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fax No: 812-7768</td>
</tr>
<tr>
<td>Stronghold Steel</td>
<td>Steel</td>
<td>2155 Pasong Tamo ST., Makati City</td>
<td>Pat Arellano</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tel No: 813-8892 to 97</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fax No: 810-3536</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Nina Tamandong</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tel No: (045) 302-5454 (plant)</td>
</tr>
<tr>
<td>Davao Union Cement</td>
<td>Rubber, PVC, shoes’ sole</td>
<td>166 Salcedo St., Legaspi Village, Makati City</td>
<td>Mike Andrada</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tel No: 810-9526</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fax No: 815-2779</td>
</tr>
<tr>
<td>Union Cement Corporation</td>
<td>Rubber, PVC, shoes’ sole</td>
<td>50 Ramoy Rd., Talipapa, Novaliches, Caloocan City</td>
<td>Cesar Ramirez / Luis Fadrigo</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tel no: 810-9526</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fax no: 815-2779</td>
</tr>
</tbody>
</table>
Table 28: Metro Manila Linis-Ganda Metro Manila Federation of Environment Multi-Purpose Cooperative
Makati Purchase Report from January to December 2002

<table>
<thead>
<tr>
<th>Material</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>Aug</th>
<th>Sept</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Total (Tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Old Newspaper</td>
<td>67.1</td>
<td>68.3</td>
<td>73.7</td>
<td>60.3</td>
<td>63.8</td>
<td>113.8</td>
<td>66.5</td>
<td>51.5</td>
<td>48.2</td>
<td>43.8</td>
<td>49.3</td>
<td>46.0</td>
<td>752</td>
</tr>
<tr>
<td>Waste Paper</td>
<td>39.6</td>
<td>32.5</td>
<td>35.9</td>
<td>43.5</td>
<td>38.6</td>
<td>35.9</td>
<td>31.9</td>
<td>29.7</td>
<td>22.0</td>
<td>26.4</td>
<td>24.2</td>
<td>16.5</td>
<td>377</td>
</tr>
<tr>
<td>Carton</td>
<td>112.8</td>
<td>136.7</td>
<td>143.2</td>
<td>137.1</td>
<td>121.0</td>
<td>104.5</td>
<td>104.8</td>
<td>112.2</td>
<td>103.4</td>
<td>110.0</td>
<td>115.5</td>
<td>106.7</td>
<td>1,408</td>
</tr>
<tr>
<td>Broken Bottles</td>
<td>24.9</td>
<td>21.7</td>
<td>22.5</td>
<td>24.9</td>
<td>21.2</td>
<td>20.4</td>
<td>22.6</td>
<td>20.3</td>
<td>20.9</td>
<td>23.0</td>
<td>23.1</td>
<td>20.9</td>
<td>266</td>
</tr>
<tr>
<td>Plastic</td>
<td>45.7</td>
<td>44.0</td>
<td>43.5</td>
<td>44.4</td>
<td>47.3</td>
<td>47.9</td>
<td>41.9</td>
<td>44.0</td>
<td>45.1</td>
<td>41.2</td>
<td>46.2</td>
<td>42.9</td>
<td>534</td>
</tr>
<tr>
<td>Bakal/ Tapalodo/ Lata/ Yero/ Aluminum Cans</td>
<td>130.2</td>
<td>109.5</td>
<td>146.5</td>
<td>115.5</td>
<td>129.3</td>
<td>120.5</td>
<td>128.9</td>
<td>108.0</td>
<td>107.1</td>
<td>106.0</td>
<td>112.5</td>
<td>110.3</td>
<td>1,424</td>
</tr>
<tr>
<td>Grand Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>4,762</strong></td>
</tr>
</tbody>
</table>
3.9 IEC

Sectors Oriented by the IEC Section on RA 9003 and Oplan SIMPLE for 2002.

<table>
<thead>
<tr>
<th>Sectors Oriented</th>
<th>Target Participants</th>
<th>Number of Participants who Attended</th>
<th>Accomplishment Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household with receptacles</td>
<td>3026</td>
<td>2667</td>
<td>75</td>
</tr>
<tr>
<td>Market Operators and Stall Owners</td>
<td>19 establishments</td>
<td>19 establishments with 600 attendees</td>
<td>100</td>
</tr>
<tr>
<td>Vendor Associations</td>
<td>24 Vendor Association with 1,417 members</td>
<td>24 vendor associations with 724 attendees</td>
<td>100</td>
</tr>
<tr>
<td>Scavengers</td>
<td>114 persons</td>
<td>41 attendees</td>
<td>36</td>
</tr>
<tr>
<td>Square Corps</td>
<td>7 members</td>
<td>4 attendees</td>
<td>57</td>
</tr>
<tr>
<td>Informal Settlers</td>
<td>200</td>
<td>26</td>
<td>13</td>
</tr>
<tr>
<td>Foremen &amp; Bantay Linis</td>
<td>17 Foremen 192 Bantay Linis</td>
<td>17 Foremen 192 Bantay Linis</td>
<td>100</td>
</tr>
</tbody>
</table>

Sectors Oriented by the IEC Section on RA 9003 and Oplan SIMPLE for 2003.

<table>
<thead>
<tr>
<th>Sectors Oriented</th>
<th>Target Participants</th>
<th>Number of Participants who Attended</th>
<th>Accomplishment Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household with receptacles</td>
<td>4868</td>
<td>4633</td>
<td>95</td>
</tr>
<tr>
<td>Collection Paleros and Drivers</td>
<td>717</td>
<td>576</td>
<td>80</td>
</tr>
</tbody>
</table>
### Information, Education and Communication Section II

<table>
<thead>
<tr>
<th>SECTOR</th>
<th>PROJECT TITLE</th>
<th>MESSAGE</th>
<th>TARGET AUDIENCE</th>
<th>ACTIVITY</th>
<th>MONITORING PLAN</th>
<th>RESPONSIBLE PERSONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Social Community</td>
<td><strong>Oplan Barangay</strong></td>
<td>To organize and orient residents to implement and practice waste segregation in their communities. 3B-3K formula shall be introduced and they will undergo seminars how to practice it.</td>
<td><strong>Primary:</strong> Residents of identified Pilot streets of different barangays. &lt;br&gt;<strong>Secondary:</strong> All residents of the city.</td>
<td><strong>Pre-Implementation:</strong> &lt;br&gt;➢ Identify pilot streets that will undergo these seminars &lt;br&gt;➢ Coordinate with identified pilot streets and their respective barangay council. &lt;br&gt;➢ Hold a preview of the seminar with the barangay council. &lt;br&gt;<strong>Implementation:</strong> &lt;br&gt;➢ Seminar on the pilot streets of the barangay. &lt;br&gt;<strong>Activities during the Seminar:</strong> &lt;br&gt;1. Introduction of the 93-299, and the significance of the 3B-3K Formula &lt;br&gt;2. Identification of the barangay problems with waste management. &lt;br&gt;3. Identify solutions. &lt;br&gt;4. Dramatizations of the city programs, like the following: &lt;br&gt; ✓ Apprehension of violators &lt;br&gt; ✓ Proper waste management and segregation &lt;br&gt;5. Information on all the ordinances and their corresponding penalties for the purpose of, that the residents would prevent apprehension.</td>
<td>IEC Staff will visit the community every now and then to monitor the implementation of 93-299 and continuously give them assistance to make sure that the program is implemented.</td>
<td>➢ SWMD  &lt;br&gt;➢ Barangay Council  &lt;br&gt;➢ Residents</td>
</tr>
<tr>
<td>SECTOR</td>
<td>PROJECT TITLE</td>
<td>MESSAGE</td>
<td>TARGET AUDIENCE</td>
<td>ACTIVITY</td>
<td>MONITORING PLAN</td>
<td>RESPONSIBLE PERSONS</td>
</tr>
<tr>
<td>-----------------</td>
<td>----------------</td>
<td>---------------------------------------------------------------------------------------------</td>
<td>------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------</td>
<td>---------------------------</td>
</tr>
</tbody>
</table>
| 1. Social Education | Bulilit Enforcers | To organize and orient students to implement and practice waste segregation in their schools. These students will be trained and shall undergo seminars that will teach them how to enforce waste ordinances in their schools. They are also trained to disseminate information about these ordinances on how to practice 93-299 thru the 3B-3K formula in their school to their schoolmates. | *Primary:* Grade Six students of Public Schools  
*SSecondary:* All students of Public Elem. Schools | *Pre-Implementation*  
➢ Conduct seminars in schools that will introduce C.O. 93-299 thru the 3B-3K formula. The seminar would also discuss the project “Bulilit Enforcers”  
➢ Identify students that will undergo seminar on apprehension and information dissemination on C.O. 93-299  
➢ Initial implementation of 93-299 within the school.  
*Implementation:*  
➢ Launching of Waste Segregation and the Bulilit Enforcers  
➢ Bulilit Enforcers will be assigned  
➢ Bulilit Enforcers and 93-299 shall be fully implemented. | IEC Staff will visit the schools every now and then to monitor the implementation of 93-299 and the efficiency of the Bulilit Enforcers | ➢ SWMD  
➢ PTA and School Admin  
➢ Students |
3.10 Costs and Revenues

3.10.1 Annual Budget

### PROGRAM APPROPRIATION AND OBLIGATION BY OBJECT

<table>
<thead>
<tr>
<th>OFFICE/DEPARTMENT</th>
<th>DES/SWMD/POLLUTION</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>OBJECT OF EXPENDITURES</th>
<th>ACCOUNT CODE</th>
<th>PAST YEAR 2001 (Actual)</th>
<th>CURRENT YEAR As of June 2002 (Actual)</th>
<th>BUDGET YEAR 2003 (Estimate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PERSONAL SERVICES:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salaries &amp; Wages – Regular Pay</td>
<td>801</td>
<td>61,795,898.46</td>
<td>31,387,305.47</td>
<td>101,679,592.00</td>
</tr>
<tr>
<td>Personal Economic Relief Allowance (PERA)</td>
<td>804</td>
<td>3,962,295.76</td>
<td>1,974,590.80</td>
<td>6,726,000.00</td>
</tr>
<tr>
<td>Additional Compensation (ADCOM)</td>
<td>805</td>
<td>3,962,250.00</td>
<td>1,974,590.80</td>
<td>6,726,000.00</td>
</tr>
<tr>
<td>Representation Allowance</td>
<td>806</td>
<td>14,400.00</td>
<td>7,200.00</td>
<td>28,800.00</td>
</tr>
<tr>
<td>Transportation Allowance</td>
<td>807</td>
<td>-</td>
<td>-</td>
<td>28,800.00</td>
</tr>
<tr>
<td>Clothing Allowance</td>
<td>808</td>
<td>2,043,000.00</td>
<td>1,938,000.00</td>
<td>4,484,000.00</td>
</tr>
<tr>
<td>Overtime and Night Pay</td>
<td>811</td>
<td>2,495,881.21</td>
<td>181,501.30</td>
<td>3,500,000.00</td>
</tr>
<tr>
<td>Christmas Bonus</td>
<td>813</td>
<td>6,191,410.50</td>
<td>2,699,083.50</td>
<td>8,606,299.00</td>
</tr>
<tr>
<td>Cash Gift</td>
<td>814</td>
<td>3,400,000.00</td>
<td>-</td>
<td>5,605,000.00</td>
</tr>
<tr>
<td>Productivity Incentive Benefits</td>
<td>815</td>
<td>-</td>
<td>-</td>
<td>2,242,000.00</td>
</tr>
<tr>
<td>Other Bonuses &amp; Allowances</td>
<td>816</td>
<td>5,336,406.00</td>
<td>-</td>
<td>9,727,299.00</td>
</tr>
<tr>
<td>Life &amp; Retirement Insurance Contributions</td>
<td>817</td>
<td>7,507,043.63</td>
<td>3,804,617.18</td>
<td>12,393,071.00</td>
</tr>
<tr>
<td>Pag-Ibig Contributions</td>
<td>818</td>
<td>792,500.00</td>
<td>384,000.00</td>
<td>1,345,200.00</td>
</tr>
<tr>
<td>Philhealth Contributions</td>
<td>819</td>
<td>702,318.75</td>
<td>372,781.25</td>
<td>1,345,200.00</td>
</tr>
<tr>
<td>ECC Contributions</td>
<td>820</td>
<td>237,780.00</td>
<td>118,200.00</td>
<td>1,345,200.00</td>
</tr>
<tr>
<td>Pensions &amp; Retirement Benefits</td>
<td>821</td>
<td>-</td>
<td>215,271.62</td>
<td>1,100,000.00</td>
</tr>
<tr>
<td>Terminal Leave Benefits</td>
<td>822</td>
<td>3,204,191.59</td>
<td>3,407,898.63</td>
<td>3,808,624.00</td>
</tr>
</tbody>
</table>

**TOTAL P.S.** | **101,645,375.90** | **48,510,040.55** | **170,691,085.00**
## OBJECT OF EXPENDITURES

<table>
<thead>
<tr>
<th>ACCOUNT CODE</th>
<th>PAST YEAR 2001 (Actual)</th>
<th>CURRENT YEAR As of June 2002 (Actual)</th>
<th>BUDGET YEAR 2003 (Estimate)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MAINTENANCE &amp; OTHER OPERATING EXPENSES</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training &amp; Seminar Workshop</td>
<td>833</td>
<td></td>
<td>480,000.00</td>
</tr>
<tr>
<td>Advertising &amp; Publication Expenses</td>
<td>840</td>
<td></td>
<td>45,000.00</td>
</tr>
<tr>
<td>Office Supplies &amp; Materials</td>
<td>849</td>
<td>811,537.89</td>
<td>536,037.45</td>
</tr>
<tr>
<td>Gasoline, Oil &amp; Lubricant Expenses</td>
<td>852</td>
<td>1,134,751.08</td>
<td>348,861.71</td>
</tr>
<tr>
<td>Printing &amp; Binding Expense</td>
<td>854</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Services</td>
<td>857</td>
<td>310,000,000.00</td>
<td>170,487,352.05</td>
</tr>
<tr>
<td>Building Maintenance</td>
<td>864</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor Vehicles Maintenance</td>
<td>878</td>
<td>365,124.30</td>
<td>88,461.00</td>
</tr>
<tr>
<td>Office Equipment Maintenance</td>
<td>882</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Furniture &amp; Fixtures Maintenance</td>
<td>884</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Repairs &amp; Maintenance</td>
<td>887</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Expenses/Beautification Projects</td>
<td>950</td>
<td>4,620,105.40</td>
<td>1,215,294.00</td>
</tr>
<tr>
<td><strong>TOTAL M.O.O.E.</strong></td>
<td>316,931,518.67</td>
<td>172,676,006.21</td>
<td>322,278,334.00</td>
</tr>
<tr>
<td><strong>CAPITAL OUTLAY</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land, Land Improvement, IT Equipment &amp; Software, Telegraph, Telephone Cable, TV &amp; Radio Equipment, Motor Vehicles, Office Equipment, Furniture &amp; Fixtures, Books Outlay &amp; Other Expenses</td>
<td></td>
<td></td>
<td>120,000,000.00</td>
</tr>
<tr>
<td><strong>TOTAL C.O.</strong></td>
<td></td>
<td></td>
<td>120,000,000.00</td>
</tr>
<tr>
<td><strong>GRAND TOTAL</strong></td>
<td>418,576,894.57</td>
<td>221,186,046.76</td>
<td>612,969,419.00</td>
</tr>
</tbody>
</table>

As of October 2, 2003
3.10.2 Revenues


<table>
<thead>
<tr>
<th>Year</th>
<th>Quarter</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>1st Quarter</td>
<td>PhP 2,700.00</td>
</tr>
<tr>
<td></td>
<td>2nd Quarter</td>
<td>400.00</td>
</tr>
<tr>
<td></td>
<td>3rd Quarter</td>
<td>2,800.00</td>
</tr>
<tr>
<td></td>
<td>4th Quarter</td>
<td>2,200.00</td>
</tr>
<tr>
<td></td>
<td><strong>TOTAL</strong></td>
<td><strong>PhP 8,100.00</strong></td>
</tr>
<tr>
<td>2002</td>
<td>1st Quarter</td>
<td>PhP 6,700.00</td>
</tr>
<tr>
<td></td>
<td>2nd Quarter</td>
<td>5,200.00</td>
</tr>
<tr>
<td></td>
<td>3rd Quarter</td>
<td>62,250.00</td>
</tr>
<tr>
<td></td>
<td>4th Quarter</td>
<td>23,200.00</td>
</tr>
<tr>
<td></td>
<td><strong>TOTAL</strong></td>
<td><strong>PhP 97,350.00</strong></td>
</tr>
<tr>
<td>2003</td>
<td>1st Quarter</td>
<td>PhP 54,400.00</td>
</tr>
<tr>
<td></td>
<td>APRIL</td>
<td>13,650.00</td>
</tr>
<tr>
<td></td>
<td><strong>TOTAL</strong></td>
<td><strong>PhP 68,050.00</strong></td>
</tr>
</tbody>
</table>

Source: IEC Section of SWMD
4. Waste Characteristics

Makati City through the technical assistance of Asian Development Bank conducted a Waste Analysis and Characteristics Survey last February 2003. The WACS studied the composition and volume of wastes disposed by the different sectors of the population.

**Volume and Mass Composition of Mixed Wastes**

Makati City has thirty-three (33) barangays, which includes the Central Business District and Ayala Center. But collection of wastes are done for only 27 barangays, the six (6) barangays excluded are the plush subdivisions including the CBD and Ayala Center. The WACS conducted represents the whole 33 barangays.

A separate computation for the twenty-seven (27) barangays was done to determine the daily volume and mass of waste disposed. The computation will also indicate the minimum volume and number of collection trips required for the service area or the 27 barangays. The source of wastes disposed included in the computation are the low and middle-income household wastes, the institutional wastes, industrial wastes and market wastes.

In order to compute for the total mass of wastes collected for disposal of the whole 27 barangays, separate computations for each source generation was done using different units of generators. For the low and middle income, we used the population of the low and middle income residents of the city. This cannot be done for the non-residential generators. For the institutional and industrial wastes, we used the available data on the number of registered establishments from the Permits Office. The market wastes used the number of stalls occupied and the number of sari-sari stores and carinderias/canteens registered as of March 2003.

The computed density of the wastes is 89.45 k/m$^3$, this indicates bulkiness of the wastes collected for disposal. The computed density was used to compute for the volume of the wastes generated per source generator. Table 1 show that the total mass generation for the 27 barangays is an average of 49.74 k or .557 m$^3$.

**Table 30: Average Daily Waste Disposed in Mass and Volume and Number of Collection Trips Required Per Day for the 27 Barangays**

<table>
<thead>
<tr>
<th>City Level</th>
<th>Average Daily Generation Rate (K)/unit$^1$</th>
<th>Per Unit Volume Generation (M$^3$)$^2$</th>
<th>Average Daily Weight Generation (K)$^3$</th>
<th>Average Daily Volume Generation (M$^3$)$^4$</th>
<th>Number of Trips Required/Day$^5$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low &amp; Mid</td>
<td>0.23</td>
<td>.003</td>
<td>93339.52</td>
<td>1043.48</td>
<td>56</td>
</tr>
<tr>
<td>Institutional</td>
<td>18.57</td>
<td>.21</td>
<td>14856.00</td>
<td>166.08</td>
<td>9</td>
</tr>
<tr>
<td>Industrial</td>
<td>30.54</td>
<td>.34</td>
<td>46390.26</td>
<td>518.62</td>
<td>28</td>
</tr>
<tr>
<td>Market</td>
<td>0.40</td>
<td>.004</td>
<td>8000</td>
<td>89.43</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>49.74</strong></td>
<td><strong>.557</strong></td>
<td><strong>162585.79</strong></td>
<td><strong>1817.61</strong></td>
<td><strong>98</strong></td>
</tr>
</tbody>
</table>

$^1$ Daily average mass generation divided over the population and number of establishments where the sample wastes was collected, units for low and middle will be in k/capita

$^2$ Per capita generation or unit generation over the computed density of 89.45 k/m$^3$

$^3$ Daily average mass generation multiplied to the population of the low and middle income residents and the approximate number of registered establishments located within the 27 barangays.
Average daily mass generation of the 27 barangays over the computed density of 89.45 k/m$^3$
Average daily volume generation for the 27 barangay over 19 m$^3$ volume of the dump truck used for collection.

To compute for the 33 barangays, the total volume of wastes disposed based on the WACS is shown below.

<table>
<thead>
<tr>
<th>City Level</th>
<th>Average Daily Generation Rate (K)/unit$^1$</th>
<th>Per Unit Volume Generation (M$^3$)$^2$</th>
<th>Average Daily Weight Generation (K)$^3$</th>
<th>Average Daily Volume Generation (M$^3$)$^4$</th>
<th>Number of Trips Required/Day$^5$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low &amp; Mid</td>
<td>0.23</td>
<td>.003</td>
<td>93339.52</td>
<td>1043.48</td>
<td>56</td>
</tr>
<tr>
<td>Institutional</td>
<td>18.57</td>
<td>.21</td>
<td>14856.00</td>
<td>166.08</td>
<td>9</td>
</tr>
<tr>
<td>Industrial</td>
<td>30.54</td>
<td>.34</td>
<td>46390.26</td>
<td>518.62</td>
<td>28</td>
</tr>
<tr>
<td>Market</td>
<td>0.40</td>
<td>.004</td>
<td>8000</td>
<td>89.43</td>
<td>5</td>
</tr>
<tr>
<td>High Income</td>
<td>0.037</td>
<td>.00041</td>
<td>1,343.84</td>
<td>15.02</td>
<td>1</td>
</tr>
<tr>
<td>Commercial</td>
<td>0.041</td>
<td>.00045</td>
<td>1,221.308</td>
<td>13.65</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>49.818</td>
<td>.558</td>
<td>165160.93</td>
<td>1846.31</td>
<td>100</td>
</tr>
</tbody>
</table>

**Percentage Composition of Sorted Wastes**

Below are the results of the computation for the composition of sorted wastes collected for disposal of Makati City. The population where the waste samples were collected was used to compute for the per capita generation rates.

**Low Income**

The waste samples for low income were collected from the MACDA and LAPERAL areas representing 1,873 residents. "Other Organic" has the highest percentage composition with 52 percent or 82 k of the daily average generation.

<table>
<thead>
<tr>
<th>Type of Waste</th>
<th>Total Weight for 7 days (Kg)</th>
<th>Average Daily Generation Weight (Kg)</th>
<th>Population</th>
<th>Percentage Composition of Waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper</td>
<td>105.63</td>
<td>15.09</td>
<td>1873</td>
<td>9.76</td>
</tr>
<tr>
<td>Glass</td>
<td>26.3</td>
<td>3.75</td>
<td>1873</td>
<td>2.42</td>
</tr>
<tr>
<td>Metal</td>
<td>34.26</td>
<td>4.89</td>
<td>1873</td>
<td>3.16</td>
</tr>
<tr>
<td>Plastic</td>
<td>271.52</td>
<td>38.79</td>
<td>1873</td>
<td>25.09</td>
</tr>
<tr>
<td>Other Organic</td>
<td>571.11</td>
<td>81.59</td>
<td>1873</td>
<td>52.78</td>
</tr>
<tr>
<td>Other Inorganic</td>
<td>69.635</td>
<td>9.95</td>
<td>1873</td>
<td>6.44</td>
</tr>
<tr>
<td>Hazardous</td>
<td>1.317</td>
<td>.19</td>
<td>1873</td>
<td>0.12</td>
</tr>
<tr>
<td>Special</td>
<td>2.32</td>
<td>.33</td>
<td>1873</td>
<td>0.21</td>
</tr>
<tr>
<td>Total</td>
<td>1082.092</td>
<td>154.58</td>
<td>1873</td>
<td>100</td>
</tr>
</tbody>
</table>
Middle Income

While the waste samples from the middle income were collected from selected areas of Barangays Palanan, Olympia, Tejeros, Valenzuela, Poblacion, G. Viejo, Pitogo, G. Nuevo, South Cembo, Cembo, La Paz representing 8,438 residents.

<table>
<thead>
<tr>
<th>Type of Waste</th>
<th>Total Weight for 7 days (Kg)</th>
<th>Average Daily Generation Weight (Kg)</th>
<th>Average Population</th>
<th>Percentage Composition of Waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper</td>
<td>100.24</td>
<td>14.32</td>
<td>8438</td>
<td>10.19</td>
</tr>
<tr>
<td>Glass</td>
<td>27</td>
<td>3.86</td>
<td>8438</td>
<td>2.75</td>
</tr>
<tr>
<td>Metal</td>
<td>30.22</td>
<td>4.32</td>
<td>8438</td>
<td>3.07</td>
</tr>
<tr>
<td>Plastic</td>
<td>247.08</td>
<td>35.30</td>
<td>8438</td>
<td>25.11</td>
</tr>
<tr>
<td>Other Organic</td>
<td>539.07</td>
<td>77</td>
<td>8438</td>
<td>54.78</td>
</tr>
<tr>
<td>Other Inorganic</td>
<td>39.26</td>
<td>5.61</td>
<td>8438</td>
<td>3.99</td>
</tr>
<tr>
<td>Hazardous</td>
<td>.2</td>
<td>.03</td>
<td>8438</td>
<td>0.02</td>
</tr>
<tr>
<td>Special</td>
<td>.92</td>
<td>.13</td>
<td>8438</td>
<td>0.09</td>
</tr>
<tr>
<td>Total</td>
<td>983.99</td>
<td>140.57</td>
<td>8438</td>
<td>100</td>
</tr>
</tbody>
</table>

High Income

The waste sample was collected at Bel Air representing 506 residents. Bel-Air has their own segregation program which shows the small turn-out of wastes collected.

<table>
<thead>
<tr>
<th>Type of Waste</th>
<th>Total Weight for 7 days (Kg)</th>
<th>Average Daily Generation Weight (Kg)</th>
<th>Population</th>
<th>Percentage Composition of Waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper</td>
<td>19.525</td>
<td>2.79</td>
<td>506</td>
<td>14.82</td>
</tr>
<tr>
<td>Glass</td>
<td>3.48</td>
<td>.50</td>
<td>506</td>
<td>2.66</td>
</tr>
<tr>
<td>Metal</td>
<td>4.16</td>
<td>.60</td>
<td>506</td>
<td>3.19</td>
</tr>
<tr>
<td>Plastic</td>
<td>23.35</td>
<td>3.33</td>
<td>506</td>
<td>17.72</td>
</tr>
<tr>
<td>Other Organic</td>
<td>77.72</td>
<td>11.10</td>
<td>506</td>
<td>59.1</td>
</tr>
<tr>
<td>Other Inorganic</td>
<td>2.885</td>
<td>.41</td>
<td>506</td>
<td>2.18</td>
</tr>
<tr>
<td>Hazardous</td>
<td>.025</td>
<td>.004</td>
<td>506</td>
<td>0.02</td>
</tr>
<tr>
<td>Special</td>
<td>.375</td>
<td>.05</td>
<td>506</td>
<td>0.27</td>
</tr>
<tr>
<td>Total</td>
<td>131.52</td>
<td>18.79</td>
<td>506</td>
<td>100</td>
</tr>
</tbody>
</table>

Low and Middle Income Wastes

The three top type of wastes with the highest percentage composition for the low and middle income residents of the 27 barangays are Other Organic (53.73%), Plastic (25.10%) and Paper (9.96%).
Institutional Wastes

Samples were collected from the University of Makati representing 8,129 population. The disparity in percentage composition of other organic, plastic and paper is so small showing the viability of reduction through resource recovery and composting.

<table>
<thead>
<tr>
<th>Type of Waste</th>
<th>Total Weight for 7 days (Kg)</th>
<th>Average Daily Generation Weight (Kg)</th>
<th>Population</th>
<th>Percentage Composition of Waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper</td>
<td>34.18</td>
<td>4.88</td>
<td>8,129</td>
<td>28.20</td>
</tr>
<tr>
<td>Glass</td>
<td>2.585</td>
<td>.37</td>
<td>8,129</td>
<td>2.14</td>
</tr>
<tr>
<td>Metal</td>
<td>.98</td>
<td>.14</td>
<td>8,129</td>
<td>0.81</td>
</tr>
<tr>
<td>Plastic</td>
<td>34.6</td>
<td>4.94</td>
<td>8,129</td>
<td>28.54</td>
</tr>
<tr>
<td>Other Organic</td>
<td>38.29</td>
<td>5.47</td>
<td>8,129</td>
<td>31.60</td>
</tr>
<tr>
<td>Other Inorganic</td>
<td>10.54</td>
<td>1.5</td>
<td>8,129</td>
<td>8.66</td>
</tr>
<tr>
<td>Hazardous</td>
<td>.04</td>
<td>.005</td>
<td>8,129</td>
<td>0.03</td>
</tr>
<tr>
<td>Special</td>
<td>.03</td>
<td>.004</td>
<td>8,129</td>
<td>.02</td>
</tr>
<tr>
<td>Total</td>
<td>121.245</td>
<td>17.31</td>
<td>8,129</td>
<td>100</td>
</tr>
</tbody>
</table>

Industrial Wastes

Samples were collected from Colgate and Café Puro with a total of 325 workforce. The per capita generation rate is .16 k/day or an average of 26.38 k/day. Plastic occupies the top percentage composition of industrial wastes followed by other organic and other inorganic.

<table>
<thead>
<tr>
<th>Type of Waste</th>
<th>Total Weight for 7 days (Kg)</th>
<th>Average Daily Generation Weight (Kg)</th>
<th>Population</th>
<th>Percentage Composition of Waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper</td>
<td>17.58</td>
<td>2.51</td>
<td>325</td>
<td>4.76</td>
</tr>
<tr>
<td>Glass</td>
<td>1.41</td>
<td>0.20</td>
<td>325</td>
<td>0.379</td>
</tr>
<tr>
<td>Metal</td>
<td>3.255</td>
<td>0.465</td>
<td>325</td>
<td>0.881</td>
</tr>
<tr>
<td>Plastic</td>
<td>235</td>
<td>33.57</td>
<td>325</td>
<td>63.627</td>
</tr>
<tr>
<td>Other Organic</td>
<td>34.46</td>
<td>4.92</td>
<td>325</td>
<td>9.325</td>
</tr>
<tr>
<td>Other Inorganic</td>
<td>76.35</td>
<td>10.91</td>
<td>325</td>
<td>20.678</td>
</tr>
<tr>
<td>Hazardous</td>
<td>.035</td>
<td>0.005</td>
<td>325</td>
<td>0.009</td>
</tr>
<tr>
<td>Special</td>
<td>1.2</td>
<td>0.17</td>
<td>325</td>
<td>0.322</td>
</tr>
<tr>
<td>Total</td>
<td>369.29</td>
<td>52.76</td>
<td>325</td>
<td>100</td>
</tr>
</tbody>
</table>
Market Wastes

Samples were collected from the Guadalupe Nuevo public market representing 51 stalls with 102 stall owners. As expected, other organic occupies the top percentage composition for market wastes with 82.50%, the highest amongst the source generators.

<table>
<thead>
<tr>
<th>Type of Waste</th>
<th>Total Weight for 7 days (Kg)</th>
<th>Average Daily Generation Weight (Kg)</th>
<th>Population</th>
<th>Percentage Composition of Waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper</td>
<td>11.88</td>
<td>1.697</td>
<td>102</td>
<td>4.60</td>
</tr>
<tr>
<td>Glass</td>
<td>0.9</td>
<td>0.129</td>
<td>102</td>
<td>0.35</td>
</tr>
<tr>
<td>Metal</td>
<td>0.84</td>
<td>0.12</td>
<td>102</td>
<td>0.33</td>
</tr>
<tr>
<td>Plastic</td>
<td>30.24</td>
<td>4.32</td>
<td>102</td>
<td>11.72</td>
</tr>
<tr>
<td>Other Organic</td>
<td>212.86</td>
<td>30.41</td>
<td>102</td>
<td>82.50</td>
</tr>
<tr>
<td>Other Inorganic</td>
<td>1.28</td>
<td>0.183</td>
<td>102</td>
<td>0.50</td>
</tr>
<tr>
<td>Hazardous</td>
<td>-</td>
<td>0</td>
<td>102</td>
<td>0</td>
</tr>
<tr>
<td>Special</td>
<td>-</td>
<td>0</td>
<td>102</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>258</td>
<td>36.86</td>
<td>102</td>
<td>100</td>
</tr>
</tbody>
</table>

Commercial Wastes

Samples were collected from 5 establishments located within the CBD area with a total of 1,819 workforces. The top four wastes can be diverted through recycling and composting.

<table>
<thead>
<tr>
<th>Type of Waste</th>
<th>Total Weight for 7 days (Kg)</th>
<th>Average Daily Generation Weight (Kg)</th>
<th>Population</th>
<th>Percentage Composition of Waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper</td>
<td>165.43</td>
<td>23.63</td>
<td>1819</td>
<td>33.49</td>
</tr>
<tr>
<td>Glass</td>
<td>11.35</td>
<td>1.62</td>
<td>1819</td>
<td>2.29</td>
</tr>
<tr>
<td>Metal</td>
<td>12.01</td>
<td>1.72</td>
<td>1819</td>
<td>2.44</td>
</tr>
<tr>
<td>Plastic</td>
<td>95.8</td>
<td>13.69</td>
<td>1819</td>
<td>19.4</td>
</tr>
<tr>
<td>Other Organic</td>
<td>197.705</td>
<td>28.24</td>
<td>1819</td>
<td>40.02</td>
</tr>
<tr>
<td>Other Inorganic</td>
<td>10.02</td>
<td>1.43</td>
<td>1819</td>
<td>2.03</td>
</tr>
<tr>
<td>Hazardous</td>
<td>0.768</td>
<td>0.11</td>
<td>1819</td>
<td>.16</td>
</tr>
<tr>
<td>Special</td>
<td>0.85</td>
<td>0.12</td>
<td>1819</td>
<td>.17</td>
</tr>
<tr>
<td>Total</td>
<td>493.933</td>
<td>70.56</td>
<td>1819</td>
<td>100</td>
</tr>
</tbody>
</table>

City Service Area

For the whole 27 barangays, the top three type of wastes with the highest percentage composition are Other Organic (48.58%), plastic (27.25%) and paper (13.21%). The wastes generated by the 27 barangays can be diverted through recycling and composting. The 22 kilos of organic wastes generated daily can be diverted for composting, though there is a need to study where composting can be done best. The initial 22 kilos daily or 669 kilos monthly can be just enough for local consumption of the 6 plush subdivisions.

The 13 kilos of plastics generated daily or 404 kilos monthly can be sold to recycling plants located within Metro Manila. This can add to the bulkiness of the wastes. While the 12 k daily generation of paper or 365 k monthly will indicate two strategies for paper:
recycling or paper or selling to recycling plants. But further study must be done to determine the feasibility of recycling paper.

<table>
<thead>
<tr>
<th>Type of Waste</th>
<th>Total Weight for 7 days (Kg)</th>
<th>Average Daily Generation Weight (Kg)</th>
<th>Population</th>
<th>Percentage Composition of Waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper</td>
<td>454.465</td>
<td>64.92357143</td>
<td>13351</td>
<td>13.21</td>
</tr>
<tr>
<td>Glass</td>
<td>73.025</td>
<td>10.43214286</td>
<td>13351</td>
<td>2.12</td>
</tr>
<tr>
<td>Metal</td>
<td>85.725</td>
<td>12.24642857</td>
<td>13351</td>
<td>2.49</td>
</tr>
<tr>
<td>Plastic</td>
<td>937.59</td>
<td>133.9414286</td>
<td>13351</td>
<td>27.25</td>
</tr>
<tr>
<td>Other Organic</td>
<td>1671.215</td>
<td>238.745</td>
<td>13351</td>
<td>48.58</td>
</tr>
<tr>
<td>Other Inorganic</td>
<td>209.97</td>
<td>29.99571429</td>
<td>13351</td>
<td>6.10</td>
</tr>
<tr>
<td>Hazardous</td>
<td>2.385</td>
<td>.340714286</td>
<td>13351</td>
<td>0.07</td>
</tr>
<tr>
<td>Special</td>
<td>5.695</td>
<td>.813571429</td>
<td>13351</td>
<td>0.17</td>
</tr>
<tr>
<td>Total</td>
<td>3440.07</td>
<td>491.4385714</td>
<td>13351</td>
<td>100.00</td>
</tr>
</tbody>
</table>
5. LEGAL/INSTITUTIONAL FRAMEWORK

5.1 Local Laws and Regulations

The local government of Makati has passed legislations pertaining to the protection of the environment through the enactment of ordinances and resolutions, which are classified into public order and safety (Ordinance Nos. 89-99 and 93-172), waste management (Ordinance Nos. 90-264, 93-065, 93-111, 93-299, 93-396, 94-120, 94-121 and Resolution No. 93-228), and ecology and environmental protection (Resolution No. 1999-239). Other related ordinances are the Public sanitation (Ordinance Nos. 30, 04, and 99), the Pollution prevention ordinance (Ordinance No. 106), the Indiscriminate waste dumping (Ordinance Nos. 90-009 and 2002-005), and the City Ordinance No. 99-052 (Towing of Junk and Dilapidated Vehicles).

5.1.1 Ordinance No. 89-99

An ordinance penalizing spitting, urinating and/or defecation of human waste or excreta, that are offensive to the public sensibilities in open vacant lots, sidewalks, streets, plazas, public landmarks and in all public places, and imposing penalty for violation thereof.

5.1.2 Ordinance No. 90-264

An ordinance requiring owners, lessees, tenants, and the like of residential houses, commercial establishments, buildings, and other entities in this municipality to maintain clean and sanitary surroundings on the frontage of their residences, establishments, buildings and the like, and for other purposes.

5.1.3 Ordinance No. 93-065

(Memorandum for all barangay captains)

In line with the municipality’s anti-pollution campaign, the burning of garbage and other waste materials are prohibited as per instructions of the Office of the Mayor.

5.1.4 Ordinance No. 93-111

An ordinance requiring all owners of vacant lots to install provisional walls on their premises and providing penalty for violation thereof.

5.1.5 Ordinance No. 93-172

An ordinance amending Ordinance No. 03 Series of 1988 of the Municipal Council of Makati, Metro Manila, prohibiting the dumping of waste, refuse, garbage materials, papers, cigarette butts, and the like, in any place in the streets or public building or property to include waterways, creeks and/or riverbanks not designated as dumping places, and providing for a penalty for violation.
5.1.6 Resolution No. 93-228

A resolution affirming the creation of the Task Force on Solid Waste Management pursuant to the Memorandum of Agreement (MOA) between the Metro Manila Authority (MMA) and the Municipality of Makati as per MMC Resolution No. 1-_92, and providing funds for the compensation, remuneration or incentives to the members of the Task Force and their corresponding Secretariat Staff in the form of allowance/honorarium funds to be taken from the RPT share of the MMA under the existing MOA subject to all legal and auditing rules and regulations.

5.1.7 Ordinance No. 93-299

An ordinance requiring owners, lessees, tenants and the like of residential houses, commercial establishments, buildings, and other entities in this municipality to separate, sort out their solid waste, refuse, garbage materials into biodegradable (wet) and non-biodegradable (dry) and providing penalties for violation thereof.

5.1.8 Ordinance No. 93-396

An ordinance regulating and controlling the discharge of industrial and other wastes into the atmospheric air or body of water within the territorial limits of the Municipality of Makati for the purpose of abatement and prevention of pollution, providing penalties for its violation and for other purposes.

5.1.9 Ordinance No. 94-120 (Draft Ordinance)

An ordinance regulating/requiring the private garbage contractors to register their pump trucks, compactors, and other equipment for purposes of garbage hauling within the territorial jurisdiction of Makati with the Department of Environmental Services and providing penalty for violation thereof.

5.1.10 Ordinance No. 94-121

An ordinance regulating/requiring pushcart owners/operators in line with the recycling business to register their pushcart for purposes of garbage and junk collection within the territorial jurisdiction of the City of Makati with the Department of Environmental Services and providing penalties for violations thereof.

5.1.11 Resolution No. 95-004

A resolution declaring the month of January as Cleanliness Awareness Month

5.1.12 Resolution No. 1999-239

Garbage collection and disposal covering January 1, 2000 to December 31, 2000
5.2 Roles

As per section 12 of Republic Act 9003 or the Ecological Solid Waste Management Act of 2000, each city or municipality shall form a City or Municipal Waste Management Board that shall prepare, submit and implement a plan for the safe and sanitary management of solid waste generated in areas under its geographic and political coverage.

The City and Municipal Solid Waste Management Boards shall have the following duties and responsibilities:

a. Develop the City or Municipal Solid Waste Management Plan that shall ensure the long-term management of solid waste, as well as integrate the various solid waste management plans and strategies of the barangays in its area of jurisdiction. In the development of the Solid Waste Management Plan, it shall conduct consultations with the various sectors of the community;

b. Adopt measures to promote and ensure the viability and effective implementation of solid waste management programs in its component barangays;

c. Monitor the implementation of the City or Municipal Solid Waste Management Plan through its various political subdivisions and in cooperation with the private sector and the NGOs;

d. Adopt specific revenue-generating measures to promote the viability of its Solid Waste Management Plan;

e. Convene regular meetings for purposes of planning and coordinating the implementation of the solid waste management plans of the respective component barangays;

f. Oversee the implementation of the City or Municipal Solid Waste Management Plan;

g. Review every two (2) years or as the need arises the City of Municipal Solid Waste Management Plan for purposes of ensuring its sustainability, viability, effectiveness, and relevance in relation to local and international developments in the field of solid waste management;

h. Develop the specific mechanics and guidelines for the implementation of the City or Municipal Solid Waste Management Plan;

i. Recommend to appropriate local government authorities specific measures or proposals for franchise or build-operate-transfer agreements with duly
recognized institutions, pursuant to R.A. 6957, to provide either exclusive or non-exclusive authority for the collection, transfer, storage, processing, recycling or disposal of municipal solid waste. The proposals shall take into consideration appropriate government rules and regulations on contracts, franchises and build-operate-transfer agreements;

j. Provide the necessary logistical and operational support to its component cities and municipalities in consonance with subsection (f) of Section 17 of the Local Government Code;

k. Recommend measures and safeguards against pollution and for the preservation of the natural ecosystem; and

l. Coordinate the efforts of its component barangays in the implementation of the city or municipal Solid Waste Management Plan.

5.3 City Solid Waste Management Board

Below is the draft City Resolution for the creation of the Makati City Solid Waste Management Board. The members of the City board are in the selection process. Finalization of Board and formal creation will take another two to three weeks.

DRAFT RESOLUTION

A RESOLUTION CREATING THE MAKATI CITY SOLID WASTE MANAGEMENT BOARD

Whereas, Article 2, Section 12 of the Republic Act 9003 otherwise known as the Ecological Solid Waste Management Act of 2000 requires the creation of Solid Waste Management Board in every LGUs;

Whereas, in compliance with the mandate of R.A. 9003, a resolution for its creation should be made;

Now therefore, be it resolved as it is hereby resolved by the Sangguniang Panglunsod of the City of Makati, in session assembled that the Makati City Solid Waste Management Board is hereby created and shall prepare, submit and implement a plan for the safe and sanitary management of solid waste generated in areas under its geographic and political coverage.

Section I - That the Makati City Solid Waste Management Board shall have the following composition:

Chairman - HON. JEJOMAR C. BINAY
City Mayor

Members - COUN. NELSON S. PASIA
Chairman, Committee on Health & Sanitation
- COUN. RODOLFO F. SESE
  ABC President

- COUN. CHRISTINE MERCADO
  Chairperson, Sangguniang Kabataan Federation

- NGO Representative

- Representative from the Recycling Industries

- Representative from the Manufacturing Industries

- Representatives from the following concerned government agencies:
  DENR
  DOST
  DILG

The City Solid Waste Management Board may, from time to time, call on any concerned agencies or sectors as it may deem necessary.

*Provided*, That representatives from the NGOs, recycling and manufacturing or packaging industries shall be selected through a process designed by themselves and shall be endorsed by the government agency representatives of the Board.

**Section II** - That the City Solid Waste Boards shall have the following duties and responsibilities:

1. Develop the City Solid Waste Management Plan that shall ensure the long-term management of solid waste, as well as integrate the various solid waste management plans and strategies of the barangays in its area of jurisdiction. In the development of the Solid Waste Management Plan, it shall conduct consultations with the various sectors of the community;

2. Adopt measures to promote and ensure the viability and effective implementation of solid waste management programs in its component barangays;

3. Monitor the implementation of the City Solid Waste Management Plan through its various political subdivisions and in cooperation with the private sector and the NGOs;

4. Adopt specific revenue-generating measures to promote the viability of its Solid Waste Management Plan;

5. Convene regular meetings for purposes of planning and coordinating the implementation of the solid waste management plans of the respective component barangays;

6. Oversee the implementation of the City Solid Waste Management Plan;

7. Review every two (2) years or as the need arises the City Solid Waste Management Plan for purposes of ensuring its sustainability, viability, effectiveness and relevance in relation to local and international developments in the field of solid waste management;

*As of October 2, 2003*
8. Develop the specific mechanics and guidelines for the implementation of the City Solid Waste Management Plan;
9. Recommend to appropriate local government authorities specific measures of proposals for franchise or build-operate-transfer agreements with duly recognized institutions, pursuant to R.A. 6957, to provide either exclusive or non-exclusive authority for the collection, transfer, storage, processing, recycling or disposal of city solid waste. The proposals shall take into consideration appropriate government rules and regulations on contracts, franchises and build-operate-transfer agreements;
10. Provide the necessary logistical and operational support to its component cities and municipalities in consonance with subsection (f) of Section 17 of the Local Government Code;
11. Recommend measures and safeguards against pollution and for the preservation of the natural ecosystem; and
12. Coordinate the efforts of its component barangays in the implementation of the City Solid waste Management Plan.

Section III - The Solid Waste Management Division shall provide secretariat support to the City Solid Waste Management Board.

Section IV – This resolution shall take effect upon its approval.

Approved this _____ day of ____________ 2003.

Based on section 12 of Republic Act 9003, the City or Municipal Solid Waste Management Board shall be composed of the city or municipal mayor as head with the following as members:

a. One (1) representative of the Sangguniang Panlungsod or the Sangguniang Bayan, preferably chairpersons of either the Committees on Environment or Health, who will be designated by the presiding officer;

b. President of the Association of Barangay Councils in the municipality or city;

c. Chairperson of the Sangguniang Kabataan Federation;

d. A representative from NGOs whose principal purpose is to promote recycling and the protection of air and water quality;

e. A representative from the recycling industry;

f. A representative from the manufacturing or packaging industry; and
g. A representative of each concerned government agency possessing relevant technical and marketing expertise as may be determined by the Board.

The City or Municipal Solid Waste Management Board may, from time to time, call on any concerned agencies or sectors as it may deem necessary. Provided, that representatives from the NGOs, recycling and manufacturing or packaging industries shall be selected through a process designed by themselves and shall be endorsed by the government agency representatives of the Board.

5.4 Barangay Solid Waste Management Board

For the creation of the Barangay Solid Waste Management Committee, a draft resolution was made for all barangay to use for the creation of their respective Barangay Solid Waste Management Committees.

DRAFT BARANGAY RESOLUTION


Whereas, Memorandum Circular no. 2001-19 and the Implementing Rules and Regulation (IRR) of RA 9003 requires for the creation of barangay solid waste management committee;

Whereas, Rule VI Section 6 of the said IRR enumerates their function and responsibilities, to wit;

a) Formulate solid waste management program consistent with the city plan.
b) Segregation and collection of biodegradable, compostable, reusable waste.
c) Allocate barangay funds; look for source of funds.
d) Organize core coordinator.
e) Submit monthly report to city.

Whereas, in compliance thereof, a resolution to that effect should be made.

Now therefore, be it resolved, as it is hereby resolved by the Sangguniang Barangays of Barangay ___________ in session assembled that the BARANGAY ECOLOGICAL SOLID WASTE MANAGEMENT COMMITTEE (BESWMC) is hereby created to
undertake the function and responsibilities required to it by law, and shall be composed of the following members:

**Chairman** - _______________
**Members** - _______________

_________________
_________________
_________________
_________________
_________________

Done this pay of ____________ 2003

The Barangay Solid Waste Management Board shall have the following functions and responsibilities:

- Formulate solid waste management program consistent with city/municipality plan
- Segregation and collection of biodegradable, compostable, reusable wastes
- Establish materials recovery facility
- Allocate barangay funds; look for sources of funds
- Organize core coordinators
- Submit monthly report to city or municipality

The Barangay Solid Waste Management Board shall be composed of the barangay captain as chair with the following members:

- One (1) Kagawad
- SK Chair
- President of Home Owners Association
- Public/Private school principals or representative
- One (1) Parents and Teachers Association president or representative
- One (1) Religious organization representative
- One (1) Business community representative
- One (1) Environmental NGO representative
- President of Market Vendors Association
- One (1) representative from junkshop owner’s association

### 5.5 Barangay Solid Waste Management Board

As of July 3, 2003 the barangays who have organized their Barangay Solid Waste Management Committees are the following:

For District I:

Barangay Valenzuela
Barangay Poblacion
Barangay Singkamas
Barangay Kasilawen
Barangay Carmona
Barangay Sta. Cruz
Barangay Bangkal
Barangay Palanan
Barangay San Isidro
Barangay San Antonio
Barangay La Paz
Barangay Tejeros

For District II:

Barangay South Cembo
Barangay Cembo
Barangay West Rembo
Barangay Comembo
Barangay Pembo
Barangay Guadalupe Nuevo

5.5.1 Barangay Solid Waste Management Plan 2004-2006

Rapid Community Appraisal Results

The preparation of the Barangay Solid Waste Management Plan for 2004-2006 was made possible through the collaborative efforts of the Liga ng mga Barangay and the Solid Waste Management Division. Prior to the conduct of the planning workshop, the Solid Waste Management Division conducted a rapid community appraisal of the 27 barangays to identify the problems faced by the barangay on four issues related to RA 9003: 1) compliance of the barangay to the provisions of RA 9003; 2) segregation and resource recovery; 3) garbage collection; and 4) enforcement.

The top five among the identified problems were chosen for each issue. For the issue on compliance to RA 9003, the top five problems identified were:

1. Lack of funds
2. Area for MRF
3. Enforcement
4. Information dissemination
5. Lack of available manpower

The identified problems sprung from the barangays' lack of a definite and comprehensive long-term solid waste management program with identified priority projects whose budget for implementation are submitted for budget allocation of the City Government. This is because the barangay council or even the barangay solid waste management committees need to develop the capacity to do comprehensive development planning that will help them among others:

- Identify problems
- Identify possible solutions and strategies
- Develop programs and projects
- Prepare budget requirements for identified priority programs and projects
• Identify administrative and legislative requirements for the implementation of the identified programs and projects

Moreover, they also need to develop the capacity to implement the identified programs and projects. Our local barangay executives comes from different discipline and must be able to prepare plans and implement them as required by law but the law do not teach or detail the planning process and the best methods of implementation. These are skills that national government agencies have been neglecting to take time to concentrate and put their attention.

The top five problems identified for segregation and resource recovery were:

1. Lack of cooperation from residents
2. Lack of information on RA 9003
3. Lack of materials for segregation
4. No receptacles
5. Lack of strict enforcement on segregation

Most of the barangay do not have an organizational structure that will support and implement segregation and resource recovery in their area. Those most attested that previous administrations have implemented projects on segregation and recycling, these projects were not sustained through the years. The barangay must be able to develop and sustain an organization that will support the implementation of their solid waste management plans. This organization must be able to:

• Disseminate information
• Implement the programs and projects
• Enforce the provisions of RA 9003 and other city and barangay ordinances
• Monitor the status of the program/project implementation and compliance of constituents

The RCA also asked the participants on their problems with the garbage collection services given by the City Government. The top five problems identified were:

1. No definite collection schedule
2. Scavenging
3. Double parking
4. Collection crew leaves collection area not very clean and do not use brass bell to signal residents
5. Early dumping

For the identified problems, the barangay must establish a collaborative coordination with the collection crew and the SWMD especially for the monitoring of the quality of services given by contractors. They also need to organize their counterpart local enforcers or community officers that will monitor compliance of contractors and residents on segregation. The SWMD through the Action Line Section are accommodating all requests or complaints related to solid waste management.

As of October 2, 2003
The last issue was on **Enforcement**. The results of the RCA showed the following top five problems:

1. Wastes generated by roaming animals
2. Illegal dumping
3. Lack of enforcers
4. Compliance of junked vehicle, double parking and illegal parking
5. Compliance to city ordinances

To address the problems the barangay need to organize local barangay enforcers or community officers who have passed the selection process and duly recognized by the city government to assist in the enforcement of laws in their area. They must be able to allocate sufficient budget for the creation and operation of the Enforcers. The Barangay enforcement group will follow a definite system of hiring and reporting with SWMD.

**Outputs of the Barangay Solid Waste Management Planning Workshop 2004-2006**

The planning workshop divided the 33 barangays into 7 clusters. The barangays were clustered to encourage them to maximize the available resources and collaborate with their neighboring barangays especially for the construction and operation of a materials recovery facility.

The 33 barangays who attended the planning workshops were able to come up with projects that they will implement for 2004-2006. The projects identified by the barangays are projects that can be implemented in cluster level or individual barangay. Each member of the cluster has the chose to either collaborate with the other member of the cluster or implement in own their own. Each cluster identified their priority projects for the next three years according to the target sectors they believe must be prioritized to comply with the provisions of RA 9003.

**Cluster 1** barangays are the plush subdivisions: Barangays Bel-Air, Dasmariñas, Urdaneta, Forbes Park, Magallanes, and San Lorenzo. These villages have their own separate contractors who do the collection trips for their wastes. They are also considered as the richest barangays in the city. The projects identified by the clusters are as follows:

1. Common Composting Area for Six (6) Villages
2. Brgy. Bel –Air Home Composting
3. Dasma-Linis Ganda Daluyang Tubig
4. Segregation @ Source Magallanes
5. Brgy. Urdaneta Kabalikat sa Tahanan ng Daang Tubig

**Cluster 2** composed of Barangays Pio del Pilar, Palanan, Bangkal and San Isidro. The projects integrated the health aspect as integral component of each project for the taget sectors. The barangays identified that following projects:
a. Kalinisan Kaakibat ng Kaunlaran
b. Kalinisan para sa Kalusugan ng Pamilyahan ng Mamamayan
c. Tulong Sulong sa Kaunlaran
d. Damayan at Kalusugan ng Mamamayan

**Cluster 3** composed of Barangays San Antonio, Tejeros, La Paz, Singkamas, and Sta. Cruz. The cluster focused on the income generation of resource recovery to make the project sustainable. The projects identified are:

1. Basura Ko, Sagot Ko
2. Pera sa Papel
3. Tapon Gamit, May Kapalit
4. Hoy! Ligtas Ka Bata!
5. Oplan: MRF

**Cluster 4** composed of Barangays Carmona, Kasilawan, Olympia, Valenzuela and Poblacion. The projects are:

1. Kabataan sa Kalikasan
2. Kalinisan sa Kapaligiran ng Tahanan
3. Basura Mo, Tulong Mo!
4. Segregation and Resource Recovery among Health Care Providers

**Cluster 5** composed of Barangays Pinagkaisahan, Pitogo, Guadalupe Nuevo, Guadalupe Viejo, and South Cembo. The projects are:

1. May Pera sa Basura
2. Oplan: Kalusugan para sa Kaunlaran
3. School Ko, Linis Ko
4. Linis Ganda Award
5. Hayop na Pinakawalan Mo! Sakit ang Ibabalik Sa’yo

**Cluster 6** composed of Barangays Cembo, Comembo, West Rembo and East Rembo. The projects are:

1. MRF Establishment (Cembo)
   a. Maintenance of existing structure
2. Waste Segregation and Recycling
3. Nutrition and Health Early Education Program (NHEEP)
4. Establishment of MRF (Comembo)

**Cluster 7** composed of Barangays Pembo, Rizal, South Side, and North Side. South Side and North Side are two barangays who has a standing boundary dispute with Makati City’s neighboring Tagig City. The case is still awaiting court decision. But they decided to participate in the workshop and in their cluster in the identification of projects in order to come up with priority projects that they can easily submit to the City Government they belong according to court rulings. The projects identified are:

As of October 2, 2003
1. Waste Segregation
2. WACS (Waste Analysis Characterization Study)
3. MRF (Materials Recovery Facility)

5.6 Stakeholders Participation

The SWMD have for a time, started to establish strong coordination and linkages with the barangays of the twenty-seven (27) service areas. The IEC sections of the division have been coordinating with the public schools, clinics, market vendors, and commercial establishments by inviting them to attend orientation seminars. These seminars have been used as venues to establish dialogues with the owners and administrators.

These seminars were intensified through the Oplan SIMPLE or Strict Implementation of Laws on Environment, which took off last June 2002. Commitment papers were signed by the PNP, the City Government and the different target sectors. A product of the Oplan is the extension of enforcement at the barangays.

The close coordination made it possible for the SWMD to obtain data pertinent to the preparation of the plan. The most of the different target sectors are organized and are willing to participate in the programs and projects of the city and even the barangays.

For 2003, the SWMD intensified its coordination efforts to enforce compliance of the different target sectors besides the barangay for segregation and resource recovery. The SWMD have established a strong coordinative link with the public schools through the Department of Education, the barangay health centers through the City Health Department, the junkshops through the Kapisanan ng mga Junkshop Operators ng Makati.

To encourage the public schools to mobilize and segregate their wastes, the SWMD through their IEC programs conducted an “On-the-Spot” Painting of trashcans in July and linked with the San Miguel Corporation-Coca Cola Philippines PET project.

5.7 Key Issues

The current solid waste management system of Makati City gives us the following issues that must be tackled and solved through the programs and projects prepared for the next 10 years.

5.7.1 Gaps in the Current Institutional Structure and Implications of RA 9003

The institutional structure is divided into two levels: 1) administration and finance and 2) monitoring and enforcement. The two levels will require both personnel and staff development and increase in the capital outlay especially for equipments.

- Personnel and Staff Development

The current organization structure needs to assess the current organizational structure opposite the requirements and demands of the Act especially for the implementation of
the 10-year solid waste management plan. Increase in the number of manpower is a must particularly for planning and research, trainers for IEC, enforcement, monitoring and evaluation and project development.

Staff development is an option prior to the hiring of person with technical background. Critical trainings for staff development are skills in technical writing, proposal writing, project development and implementation, research practice and methodology, community organizing, public speaking and report writing. The current staff came from different fields of courses and must be trained for the requirements of the 10-year SWM plan particularly for documentation, write-up of status and monitoring reports, proposal writing, and conduct of research.

A thorough study must be done to look into the creation of an Environmental Police that will enforce all environment laws in the city.

- **Capital Outlay**

Staff development must be supported by capital outlay especially the computerization of the services provided by the Division. Research and publication will be a function of the division to sustain the implementation of the IEC plan.

5.7.2 **Sustainability of Segregation and Resource Recovery at the Barangay**

- **Lack of Space for the MRF**

Foremost problem facing most of the barangays is the lack of space for the construction of the Materials Recovery Facility or MRF. Makati City has an area of 2,735.56 hectares and only 1.25 percent is open space or 34 hectares distributed mostly in the 6 plush subdivisions of the city. Only a number of barangays can allot space for their MRF, among these are Cembo, Comembo and San Antonio.

- **Implementation of segregation and waste reduction**

The 33 Barangays of Makati City has mixed land use. Commercial, industrial and commercial uses are located within a barangay not to mention the location of health providers and institutional offices and agencies like schools and barangay halls. Currently segregation is actively done and enforced at the household level in two pilot barangays: Barangays Comembo and Bangkal. The implementation of segregation and installation of resource recovery across sectors will involve intensive orientation, mobilization and extension of technical assistance to the Barangay Solid Waste Management Committee.

The Barangay Solid Waste Management Committees (BSWMC) must be equipped with the basic technical skills of community organizing and mobilization, project development and implementation as well as documentation and monitoring. The Solid Waste Management Division can extend assistance and establish a close monitoring system to
guide the barangays. Such a capacity building approach demands a lot of room for errors and improvements.

The 27 barangays have since 1999 have started initiatives on segregation and resource recovery but most of the projects were not sustained through the years. The BSWMC needs to be reoriented to the requirements of RA 9003 and closely monitored for status reporting to motivate them to accept the tasks and take responsibility.

- **Cost recovery of resource recovery programs**

The city has yet to come up with a thorough study on the cost recovery of resource recovery programs for the 27 barangays. The barangays lack the capacity to do cost recovery calculations and are not aware that such calculations are needed to measure the amount of impact and success of the program. The SWMD needs to take this task for planning and evaluation purposes.

5.7.3 **Acceptability and Installation of User Fees**

The imposition of user fees to the different sectors for solid waste management is one problem that must be research properly and thoroughly to determine the acceptable amount and strategy of collection. Public participation through surveys and public consultations can be used as venues to elicit the public’s sentiments and come-up with a consensus.

5.7.4 **Issues Related to Junkshop Operations**

The operation of junkshops assists in the facilitation of waste diversion from source but they also pose problems to the barangay and city government. Junkshop operation involves the collection of recyclable wastes that they intend to dispose by selling them. Facilities of junkshops are basically temporary storage areas of recyclable materials.

Critical issues are the legality and the health concerns they pose both to the junkshop workers and the community where they are located. These facilities are usually not properly maintained and junkshop owners do not employ sanitation processes like cleaning and sanitizing of recyclable materials. Most of these junkshops as presented above, do not have permits to operate. And those who have permits do not practice ecological waste management even in their own facilities.

The junkshops’ basic role in the ecological solid waste management system can be described as transfer station for recyclable materials. The City Government needs to regulate the operation of the junkshops and developing a set of criteria that will ensure the practice of proper solid waste management can do this.
6. Plan Strategy

6.1 Vision

VISION

The Makati City Solid Waste Management Division shall be a service-oriented division, pro-active in its pursuit to support an environment that is ecologically balanced. It shall be technically capable and well equipped to render fast and efficient service that is flexible and responsive to urban development. It shall operate in a manner that enhances community awareness and encourages participation, working with the people in making Makati the cleanest and healthiest city in the country.

MISSION

To achieve our vision for the Solid Waste Management Division, we commit the best of our resources and ourselves in an untiring effort to serve the public. We shall exercise our duties with utmost professionalism and responsibility towards maintaining a progressive, reliable and relevant division dedicated to the pursuit of a comprehensive environmental plan and in partnership with the environmental conscious constituency of Makati.

Emboldened on its vision to make the city environmentally balanced, the city government believes that an ecological balance is needed to attain optimum benefits and to sustain the growth and development the city is experiencing. The direction and course of the city’s environment related activities are based from the said goal.

6.2 Targets

RA 9003 mandated all LGUs to divert 25% of their waste generation within five years of the enactment of the law. The City Government of Makati has set from 2004 to 2007 a cumulative diversion percentage targets in the 10 year SWM Plan. The City has started for 2003, initiatives to comply to the diversion requirements by setting a five (5) percent reduction in the daily volume of wastes that contractors will be collecting from the 27 barangays. The minimum daily volume of wastes collected based on historical data for 2002 was 3,035 cu.m. The target minimum daily volume of wastes was reduced by 5%, the cost per cubic was also reduced.

The conservative target diversion percentage for 2003 was set as basis for the implementation of programs and projects as well as a start-up point for compliance to the law. The compulsory 25% diversion will be distributed among the following years:

- 2004: 5%
- 2005: 10%
- 2006: 15%
- 2007: 25%

It is envision that by 2007 or within four years, the City of Makati has developed the capacity to maintain a minimum diversion percentage of twenty five (25) percent. The plan sets a minimum diversion percentage of 25% for the years 2008 to 2013.
6.3 Strategies

The implementation of the 10-year solid waste management plan involves the following strategies:

6.3.1 Source Reduction

RA 9003 defines source reduction as the reduction of solid waste before it enters the solid waste stream by methods such as product design, materials substitution, materials re-use and packaging restrictions.

Source reduction reduces the amount of materials produced and the harmful environmental effects associated with the production and disposal of wastes.

The source reduction component of the plan involves changes in lifestyle and the attitude of the consumers, residents and businesses. Basically, waste reduction strategies are practices that must be developed into habits. These will be done through the following strategies:

1. conduct of education, orientation seminars and technical assistance aimed at increasing participation in source reduction activities on a regular basis for all waste generators:
   
   (a) 3 Rs or Recycle, Reuse, Reduce
   (b) waste avoidance like “Eco-Shopping” and Selective Purchasing

2. conduct of contests promoting source reduction

3. Initiation of ‘in-house’ source reduction programs at company facilities

6.3.2 Segregation at source

Another strategy to reach the diversion targets and installation of ecological solid waste management system is segregation at source. RA 9003 provides for the mandatory segregation of wastes of all target sectors.

Segregation of wastes at source involves the classification of wastes generated by target sectors to biodegradable wastes and non-biodegradable wastes. The City Government in collaboration with the different barangays and national agencies like DepEd and DOH will provide orientation and technical assistance to prepare and guide the installation of segregation as well as enforce it across all target sectors.

Installation of segregation at source will be through the following strategies:

1. conduct of orientation seminars on a regular basis for all waste generators on:
   
   (a) 3 Rs or Recycle, Reuse, Reduce
   (b) Segregation of kitchen and yard wastes for composting
2. conduct of contests promoting source reduction through proper segregation
3. strict monitoring of both barangay and SWMD on compliance of waste generators
4. conduct of regular consultative meetings with the barangays to discuss problems and progress
5. set schedule of collection for each type of segregated waste. There shall be certain day(s) of the week assigned for the collection of biodegradable and non-biodegradable wastes
6. develop incentive system and penalties

6.3.3 Resource recovery

Another strategy is through the development and implementation of a resource recovery program. Barangays will be assisted in the development and installation of their resource recovery programs which among others, involves the set-up of MRFs, either mobile or stationary wherever feasible.

Resource recovery is the system of collecting recyclable and compostable materials that can be recycled, composted or sold to users as raw materials for production. Components of resource recovery are the 1) construction of MRFs, 2) the operational requirements like labor and maintenance, and 3) collection equipment.

One component resource recovery is the use of mobile MRFs like the MRF van and tri-bike especially for barangays with no available space for the construction of an MRF. Another is set-up of Materials Recovery Boys or Mr. B. The MR.Bs are the workers that will collect recyclables, weighed and document the amount of wastes collected for resource recovery.

The installation of a composting area for the processing of biodegradable wastes like food and kitchen wastes and garden wastes will be encouraged for those barangays with available space. Alternatives will be studied by the Planning and Research Section of the SWMD for composting to be viable in barangays with limited space availability. Beside the use of mobile MRFs to support resource recovery the program will also use the following strategies:

1. conduct of WACS to determine the amount and types of wastes generated at the barangay level
2. conduct of orientation seminars on a regular basis for all waste generators on:
   a. 3 Rs or Recycle, Reuse, Reduce
   b. Composting of kitchen and yard wastes
3. conduct of contests promoting 3Rs
4. strict monitoring of both barangay and SWMD on compliance of waste generators
5. conduct of regular consultative meetings with the barangays to discuss problems and progress on the linkages with waste generators
6. strict documentation of wastes diverted from dump truck or collection made by the Barangay for recyclable materials
7. conduct of trainings to increase capacity of barangays to plan and implement projects
8. develop livelihood projects
9. Improve linkages among barangays, local government and metrowide activities regarding segregation of wastes.
10. Mobilization of NGO's/Pos who have experience and expertise on organization of communities and networks.
11. Encourage the participation of sectors that are themselves waste generators, in policing their own activities and solid waste management practices.
12. Intensify IEC campaigns through the:
   i. Distribution of leaflets, brochures and flyers containing significant information
   ii. Advertisement in T.V., radios, newspapers and the official paper of Makati (e.g. Makati Mirror, Makati Ngayon, etc.)
   iii. Posting in billboards of posters
13. Provision of receptacle bins for biodegradable and non-biodegradable wastes in public places like schools, government offices, malls and parks among others.
14. Strict implementation and enforcement of Ordinance No. 93-299 or mandatory segregation of wastes to biodegradable and non-biodegradable

6.3.4 Collection and transfer

Two separate collection will be done for two types of wastes. Wastes for resource recovery will be collected by the MR.Bs or junkshops while private contractors will collect residual wastes. Collection for resource recovery will be barangay based. While collection of residual wastes will be managed by the City Government.

6.3.5 Disposal

The City Government through lack of space to develop its own sanitary disposal site is dependent on the disposal site provided by the Metro Manila Development Authority. Though it is not closing its options for other forms of final disposal of residual wastes that can be used through state-of-the-art technologies available in the market. But the appropriateness of these technologies will be assessed through the conduct of in-depth study to determine its cost-effectiveness.
7. SOLID WASTE MANAGEMENT SYSTEM

The framework for the development and implementation of the 10-year solid waste management plan of the city is based on the ecological solid waste management system that RA 9003 in totality would like to be installed. The following are the proposed programs for each target sectors and its components. Below is the diagram showing the proposed ecological system that will be implemented through the 10 year plan across all target sectors.
7.1. Source Reduction

7.1.1 Source Reduction Programs to be Implemented and Target Sectors

*Household Source Reduction*

Residents will be encouraged to reduce their waste generation besides composting and reusing, through the following strategies:

- Consumer-based “Eco-Shopping”

The City Government of Makati can promote source reduction in the residential sector by developing a strong information, education and communication program.

An aggressive information and education campaign through multi-media sources will be adopted to influence decisions on purchases based not only on product attributes and costs but also on packaging and alternative disposal handling.

“Eco-shopping” refers to the decision-making process that consumers use to judge a purchase based on its waste implications. Criteria used in the process include whether product is:

- Reusable, durable and repairable
- Made from renewable or non-renewable materials
- Over-packed
- In a reusable container
- In a recyclable container (though not source reduction, this is part of eco-shopping education)

Source reduction education campaign should include the following approaches:

- Utilization of reusable shopping bags
- Purchasing in bulk
- Purchase reusable products
- Purchase durable and repairable products
- Buy secondhand items
- Borrow or rent items when possible
- Avoid over-packaged items
- Be ware of products containing hazardous ingredients

- Reuse of paper, plastic and bottle containers
- Composting of kitchen wastes using plant pots or containers.

*Government Source Reduction*

Government offices can adopt a number of source reduction strategies:

- Copy-double-sided
- Use electronic mail
- Reuse paper by making it into scratch pads
- Buy items in reusable containers
- Provide incentives to offices who reuses materials
- Employee Education
- Procurement of products designed to be reusable and more durable
- Facility Source Reduction Programs: Performing Waste Audits

Government offices must conduct waste audit. Waste audit is an assessment of material flow through an institution. It is a detailed accounting of the amount of materials purchased, used, recycled and disposed. Audits help identify the points at which changes in purchasing, consumption, and use can be done to reduce or eliminate waste.

The steps in audits are the following:

- Quantifying current disposal costs and discarded material
- Identifying and quantifying materials that are unnecessary, reusable and recyclable
- Estimating cost savings
- Implementing and monitoring the program

Another strategy is the installation of a paper recycling project within the Government Center. The paper recycling project will address the volume of paper wastes generated by the City Government in its day to day operations.

Commercial (Industrial and Commercial) Source Reduction

Businesses will be encouraged to adopt a number of source reduction strategies:

- Copy-double-sided
- Use electronic mail
- Reuse paper by making it into scratch pads
- Buy items in reusable containers
- Provide incentives to offices who reuses materials
- Employee Education
- Procurement of products designed to be reusable and more durable
- Facility Source Reduction Programs: Performing Waste Audits

Businesses especially the industrial establishments must conduct waste audit. Waste audit is an assessment of material flow through an institution. It is a detailed accounting of the amount of materials purchased, used, recycled and disposed. Audits help identify the points at which changes in purchasing, consumption, and use can be done to reduce or eliminate waste.

The steps in audits are the following:

- Quantifying current disposal costs and discarded material
- Identifying and quantifying materials that are unnecessary, reusable and recyclable
- Estimating cost savings
- Implementing and monitoring the program

Industrial establishments may also reduce generation through the recovery of plant materials such as solvents, scrap metal, plastic, paper and other scrap, cooling waters, and oil.

7.2 Segregation, Recycling and Composting

Another strategy that the City Government will use is segregation, recycling and composting.

7.2.1 Segregation at source

To enforce segregation of wastes at the barangay level, the SWMD will use the following strategies:

1. conduct orientation seminars on a regular basis for all waste generators on:
   a. 3 Rs or Recycle, Reuse, Reduce
   b. Segregation of kitchen/food and yard wastes for composting
2. conduct of contest on the following:
   a. cleanest house
   b. cleanest barangay
   c. cleanest work area
   d. cleanest market
   e. most complying sector
3. install monitoring system and provide penalties for non-compliance
4. creation of a barangay enforcement group
5. conduct quarterly meetings with barangays and business establishments
6. finalize schedule of collection for segregated wastes

7.2.2 Resource Recovery

Resource recovery will be implemented through the set-up of Material Recovery Facilities, either mobile or stationary wherever feasible. The system involves the collection of recyclable materials from the different target sectors by the Materials Recovery Boys or Mr. B. The collected recyclables will be weighed and documented by the BSWMC. A monitoring form will be used for the documentation of the wastes diverted for disposal.

Composting on the other hand will be encouraged for those barangays with available space. Alternatives will be studied by the Planning and Research Section of the SWMD for composting to be viable in barangays with limited space availability. Beside the use of mobile MRFs to support resource recovery, the program will also use the following strategies:

1. conduct of WACS to determine the amount and types of wastes generated at the barangay level
2. conduct of orientation seminars on a regular basis for all waste generators on:
   a. **3 Rs** or Recycle, Reuse, Reduce
   b. Composting of kitchen and yard wastes
3. conduct of contests promoting **3Rs**
4. strict monitoring of both barangay and SWMD on compliance of waste generators
5. conduct of regular consultative meetings with the barangays to discuss problems and progress on the linkages with waste generators
6. strict documentation of wastes diverted from dump truck or collection made by the Barangay for recyclable materials
7. conduct of trainings to increase capacity of barangays to plan and implement projects
8. develop livelihood projects
9. Improve linkages among barangays, local government and metro-wide activities regarding segregation of wastes.
10. Mobilization of NGO’s/Pos who have experience and expertise on organization of communities and networks.
11. Encourage the participation of sectors that are themselves waste generators, in policing their own activities and solid waste management practices.
12. Intensify IEC campaigns through the:
   i. Distribution of leaflets, brochures and flyers containing significant information
   ii. Advertisement in T.V., radios, newspapers and the official paper of Makati (e.g. Makati Mirror, Makati Ngayon, etc.)
   iii. Posting in billboards of posters
13. Provision or receptacle bins for biodegradable and non-biodegradable wastes in public places like schools, government offices, malls and parks among others.
14. Strict implementation and enforcement of Ordinance No. 93-299, which is:

   “An ordinance requiring owners, lessees, tenants and the like of residential houses, commercial establishments, buildings and other entities in this municipality to separate, sort out their solid waste, refuse, garbage materials into biodegradable (wet) and non-biodegradable (dry) and providing penalties for violation thereof.”

### 7.3 Programs for Segregation, Resource Recovery, Collection, Transfer and Disposal of Wastes from the Different Source Generators

The 10 year plan involves specific projects for each target sector or waste generator that the barangay will have to involve in the implementation of its barangay solid waste management programs. Since the law mandates the barangay as the sole proponent in the enforcement of segregation and resource recovery, the City Government through the 10 year plan has specifically identified the different target sectors and the corresponding

**A. Schools**

The City Government’s program for the implementation of the RA 9003 for schools will install the following system for segregation, resource recovery, collection and transfer and final disposal. The system will be installed in all schools levels including pre-schools or day care centers.
1. System:

**Segregation**

The students will be oriented on what is segregation and how to segregate wastes. Each school will segregate and provide appropriate receptacles for biodegradable and non-biodegradable wastes. The receptacles must be located in strategic areas where students will have easy access.

The project will also encourage the students to reduce their wastes through waste avoidance or recycling or reusing their papers, plastics, bottles.

**Resource Recovery**

The schools will install resource recovery programs through the segregation of recyclable materials like papers, plastics, tetra packs that they can sell or give to the junkshops or barangay MRF.

**Collection**

Collection of wastes will be done for the residuals and recyclable materials. All recyclable materials generated by the school will be linked to the junkshops or to
the Barangay materials recovery program. The school will coordinate with the barangay or junkshops for the schedule of collection. The residual wastes will be collected by the dump trucks of the city government for final disposal.

2. **Sustainability of the Program**

   **Funds**

   The implementation of the program and its identified projects will source their funds from both the city government and barangay regular funds. Specific priority projects identified for the implementation of the programs will be submitted to the City Government for funding and approval. Additional funds will be requested from the barangay since the identified priority projects will be implemented in identified priority areas where the target sectors are located.

   Target sectors are encouraged to provide receptacles which they can procure through their own funds can be sourced for funding to local civic organizations, government agencies, private sector or international funding agencies. Assistance for sourcing of fund through the preparation of proposals and coordination can be provided by the Solid Waste Management Division.

   The SWMD’s capability to implement the programs will depend on the coordinated efforts of the planning section, the IEC sections, enforcement section and collection section. These sections will undergo further training on community organization, proposal writing, documentation, report writing and monitoring to help them perform efficiently and be effective.

   **Legal Support**

   Mandatory segregation will be enforced through the combined efforts of the SWMD Environmental Enforcers and the barangays. An ordinance requiring schools to segregate and install resource recovery programs will be prepared and submitted to the City Council or will be passed by the Barangay Council to take effect at their respective areas.

   **Monitoring and Evaluation**

   Sustainability of the program especially the identified projects for the schools will be monitored and evaluated. Close monitoring will be done through the installation of a monitoring system involving the school administration and the SWMD. The SWMD will assist the schools document the status and accomplishment of their segregation and resource recovery programs through close supervision and the provision of monitoring forms. The schools will be required to submit status report based on the monitoring forms accomplished through a weekly or monthly period. The SWMD will evaluate the performance of the program as well as the impact of the program using the target reduction rates set for the year as one of its indicators.
B. Health Providers

The 10-year SWM plan for health providers focus strictly on the management and disposal of solid wastes generated by the different hospitals, clinics, laboratories and funeral parlors. It does not include the management of pathologic, toxic and hazardous wastes or medical wastes.

The plan aims to integrate these health providers as active participants in achieving a clean and healthy environment. As well as to clearly define and identify the types of waste and the manner of handling and disposal process that will be utilized for solid wastes coming from the different health providers.

1. System:

Segregation

The conduct of a Waste Analysis and Characterization Study is recommended to all health providers to have a clear and scientific data on the types and generation rates. All health providers will be required to segregate their wastes according to the provisions of RA 9003 (Ecological Solid Waste Management Act) and RA 6969 (Toxic and Hazardous Waste Act). Segregation of solid wastes from toxic and hazardous wastes will be mandatory.

Solid wastes classified as non-toxic and non-hazardous will be segregated to biodegradable and non-biodegradable materials. Separate receptacles must be provided by the health administration to promote proper segregation. The receptacles will be located in strategic areas for easy access.

Resource Recovery

Resource recovery for health providers will be for non-toxic and non-hazardous solid wastes. All recyclable materials like papers, PET plastics, tetra packs, aluminum cans and bottles collected will be sold to junkshops or collected by the Barangay Materials Recovery Boys.

Collection

Collection of wastes will be done for the residuals and recyclable solid waste materials. All recyclable materials generated by health providers will be linked to the junkshops or to the Barangay materials recovery program. Health administration will coordinate with the barangay or junkshops for the schedule of collection both for recyclable materials and residuals. The residual wastes will be collected by the dump trucks of the city government for final disposal according to the prescribed collection schedule.
2. **Sustainability of the Program**

   **Funds**

   The implementation of the program and its identified projects will source their funds from both the city government and Department of Health. Specific priority projects identified for the implementation of the programs will be submitted to the City Government or the Department of Health for funding and approval. Equity funds will be requested from the target health providers through its administration or owners since the identified priority projects will be implemented in their respective establishments.

   Funding for the procurement of receptacles will come from the target sectors or can be submitted for funding to local civic organizations, government agencies, private sector or international funding agencies. Assistance for sourcing of fund through the preparation of proposals and coordination can be provided by the Solid Waste Management Division.
The SWMD will coordinate all activities of the program and projects with the Department of Health and the City Health Office particularly for the conduct of the Waste Composition and Amount Study.

**Legal Support**

Mandatory segregation will be enforced through the combined efforts of the SWMD Environmental Enforcers, the City Health Office, Department of Health and the barangays. An ordinance requiring all health providers to segregate and install resource recovery programs will be prepared and submitted to the City Council or will be passed by the Barangay Council to take effect at their respective areas. The Department of Health will be requested to prepare a resolution or memorandum requiring identified hospitals, clinics and funeral parlors to install segregation and resource recovery systems in their respective establishments.

**Monitoring and Evaluation**

Sustainability of the program especially the identified projects for hospitals, clinics and funeral parlors will be monitored and evaluated. Close monitoring will be done for the segregation of solid wastes from toxic and hazardous wastes. The DOH will be requested to formulate a monitoring system that will be installed and used by the health administration as well as the system of status reporting to document and measure the volume of generated and diverted wastes.

The SWMD will assist the DOH and the City Health Office, monitor the implementation status and compliance of hospitals, clinics, and funeral parlors. The target sectors will be required to submit a report on the status and accomplishment of their segregation and resource recovery programs to the SWMD. The report will be based on the monitoring forms that will be developed by the DOH, CHO and the SWMD in consultation with target waste generators.

A schedule of report submission by the health providers will be on a monthly period or quarterly depending on the size of the facility. The SWMD with the CHO will evaluate the performance of the programs implemented as well as the impact of the program using the target reduction rates set for the year.

**C. Barangay Hall and Government Offices**

RA 9003 requires all barangays to enforce mandatory segregation and must ensure the 100 percent collection of segregated wastes. The barangay must also implement resource recovery programs at the barangay level. In order to assist the barangay implement and enforce the law the plan has the following suggested system:
1. System:

Segregation will be mandatory not only in the barangay hall but in all sectors that are located in the jurisdiction of the barangay which includes among others, government offices. The barangay will not only practice segregation at their respective barangay halls but implement and enforce it on its constituents.

The barangay will spearhead projects for mandatory segregation of wastes at the household levels. The barangay may provide receptacles as a strategy to promote and assist segregation at the household level. Orientation will be given to all residents to inform them of the components of the program and the penalties for non-compliance.

Segregation of biodegradable and non-biodegradable will be enforced. Collection schedules will be set and followed by all residents and locators of the barangay. Collection of specific type of wastes scheduled for any given day will be strictly done. Any residents failing to comply will have to dispose their wastes themselves or store it inside their residence. Any wastes put out for collection but is not according to the scheduled collection will not be collected.
The barangay will oversee the segregation programs of the target sectors located within their jurisdiction. The SWMD will assist the barangay establish strong linkages with the target sectors.

**Resource Recovery**

Resource recovery will be promoted by the barangay through the provision of either mobile or on-site MRF. Segregated recyclable materials coming from the different target sectors complying to the mandatory segregation will be collected either by the barangay MR.B (Materials Recovery Boys) or the junkshops.

Due to limited space, the mobile tri-bike will be used by the Mr. Bs for the collection of recyclable materials from the residents and different locators. Biodegradable materials from the residential, market and food establishments located in the barangay jurisdiction will be collected for composting. All collected biodegradable materials will go directly to the assigned composting site.

**Collection**

Collection of wastes will be done for the residuals and recyclable solid waste materials. All recyclable materials both biodegradable and non-biodegradable generated by residents and locators of the barangay will be collected by the Barangay Mr. B for documentation and weighing purposes. The barangay will then in turn transport or have the recyclable materials picked up by the junkshops for non-biodegradable materials. All biodegradable materials will be transported to the compost site for immediate processing.

The residual wastes will be collected by the dump trucks of the city government for final disposal according to the prescribed collection schedule.

### 2. Sustainability of the Program

**Funds**

The barangay will allot in their yearly budget specific funds for the implementation of the program and its identified projects. Specific priority projects identified by the barangay will be included in the yearly budget proposal submitted to the City Government for funding and approval. The same will be done by the SWMD who will source funds or “seed money” from the city government for the mobilization of the programs and provision of assistance to the barangay. The budget will help the SWMD provide technical assistance as needed by the barangay.

Funding for the procurement of receptacles may come from the local Barangay development budget or can be submitted for funding to local civic organizations, government agencies, private sector or international funding agencies. Assistance for sourcing of fund through the preparation of proposals and coordination may be provided by the Solid Waste Management Division.

The barangay’s capability to implement the programs will be supported by the coordinated efforts of the SWMD planning section, the IEC sections, enforcement section and collection section. The barangay can request for training on community
organization, proposal writing, documentation, report writing and monitoring to help them perform efficiently and be effective.

**Legal Support**

Mandatory segregation will be enforced through the combined efforts of the SWMD Environmental Enforcers and the barangays. Amendments on the ordinance requiring all residents and locators to segregate and install resource recovery programs will be prepared and submitted to the City Council for approval.

**Monitoring and Evaluation**

Sustainability of the program especially the identified projects for the residents and locators will be monitored and evaluated. Close monitoring will be done through the installation of a monitoring system involving the barangay, the SWMD and the target sectors. The SWMD will assist in the documentation of the status and accomplishment of the barangay segregation and resource recovery programs through close supervision and the provision of monitoring forms. The barangay will be required to submit status report based on the monitoring forms accomplished through a weekly or monthly period. The SWMD will evaluate the performance of the barangay in the implementation of the programs as well as the impact of the program using the target reduction rates set for the year.

**D. Household**

RA 9003 requires mandatory segregation and one waste generator is the household. The waste-generation rates of the household differ according to the buying power each economic class possesses. The system involves the following components:

1. **System:**

   ![Diagram of household segregation system]

   **Segregation**

   Segregation will be mandatory for all household in all economic levels. The barangay will monitor the compliance status of all residents in their area of jurisdiction. The households are to use separate receptacles for their segregated wastes to facilitate the collection of segregated wastes by the private contractors for residuals and the barangay mobile MRFs. Source reduction will involve composting of kitchen and yard wastes at the household area.
IEC programs on resource recovery will be spearheaded by the barangay in collaboration with the SWMD. Waste reduction through IEC campaigns will be conducted on a regular basis to encourage households to practice and develop into a habit.

**Resource Recovery**

The barangay will promote resource recovery at the household level through the provision of either mobile or on-site MRF. Segregated recyclable materials coming from the households will be collected either by the barangay MR.B (Materials Recovery Boys) or the junkshops.

Due to limited space, the mobile tri-bike will be used by the Mr. Bs for the collection of recyclable materials from the residents. Management of biodegradable materials like kitchen and food wastes or yard wastes will be encouraged through home composting. Households composites their biodegradable wastes through the use of flower pots, compost pit or use of any containers for composting.

**Collection**

Collection of wastes will be for the residuals and recyclable solid waste materials. All non-biodegradable recyclable materials generated by residents will be collected by the Barangay Mr. B. The volume of all collected recyclable materials will be documented and weighed. The barangay will then in turn transport or have the recyclable materials picked up by the junkshops.

The residual wastes will be collected by the dump trucks of the city government for final disposal according to the prescribed collection schedule.

**E. Industrial Sector**

The plan for the industry sector is to implement segregation in their workplace and be able to link them to the resource recovery program of the barangay where they are located. It also encourages the industrial establishments to conduct their own waste audit on regular basis depending on the size of the facility. Basically, the plan would like to install the system which has the following components as shown below:

1. System:
Segregation

Segregation will be mandatory for all industries located in the city. All industries must provide separate receptacles for the segregated wastes. The barangay together with the Enforcement section of the SWMD will monitor the compliance status of all industries. The industries will provide an area for the temporary storage of recyclable materials within their workplace. The administration of each industry is required to sponsor information and educational seminars for their employees.

Resource Recovery

The barangay will collect all recyclable materials that the industries will generate. The barangay mobile MRFs will collect non-biodegradable recyclable materials. The recyclable materials will proceed to the barangay for weighing and documentation. Industries will be encouraged to provide an area for composting especially for those capable and have the capacity to do composting.

Collection

Collection of wastes will be for the residuals and recyclable solid waste materials. All non-biodegradable recyclable materials generated by residents will be collected by the Barangay Mr. B. The volume of all collected recyclable materials will be documented and weighed. The barangay will then transport or have the recyclable materials picked up by the junkshops.

The residual wastes will be collected by the dump trucks of the city government for final disposal according to the prescribed collection schedule.

2. Sustainability of the Program

Funds

Funding for the procurement of receptacles will come from the target sectors or can be submitted for funding to local civic organizations, government agencies, private sector or international funding agencies. Assistance for sourcing of fund through the preparation of proposals and coordination will be provided by the Solid Waste Management Division to the schools.

The barangay’s capability to implement the programs will be supported by the coordinated efforts of the SWMD planning section, the IEC sections, enforcement section and collection section. The barangay can request for training on community organization, proposal writing, documentation, report writing and monitoring to help them perform efficiently and be effective.

Legal Support

Mandatory segregation will be enforced through the combined efforts of the SWMD Environmental Enforcers and the barangays. An ordinance requiring all industries to segregate and install resource recovery programs will be prepared and submitted to the City Council or will be passed by the Barangay Council to take effect at their respective areas.
Monitoring and Evaluation

Sustainability of the program especially the identified projects for the industries will be monitored and evaluated. Close monitoring will be done through the installation of a monitoring system involving the barangay, the SWMD and the target locators. The SWMD will assist in the documentation of the status and accomplishment of the segregation and resource recovery programs through close supervision and the provision of monitoring forms. The industries can either link with the barangay MRF program for the collection of their recyclable materials or link with a local junkshop.

If ever they opt for the barangay MRF, the barangay will be required to submit status report based on the monitoring forms accomplished through a weekly or monthly period. The SWMD will evaluate the progress as well as the impact of the program using the target reduction rates set for the year.

F. Commercial Sector

The plan for the commercial sector is to implement mandatory segregation in all trading area and be able to link them to the resource recovery program of the barangay where they are located. The Central Business District as well as the Ayala Center has formulated their solid waste management plan. The system discussed below is for the commercial areas located outside of the Central Business District and the Ayala Center. The system involves the following components as shown below:

1. System:

   ![Diagram of Segregation System]

Segregation

Segregation will be mandatory in all commercial areas located in outside of the CBD and Ayala Center. Commercial establishments must provide separate receptacles for segregated wastes. Owners of commercial establishments will encourage both their management and clients to practice segregation especially for food establishments. The barangay together with the Enforcement section of the SWMD will monitor the compliance status of all commercial establishments.
Commercial establishments will provide an area for the temporary storage of recyclable materials within their workplace. Owners of commercial establishments are required to sponsor information and educational seminars for their employees and must provide information through advertisements their segregation program to the public.

**Resource Recovery**

The barangay can either collect all recyclable materials of the commercial establishments or link them to registered junkshops. For barangay collection, the barangay mobile MRFs will collect non-biodegradable recyclable materials. The recyclable materials will proceed to the barangay for weighing and documentation. The mobile MRF van can collect the biodegradable materials for composting.

**Collection**

Private collection of wastes will be for the residuals. The residual wastes will be collected by the dump trucks of the city government for final disposal according to the prescribed collection schedule.

2. **Sustainability of the Program**

**Funds**

Funding for the procurement of receptacles will come from the target sector. The commercial establishments will be required to pay an amount for the collection of their residual wastes by the city’s private collection. The barangay in coordination with the SWMD will enforce and monitor the compliance of all establishments within their jurisdiction and will exact fines for non-compliance. Information and educational programs must be provided or sponsored by the owners of establishments, for their workers and clients.

**Legal Support**

Mandatory segregation will be enforced through the combined efforts of the SWMD Environmental Enforcers and the barangays. An ordinance requiring all commercial establishments to segregate and install resource recovery programs will be prepared and submitted to the City Council or will be passed by the Barangay Council to take effect at their respective areas.

**Monitoring and Evaluation**

Sustainability of the program will depend mostly on monitoring. Close monitoring will be done through the installation of a monitoring system involving the barangay, the SWMD and the target locators. The SWMD will assist in the documentation of the status and accomplishment of the segregation and resource recovery programs through close supervision and the provision of monitoring forms at the barangay level. The commercial establishments can either link with the barangay MRF program for the collection of their recyclable materials or link with a local junkshop.
If ever they opt for the barangay MRF, the barangay will be required to submit status report based on the monitoring forms accomplished through a weekly or monthly period. The SWMD will evaluate the progress as well as the impact of the program using the target reduction rates set for the year.

### 7.3 Segregation, Recycling and Composting

#### 7.4.1 Segregation at source

To promote segregation of wastes at the barangay level, the SWMD will use the following strategies:

a) for the household and barangay officials and staff:
   1. conduct orientation seminars on a regular basis for all waste generators on:
      a. **3 Rs** or Recycle, Reuse, Reduce
      b. Segregation of kitchen and yard wastes for composting
   2. conduct contest on the following:
      a. cleanest house
      b. cleanest barangay
      c. most complying barangay
   3. install monitoring system and provide penalties for non-compliance
   4. creation of a barangay enforcement group
   5. conduct quarterly meetings with barangays
   6. finalize schedule of segregated wastes

b) for markets, institutional, commercial and industrial establishments
   1. conduct orientation seminars on a regular basis for all waste generators on:
      a. **3 Rs** or Recycle, Reuse, Reduce
      b. Segregation of kitchen and yard wastes for composting
   2. conduct contest on the following:
      a. cleanest market, school, company
      b. most creative trashcan
      c. most complying sector
   3. install monitoring system and provide penalties for non-compliance
   4. creation of a student enforcement group
   5. conduct quarterly meetings with barangays
   6. finalize schedule of segregated wastes

#### 7.4.2 Resource recovery

Resource recovery will be implemented through the set-up of MRFs, either mobile or stationary wherever feasible. The system involves the collection of recyclable materials from the different target sectors by the Materials Recovery Boys or Mr. B. The collected recyclables will be weighed and documented by the BSWMC. A monitoring form will be used for the documentation of the wastes diverted for disposal.

Composting on the other hand will be encouraged for those barangays with available space. Alternatives will be studied by the Planning and Research Section of the SWMD for composting to be viable in barangays with limited space availability. Beside the use
of mobile MRFs to support resource recovery the program will also use the following strategies:

1. conduct of WACS to determine the amount and types of wastes generated at the barangay level
2. conduct of orientation seminars on a regular basis for all waste generators on:
   a. **3 Rs** or Recycle, Reuse, Reduce
   b. Composting of kitchen and yard wastes
3. conduct of contests promoting **3Rs**
4. strict monitoring of both barangay and SWMD on compliance of waste generators
5. conduct of regular consultative meetings with the barangays to discuss problems and progress on the linkages with waste generators
6. strict documentation of wastes diverted from dump truck or collection made by the Barangay for recyclable materials
7. conduct of trainings to increase capacity of barangays to plan and implement projects
8. develop livelihood projects
9. Improve linkages among barangays, local government and metro-wide activities regarding segregation of wastes.
10. Mobilization of NGO’s/Pos who have experience and expertise on organization of communities and networks.
11. Encourage the participation of sectors that are themselves waste generators, in policing their own activities and solid waste management practices.
12. Intensify IEC campaigns through the:
   a. Distribution of leaflets, brochures and flyers containing significant information
   b. Advertisement in T.V., radios, newspapers and the official paper of Makati (e.g. Makati Mirror, Makati Ngayon, etc.)
   c. Posting in billboards of posters
13. Provision or receptacle bins for biodegradable and non-biodegradable wastes in public places like schools, government offices, malls and parks among others.
14. Strict implementation and enforcement of Ordinance No. 93-299, which is:

   “An ordinance requiring owners, lessees, tenants and the like of residential houses, commercial establishments, buildings and other entities in this municipality to separate, sort out their solid waste, refuse, garbage materials into biodegradable (wet) and non-biodegradable (dry) and providing penalties for violation thereof.”

- **Implementation of Mobile MRF’s**

Barangay Solid Waste Segregation and Resource Recovery Program involve the active participation of the barangays and the support of the Makati City’s Solid Waste Management Division in the set-up of a collection system of recyclable materials. The program’s components are educational campaign, segregation at source, resource recovery, collection of segregated wastes and disposal.

The barangay is tasked to provide all the needed logistics for the program while the City Government will assist in the provision of initial equipment for the utilization of the program.
Start-up:

The establishment of Materials Recovery Facilities will be in two forms: on-site construction and mobile MRFs. For mobile MRFs, the City Government was able to avail of international funds from the Asian Development Bank for the procurement of two (2) types of mobile MRF’s: mobile MRF van and mobile MRF tri-bike. The mobile MRF tri-bikes will be distributed and utilized by the two (2) Districts of Makati where the twenty-seven (27) barangays or service areas are located. The mobile MRF tri-bikes will be the sole responsibility of the recipient barangays. The mobile MRF van will be under the Solid Waste Management Division supervision and operation. The provision of mobile MRF’s is vital for the successful implementation of the Barangay Solid Waste Resource Recovery and Reduction Program.

The mobile MRF’s are to collect certain types of wastes at a given schedule throughout the barangay area. The MRF Van will initially be manned by the Makati City’s Solid Waste Management Division (SWMD) and will collect throughout the week sorted papers, plastics, metals and glass. The collected recyclables will be documented first and then directly sold to the junkshops located within the city. The mobile MRF pushcarts will be distributed to the barangays and will also collect throughout the week sorted papers, plastics, metals and glass.

- Establishment of additional MRF’s
- Establish multi-purpose cooperatives starting with the Junkshop Association of Makati, which could help in recycling.
- Mobilization of community/barangay units in recovery centers
- Improving the system and capability of MRF’s of each barangay

- Surveying and inspection of junkshop operations, including purchasing mechanisms, collection, final markets and disposal of residuals

7.4.3 Composting/Management of Biodegradable Waste

Composting will be encouraged for those barangays with available space. Alternatives will be studied by the Planning and Research Section of the Solid Waste Management Division (SWMD) for composting to be viable in barangays with limited space availability.

Overall Strategy for Managing Biodegradable Waste

- Adoption of appropriate composting technique for biodegradable wastes
- Seminars and training on composting/management of biodegradable wastes of key community leaders or barangay officials, especially households.
- Research on new ways on how to manage biodegradable wastes other than composting. Wastes can still be further processed or converted into new kind of product which has a higher value than just turning it into compost or an organic fertilizer.
Quantity of Waste to be Composted

The Waste Characterization Study conducted showed that for the whole twenty-seven (27) barangays, the top three types of wastes with the highest percentage composition are “Other Organic” (48.58%), plastic (27.25%) and paper (13.21%). The wastes generated by the twenty-seven (27) barangays can be diverted through recycling and composting.

Existing Capacity, Future Demand, and How the Capacity Will Be Met

Currently there is no official document that will provide the city data to help calculate the capacity of the composting site of Comembo. Documentation still requires improvement. Future demand as can be seen from the projection of sorted wastes shows the increasing generation of organics for all waste generators. Due to the limited space, one option is to sell all kitchen and yard wastes to either hog raisers or big composting sites located in Bulacan. These private entities can buy the biodegradable wastes from the barangay.

The City Government was able to get a grant from the UNDP-MMDA project for the construction of an MRF. But the MRF that will be constructed in Comembo will cater for the processing of recyclable materials and will not accommodate biodegradable materials. The less than 80 sq. m. lot that was allotted for the MRF cannot house a composting area.

One option is the barangay may, using the mobile tri-bike, collect all the biodegradable materials and then weigh it for documentation prior to the collection of the private contractor. Another option is to establish a link with the CBD for their composting program. The CBD can collect the biodegradable materials of neighboring barangays. Other options must be explored through research and planning.

7.4.4 Marketing

Estimated Prices for Recovered Materials and Average Selling Price/Average Price

Prices quoted are based from Metro Manila Linis-Ganda group. Additional data that will include list of buyers will be gathered as soon as regulation of junkshop operations is operational.

<table>
<thead>
<tr>
<th>PAPER</th>
<th>PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assorted Paper (folder, news print, scratch papers, receipts w/o carbon)</td>
<td>P .40/kilo</td>
</tr>
<tr>
<td>Newspaper</td>
<td>P 1.50/kilo</td>
</tr>
<tr>
<td>Carton</td>
<td>P 12.00/dangkal</td>
</tr>
<tr>
<td>Magazine</td>
<td>P 1.00/kilo</td>
</tr>
<tr>
<td>Selected White Paper</td>
<td>P 3.00/dangkal</td>
</tr>
<tr>
<td></td>
<td>P 1.50/kilo</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BOTTLES/GLASS</th>
<th>PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broken Bottle</td>
<td>P .30/kilo</td>
</tr>
<tr>
<td>a) white (clear)</td>
<td>P .20/kilo</td>
</tr>
<tr>
<td>b) colored</td>
<td></td>
</tr>
</tbody>
</table>

As of October 2, 2003
<table>
<thead>
<tr>
<th>Item</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beer (bottle)</td>
<td>P .50/pc</td>
</tr>
<tr>
<td>BFS (bottle)</td>
<td>P .25/pc</td>
</tr>
<tr>
<td>Catsup UFC (small bottle)</td>
<td>P .30/pc</td>
</tr>
<tr>
<td>Catsup UFC (big bottle)</td>
<td>P .20/pc</td>
</tr>
<tr>
<td>Medicine bottle</td>
<td>P .10/pc</td>
</tr>
<tr>
<td>Tanduay bottle</td>
<td>P .50/pc</td>
</tr>
<tr>
<td>Gilbey’s (small bottle)</td>
<td>P .25/pc</td>
</tr>
<tr>
<td>Gilbey’s (big bottle)</td>
<td>P .50/pc</td>
</tr>
<tr>
<td>Gin bottle</td>
<td>P .50/pc</td>
</tr>
<tr>
<td>Grande (bottle)</td>
<td>P 1.00/pc</td>
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<tr>
<td>Emperador (bottle)</td>
<td>P .50/pc</td>
</tr>
<tr>
<td>Softdrinks (1 liter bottle)</td>
<td>P 1.50/pc</td>
</tr>
<tr>
<td>Long neck bottle (liquor)</td>
<td>P 1.00/pc</td>
</tr>
<tr>
<td>Nescafe (medium-bottle)</td>
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</tr>
<tr>
<td>One Gallon (bottle)</td>
<td>P 3.00/pc</td>
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<tr>
<td>Shoktong (bottle)</td>
<td>P .50/pc</td>
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<tr>
<td>Silver Swan (big bottle)</td>
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<td>Softdrinks (bottle)</td>
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<tr>
<td>Vinegar (small bottle)</td>
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<tr>
<td>Vinegar (big bottle)</td>
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<td>Soy Sauce</td>
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<td>Whiskey (bottle)</td>
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<tr>
<td>HIPS Plastic Cups (#6)</td>
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<tr>
<td>PE (transparent)</td>
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<tr>
<td>PET Plastic Bottle (#1)</td>
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<tr>
<td>PVC</td>
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</tr>
<tr>
<td>Hard Plastic</td>
<td>P 2.00/kilo</td>
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### Metal/Aluminum

<table>
<thead>
<tr>
<th>Item</th>
<th>Price</th>
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</thead>
<tbody>
<tr>
<td>Aluminum Pots</td>
<td>P 8.00/kilo</td>
</tr>
<tr>
<td>Aluminum Cans</td>
<td>P 15.00/kilo</td>
</tr>
<tr>
<td>Aluminum Hard</td>
<td>P .30/kilo</td>
</tr>
<tr>
<td>Aluminum Jalousy</td>
<td>P 15.00/kilo</td>
</tr>
<tr>
<td>Scrap Metal</td>
<td>P 20.00/kilo</td>
</tr>
<tr>
<td>Cans/Softdrinks Crowns</td>
<td>P .20/kilo</td>
</tr>
<tr>
<td>Stainless</td>
<td>P 7.00/kilo</td>
</tr>
<tr>
<td>Brass</td>
<td>P 25.00/kilo</td>
</tr>
<tr>
<td>Copper</td>
<td>P 30.00/kilo</td>
</tr>
<tr>
<td>Fender</td>
<td>P .50/kilo</td>
</tr>
<tr>
<td>Washers (tingga)</td>
<td>P 5.00/kilo</td>
</tr>
<tr>
<td>G.I. Sheet</td>
<td>P .25/kilo</td>
</tr>
<tr>
<td>Zinc</td>
<td>P 5.00/kilo</td>
</tr>
</tbody>
</table>

### Cartridge of Computers

<table>
<thead>
<tr>
<th>Item</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cartridge (big)</td>
<td>P 10.00/pc</td>
</tr>
<tr>
<td>Inkjet (small)</td>
<td>P 15.00/pc</td>
</tr>
</tbody>
</table>

### Battery of Motor Vehicles

<table>
<thead>
<tr>
<th>Item</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISNF</td>
<td>P 15.00/pc</td>
</tr>
<tr>
<td>ISMF</td>
<td>P 15.00/pc</td>
</tr>
</tbody>
</table>
2SM  P 35.00/pc
3SM  P 45.00/pc
6SM  P 75.00/pc
2D   P 105.00/pc
4D   P 115.00/pc
8D   P 145.00/pc

Strategies for expanding markets

Developing the market for recyclable materials for Makati City will require full scale research and feasibility study. As of now, the city is putting the foundations for the creation of the right environment to foster market forces for the trading of recyclable materials.

7.5 IEC

The Information, Education and Communication plan for the 10 year solid waste management plan focuses on increasing not only the awareness of the target waste generators but also the level of their participation in the programs and projects implemented by both the City Government and the Barangay.

Core Messages

Schools

The target participants for the program “Batang Bantay Basura (3B)” for schools are the school administration and the student council members. The objective of the program is to establish a strong active collaboration between the City Government, the Barangay and the School administration when it comes to the implementation of the programs and projects identified in the 10-year SWM plan, as well as establish a strong relationship between the school administration and the student council.

The core message of the IEC plan of the program is “responsibility and obligation of school administration to be the role model and guide for the students to follow in the conservation of the environment through proper handling of solid wastes according to the provisions of RA 9003”. The plan hoped that through mobilization, information dissemination, provision of technical assistance and training, the school administration would have the capacity to implement and sustain identified projects for solid waste management.

The IEC plan will be coordinated with the Department of Education for the public elementary and high schools, the Commission on Higher Education for the tertiary level and the respective administration of all private schools located with the city. The IEC plan is part-and-parcel of the programs identified in the 10-year SWM plan. It is a very important component of all programs.

The IEC plan will support the technical assistance that the City Government will be providing to the school administration particularly in waste characterization, and source reduction through segregation and resource recovery (recycling and composting).
**Hospitals, Clinics**

The target participants for the program “Kalinisan at Kalusugan Tungo sa Kaunlaran” for hospitals and clinics are the administration. The objective of the program is to establish a strong active collaboration between the City Government, the Barangay, the City Health Department, the Department of Health and hospital/clinic administration in the implementation of the programs and projects identified in the 10-year SWM plan.

The core message of the IEC plan of the program is “**responsibility and obligation of hospitals and clinics to protect the health of the people of Makati City through proper handling of solid wastes according to the provisions of RA 9003**”. The plan is that the DOH and the City Health Department (CHD) will worked hand in hand with the Barangay and the SWMD in the mobilization, information dissemination, provision of technical assistance and training to the hospital/clinic administration.

The implementation of the IEC plan will be coordinated with the Department of Health, the City Health Department, and the barangay. Finalization of IEC contents for this sector will be in consultation with the DOH and the CHD. Initially, the IEC plan will support the technical assistance that the City Government will be providing particularly in waste characterization, and source reduction through segregation and resource recovery (recycling and composting).

**Funeral Parlors**

The target participants for the project “Makiramay sa Kalinisan ng Ating Bayan” are the administration of the four funeral parlors located within the city. The objective is to make the funeral parlors responsible for the proper management of their solid wastes by ensuring that only solid wastes are collected for disposal.

The core message of the IEC plan of the project for the funeral parlors is “**responsibility and obligation of funeral parlors to ensure that only solid wastes are collected by the private contractors of the city**”. The plan is that the DOH and the City Health Department (CHD) will worked hand in hand with the Barangay and the SWMD in the mobilization, information dissemination, enforcement and monitoring of compliance of the four funeral parlors to the provision of RA 9003 and RA 6969 (Toxic and Hazardous Act).

The implementation of the IEC plan will be coordinated with the Department of Health, the City Health Department, and the barangay. Finalization of IEC contents for this sector will be in consultation with the DOH and the CHD. Initially, the IEC plan will support the technical assistance that the City Government will be providing particularly in waste characterization, and source reduction through segregation and resource recovery of recyclable materials.

**Government Offices**

The target participants for the program for government offices that includes the City Hall and all barangay hall buildings, are heads and staff of the different offices. The objective of the program is to make these offices models of source reduction, proper segregation and resource recovery.
The core message of the IEC plan of the program is “responsibility and obligation of each government employee to reduce, reuse and recycle valuable resources of the city and make segregation a habit”. The plan is to require all government offices to practice segregation and source reduction through reuse and procurement of supplies that are recyclable.

The IEC plan will be coordinated with the different departments, agencies and offices of the city government as well as all barangays. It will support the program for the City Government particularly for waste characterization, and source reduction through segregation and resource recovery (recycling and composting).

**Commercial Establishments**

The target participants for the program “Malinis na Tindahan Bayan!” are the owners and management teams of the different commercial establishments in the 27 barangays outside the Commercial Business District and Ayala Center. The objective of the program is to establish a strong active collaboration between the City Government, the Barangay, and the private sector that will initiate social responsibility through active participation in the program.

The target participants of the program has two categories, the first is the informal sector that includes the market and ambulant vendors as well as owners of sari-sari stores. The other sector is the trade and services sector that includes commercial establishments selling finished products (i.e., food, clothes, shoes, etc.) and services (i.e., tailoring, beauty parlor, laundry shops, banks).

The core message of the IEC plan of the program is “responsibility and obligation of commercial establishments to manage the waste generated by their business activities according to the provisions of RA 9003”. The plan is that through mobilization, information dissemination, provision of technical assistance and training to all commercial establishments, the Barangay and the SWMD will be able to implement and sustain the program identified in the 10-Year plan.

The implementation of the IEC plan will be coordinated with the barangay and the vendors association. The IEC plan will support the technical assistance that the City Government will be providing particularly in waste characterization, and source reduction through segregation and resource recovery (recycling and composting).

**Industrial Establishments**

The target participants for the program for the industrial establishments are the owners and management teams of the different industrial establishments located within the 27 barangays or outside the Commercial Business District and Ayala Center. The objective of the program is to encourage and assist these industries achieve a level of production and management status that is acceptable for certification to the International Standards Organization. The ISO certifies industries using green production or environment-friendly production processes and management organization.

The core message of the IEC plan of the program is “responsibility and obligation of industrial establishments to manage the waste generated by their business activities according to the provisions of RA 9003”. The plan is to require all
industries to conduct waste audit at a regular basis to help the industry determine the types of wastes generated and the corresponding handling and technology needed to manage and dispose it. The plan hopes to increase the level of participation of the industrial sector in the management of solid wastes generated by their businesses.

The implementation of the IEC plan will be coordinated with the barangay and the association of industries. The IEC plan will support the technical assistance that the City Government will be providing particularly in waste characterization, and source reduction through segregation and resource recovery (recycling and composting).

**Informal Settlers**

The thrust of the City Government is to relocate all qualified informal settlers to an identified housing area to control and minimize the prevalence of professional squatting in the city. The identified projects for informal settlers are for those areas pending relocation.

The target participants for the projects “Home Along the Estero” and “WWW.Com” are the informal settlers residing along the waterways of the city. The projects are for those areas where resettlement plans have not pushed through. The objective of the projects is to encourage participation among the informal settlers in protecting the waterways and comply to the provisions of the law particularly segregation.

The core message of the IEC plan of the projects is **“responsibility and obligation of all living within the city to protect the environment through proper waste management according to the provisions of RA 9003”**. The plan hopes to make informal settlers responsible to the cleanliness of their area especially the waterways as if they own them.

The implementation of the IEC plan will be coordinated with the barangay and urban poor associations. The IEC plan will support the technical assistance that the City Government will be providing particularly in source reduction through segregation and resource recovery (recycling and composting).

**Barangays**

The target participants for the program “Makati City Barangay Solid Waste Segregation and Resource Recovery” are the 33 barangays. The objective of the program is to assist these barangays in the implementation of comprehensive programs and projects for solid waste management.

The core message of the IEC plan of the program is **“increased capacity through IEC for the implementation of programs and projects in compliance to the provisions of RA 9003”**. The plan is to increase the capacity of the barangays in the development, implementation and monitoring of programs and projects in line with the provisions of the law as well as of the 10-year SWM plan of the city.

The implementation of the IEC plan will be coordinated with the barangay. The IEC plan will support the technical assistance that the City Government will be providing particularly in updating of barangay profile that will include waste characterization, and
installation of source reduction through segregation and resource recovery (recycling and composting).

Below is the draft IEC plan for that will support the implementation of the programs and projects prepared by the SWMD.
<table>
<thead>
<tr>
<th>SECTOR</th>
<th>PROJECT TITLE</th>
<th>MESSAGE</th>
<th>TARGET AUDIENCE</th>
<th>ACTIVITY</th>
<th>MONITORING PLAN</th>
<th>RESPONSIBLE PARTY</th>
</tr>
</thead>
</table>
| 1. Funeral Parlors | “Makiramay sa Kalinisan ng Ating Bayan” | Encourage every one to practice Segregation & proper waste disposal | Administrator, Maintenance Staff (Areflor, Galang, Loyola, Filipinas) | • Coordinate with EHS, CHO, DOH & Funeral Administrators  
• Data Gathering  
• Conduct IEC  
• Characterization of Waste  
• Provision of receptacle  
• Creation of monitoring group & monitoring system  
• Formulation of & enforcement of policies  
• Recommend policy for mandatory segregation  
• Establish linkage with junkshop | Data will be supported by the IEC with the used of the monitoring sheet coming from IEC to be given to the Administrators of the Funeral to be submitted on a weekly basis. | • IEC  
• Enforcement  
• Garbage Collection  
• Barangay |
• Creation of module for the program for the school  
• Consultation for the development of module  
• Conduct IEC  
• Setting up & activation of waste management plan  
• Implementation of Project  
• Creation of incentive system for motivation | Data will be monitored by the IEC with the used of monitoring sheet, to be submitted on a weekly basis. | • IEC  
• Enforcement  
• Dep. Education  
• PTA & School Organization  
• Barangay |
| 3. Hospitals and clinics | “Kalinisan at Kalusugan tungo sa Kaunlaran” | Encourage the staff to practice segregation and proper waste disposal | Medical & maintenance staff (Brgy. Guad. Viejo, Nuevo, South Cembo, Pitogo, Pinagkaisahan) | • Coordinate with the CHO, & LIGA  
• Coordinate with the public Administrator Hospitals  
• Coordinate with Adm. Hospitals to identify collection point  
• Conduct IEC to the Hospital Staff  
• Conduct Dry-run of Segregated waste  
• Provision of receptacle | Data will be monitored by the IEC with the used of monitoring sheet, to be submitted on a weekly basis. | • IEC  
• DOH |
<table>
<thead>
<tr>
<th>SECTOR</th>
<th>PROJECT TITLE</th>
<th>MESSAGE</th>
<th>TARGET AUDIENCE</th>
<th>ACTIVITY</th>
<th>MONITORING PLAN</th>
<th>RESPONSIBLE PARTY</th>
</tr>
</thead>
</table>
| 4. Informal Settlers | "Home Along the Estero" | Implement policies to maintain the cleanliness of water   | Residents along water ways (Brgy. Guad. Nuevo, Guad. Viejo, Pinagkaisahan, Pitogo, South Cembo) | • Coordinate with LIGA  
• Set-up Dialogues with the concern agencies  
• Conduct consultative meeting  
• Data gathering on # of residents along water ways | Monitoring of the area with the use of monitoring sheet to be submitted on a weekly (1st step) monthly (2nd step) | • IEC  
• Enforcer |
| 5. Commercial Establishments | "Malinis na Tindahan Bayan" | Encourage every stall owners to practice cleanliness in their stalls. | Sari-sari store owners | • Coordination with LIGA, BSWMC, Permit & EEMO  
• Conduct meeting with the concerned agencies  
• Data gathering as to the number of manpower  
• Conducts IEC  
• Provides technical assistance  
• Set-up incentives and award system  
• Enforcement of policies | Data will be monitored by the IEC with the used of monitoring sheet, to be submitted on a weekly basis. | • IEC  
• Enforcement  
• Permit Division  
• Barangay |
## Information, Education and Communication Plan

<table>
<thead>
<tr>
<th>SECTOR</th>
<th>PROJECT TITLE</th>
<th>MESSAGE</th>
<th>TARGET AUDIENCE</th>
<th>ACTIVITY</th>
<th>MONITORING PLAN</th>
<th>RESPONSIBLE PARTY</th>
</tr>
</thead>
</table>
| 1. Schools | **“Batang Bantay Basura (3B)”**      | Organize & orient High school students to implement & practice RA 9003 within the community where their school is located. These students shall assist the residents in collecting their biodegradable where both the residents and the students will financially benefit. | Primary-High schools Secondary – High schools Community where the schools are located | • Segregation  
• Conduct IEC per school  
• Creation of module for the solid waste management program for the school  
• Coordination with the community where school is located  
• Recycling  
• Establish strong linkage with junkshop operators & livelihood cooperative  
• Composting  
• Identification of compostable waste & availability of composting area  
• Setting up a dialogue with the community, Brgy., & private contractors  
• Creation of incentive system for motivation  
• Collection  
• enforcement of the installed collection scheme | • Preparation of a monitoring plan for the school, junkhop & other stakeholders  
• Weekly consultation with schools & junkshop operators  
• Weekly monitoring system to be done by schools, junkshops & SWMD. | • SWMD  
• Dep. Ed  
• PTA & School Organization  
• High school Students  
• Barangay |
| 2. Informal Settlers | **“WWW.COM Walang Waste sa Water Ways”** | Encourage participation of the community along waterways of Makati in maintaining the waterways clean.                                                                                                                                                   | Residents along waterways Brgy:  
- Bangkal – Tripa de Galina  
- San Isidro – Sanzibar Creek  
- Pio del Pilar – P. Medina Creek  
- Palanan - Calatagan | • Segregation  
• Identify community residents living along waterways  
• Conduct IEC regarding Segregation, Recycling, Composting & Collection  
• Set up dialogue with the community concern  
• Integration of the collection schedule with private contractors and identification of collection point  
• Distribution of flyers  
• Recycling  
• Composting  
• Collection | • Evaluation and monitoring of the applied method for sustainability  
• Monitoring of the collection scheme for sustainability  
• Daily monitoring Report by the Barangay  
• Weekly report of the Barangay submitted to SWMD office | • SWMD  
• DPWH  
• Barangay |
<table>
<thead>
<tr>
<th>SECTOR</th>
<th>PROJECT TITLE</th>
<th>MESSAGE</th>
<th>TARGET AUDIENCE</th>
<th>ACTIVITY</th>
<th>MONITORING PLAN</th>
<th>RESPONSIBLE PARTY</th>
</tr>
</thead>
</table>
  • Develop profile / policy / plan of SWMD  
  • Encourage vendors to practice proper waste segregation and disposal  
  • Integrate collection point with private contractor | • Daily monitoring of Datu Basurero on area of coverage  
  • Daily situational Report submitted by the Datu Basurero | SWMD  
  SSD  
  Makati Vendors Association |
8.0 Implementation Strategy

The 10 year Solid Waste Management Plan involves the development and implementation of programs and specific projects that will target the different waste generators. The priority programs aim to enable the barangay and all waste generators to be active and capable participants in the implementation of the 10 year plan.

8.1 Framework

8.1.1 Schools

A.1 Pre-Schools

**Description:** The Solid Waste Reduction and Resource Recovery program for pre-schools will establish a working relationship in coordination with the different pre-school owners, the City Social Services and the Department of Education in developing a sustainable solid waste management system that is applicable to the school and integrated in the school curriculum of the students. The program aims to develop a culture of cleanliness through responsible waste management among our pre-schoolers at a very young age. Coordination will be for the 1) proper profiling of target beneficiaries, and 2) developing a yearly school program that will expose the pre-school students to the different aspects of solid wastes, its proper management and the role they must play as active members of the family and society.

For the owners of the schools, the program includes the extension of technical assistance in the conduct of IEC on segregation, recycling and composting for teacher and students. Assistance will be provided by the SWMD to the school in establishing linkage with junkshops that will buy the non-biodegradable wastes. The non-biodegradable wastes may be collected by the barangay or by the junkshop.

The program also involves the development of an appropriate monitoring system in order to 1) evaluate the compliance rate, which includes the use of waste receptacles, and 2) measure the reduction rate of wastes. The program will create an incentive and awards system to motivate both the school owners and the students to practice ecological solid waste management.

For the recycling component, aside from the required seminar on recycling, the program involves the establishment of linkages to junkshops or livelihood cooperatives to divert recyclable materials to the schools. The installation of segregation and recycling within the schools will reduce the amount of wastes to be collected.

A.2 Elementary Schools

**Description:** The program for the elementary schools involves the establishment of an active and empowered school administration and students. The different components of solid waste management involves both the school administration and the student to participate in the development and implementation of activities not only for segregation, recycling and composting but also the establishment of possible livelihood from recyclables.

Proper segregation will be required from all elementary schools both public and private. The City government will provide technical assistance through the conduct of IEC on segregation for all employees and staff of school administration as well as for the students. The school administration will be required to provide receptacles for proper segregation as required by law and to support the segregation component of the program. Each school will segregate and provide appropriate receptacles for biodegradable and non-biodegradable wastes. The school will be assisted by the
A monitoring system will be installed in collaboration with the school administration to document and assess the performance and impact of the program from segregation to collection of residuals. The monitoring system will also be used as basis for the awards and incentives program that will be developed by the schools themselves together with the City Government and the Department of Education. This will complement the current Project Angel that most elementary schools have for solid waste management. Project Angel is a project of public elementary schools encouraging students to be ‘guardians’ of cleanliness both in schools and in their respective homes.

A.3 High School

**Description:** The solid waste management program for high schools aims to:

1. to instill a sense of responsibility in the students for the wastes they generate;
2. to encourage schools to spearhead solid waste management not only within the premises of the school but also include the community where they are located; and
3. to help the school and the students establish a strong working relationship with the community they are located when it comes to the proper management of wastes.

One priority project is the “Batang Bantay Basura” or “3B” that aims to achieve the above objectives through the installation of proper segregation of wastes, recycling, the installation of a composting area within the premises of the school or of the community and the establishment of linkages for the recyclables and composts. Segregation will be installed through the conduct of IEC to school administration and students and will be supported by the provision of receptacles by the school. Recycling and composting will be installed upon finalization of the waste characterization study of the schools. The WACS will determine if the school is capable of generating recyclables and compostables for the school to sell.

The school will also extend the recycling and composting project to the community they are located. The school with the City government, the Barangay officials, the DepEd will work out a system wherein the students will play an active part in the expansion of the project throughout the barangay. The system will be based on the consensus of the group. The City government will provide the needed technical assistance to the schools in the implementation of the program. Assistance will also include the development and installation of appropriate monitoring tools and system that will help measure the amount of waste reduced, recycled or composted. The monitoring system will also be used as a tool for identifying the most effective school in the city for the rewards and incentives program for solid waste management.

A.4. Colleges

**Description:** The target beneficiaries of the SWM program for colleges are the identified public and private colleges located within the city. Makati has two public colleges and sixty-four private colleges (including vocational, technical and special schools) that are mostly located within the Central Business District. The SWM program for the colleges will be fully developed upon the completion of the waste characterization study for colleges. The WACS will help the city government to identify the viability and applicability of installing recycling and composting or the appropriate process that will divert wastes from the regular collection system. Initial segregation and provision of receptacles will be required from these colleges. The administration of these colleges will segregate and provide appropriate receptacles for biodegradable and non-biodegradable wastes. The school will be assisted by the SWMD in establishing linkage with junkshops that will buy the non-biodegradable wastes. The non-biodegradable wastes can be collected by the barangay or by the junkshop.
Upon completion of the WACS, the City government through the Solid Waste Management Division will extend the needed IEC and technical assistance to help the colleges mobilize their staff and students for the implementation of an appropriate solid waste management reduction scheme. The assistance will also include the development of a monitoring system for documentation, evaluation and assessment purposes.

8.1.2 Health Providers

Description: The collection of municipal wastes includes those that come from 256 health care providers both private and public located in the city. Included in the health sector are the hospitals, health centers or medical clinics, lying-in clinics and maternity clinics, dental clinics and the 4 funerals serving the city. The SWM program involves the integration of RA9003 provisions in the daily operation of the health care providers. The program aims to ensure that the wastes collected from these health care providers are only solid wastes and must not be mixed with other medical wastes. In order to reach this goal, the SWM program will work on establishing a strong working relation between the City government, the Department of Health and the owners of the health care facilities.

The SWMD will coordinate with the DOH, City Health Department (CHD), and the administrators of the health care facilities on the development of an appropriate system for segregation, recycling and proper collection of residual wastes. Waste characterization will be conducted by the administration of the health care provider with assistance from the city government and DOH. The results of the WACS will help establish a baseline data that can be use to project the waste generation of health care providers. It will also help determine the viability of recycling and composting or at the least is to identify the wastes can be collected and transported to other recycling and composting areas.

Upon completion of the WACS, the SWMD will continue coordinating for the development of appropriate solid waste management system. All health care providers will be required to provide receptacles to implement segregation at an initial stage. A system of monitoring will be required for all health care providers for enforcement and documentation purposes.

The projects “Kalikasan at Kalusugan Tungo sa Kaunlaran” and “Klinikalinisan” are two projects whose target beneficiaries are the hospitals and clinics within the city. The project promotes the installation of segregation and resource recovery in hospitals and clinics. These are priority projects that will basically involve consultations and coordination with the health administration and owners for the implementation of segregation and resource recovery programs in their hospitals and clinics.

Another project, “Makiramay sa Kalinisan ng Ating Bayan” aims to ensure that the collected wastes coming from the 4 identified funeral parlors in the city are solid wastes and not mixed with toxic and hazardous wastes. The City Environmental Health and Sanitation has no jurisdiction over the waste disposal system of the funerals. The SWMD would like to look into this concern and make it a priority project to avoid any forthcoming health crisis. The project entails close coordination with the four funeral parlors for the conduct of WACS and segregation at the initial stage. They will also be required to provide receptacles for segregation of wastes.

8.1.3 Barangay
Description: The SWM program for barangays aims to equip each Barangay Solid Waste Management Committee the capacity to do planning and project implementation through the extension of technical assistance in the establishment of each component of the program.

The plan hopes that all barangays will conduct their own WACS, a capacity that will greatly help the barangays develop projects for the reduction and recovery of wastes generated in their area. Another critical document needed for planning is the updated profile of the barangay. The identification and documentation of the number of residents, commercial, industrial, and institutional establishments located within their boundaries are needed to calculate and project the waste generation each year. This will help the barangay identify the requirements for the changes and be able to address future problems and needs.

The SWMD has for the past months started extending assistance to two pilot barangays: Bangkal and Comembo. The City Government has provided receptacles to integrate segregation of wastes into biodegradable and non-biodegradable. The barangay set-up collection schedule for biodegradable and non-biodegradable wastes. Linkage with junkshops has been established initially and reduction of wastes collected was observed in the reduction of collection trips made for the day. A monitoring tool was developed to document the specific type of wastes collected either by the junkshop or city dump truck and the actual weight. The monitoring tool will indicate the barangay’s capacity to conduct monitoring at their level and help assess the performance of the program.

The “Makati City Barangay Solid Waste Segregation and Resource Recovery Program” is the comprehensive program that will focus on the development of ecological solid waste management for all 33 barangays. The inclusion of the 6 plush subdivisions in the program is an initiative to integrate them back to the rest of the city. The program entails the conduct of WACS, IEC on segregation, recycling and composting, establishment of linkages with junkshops and livelihood cooperatives, installation of monitoring system for enforcement and documentation and setting-up of collection schedule.

It also includes the role of informal settlers as active participants in keeping our environment clean and healthy. This program will be implemented in collaboration with the Liga ng mga Barangays. The program involves a mapping of the informal settlers’ location. Technical assistance will be provided to them through the conduct of IEC on segregation and benefits of environmental health through proper waste management. The conduct of WACS will verify the amount and type of wastes that informal settlers really generate. The results of the WACS will indicate the applicability of recycling and even composting. Only then can a linkage between the informal settlers and the junkshops be established. The results will also indicate the amount of wastes that must be collected by the dump trucks. Collection points can be identified for the collection of the wastes. Monitoring must be done through the barangay as well as enforcement.

8.1.4 Industrial Sector

Description: The secondary sector of the economy are those in the manufacturing of food products, cosmetics, textiles, wood works, metal works, production of chemicals and paints, shoes, garments. Makati City is home to more than 2,000 manufacturers. A separate SWM program must be prepared to address possible problems in pollution and set-up an ecological solid waste management system that can be integrated in the upgrading of production system for future application to the International Standard of Operations or ISO.

The approach in the implementation of the program involves establishment of collaborations with the manufacturing sector. The SWMD will work towards the establishment of a strong linkage with
the identified members of the sector. The linkage aims to facilitate consensus building between and among the members of the sector and the city government.

The program involves the development of a database on the type and amount of wastes generated by the sector. The conduct of WACS will be done in collaboration with the owners or management of the establishments. IEC on the conduct of WACS will be extended to the establishments in the hope that they will develop the capability to conduct WACS on their own as the need arises. The results of the WACS will facilitate the identification of waste materials for recycling and composting. This in turn will indicate the requirements for the set-up of a materials recovery facility within the barangay the sector is located or within the premises of the establishment. A specific project for recycling and composting will be developed in collaboration with the establishments and the barangay.

The program will require the establishments to segregate and to provide appropriate receptacles for the segregate the wastes prior to the development of a recycling and composting project. As in all programs, it also involves the creation and installation of appropriate monitoring tools and system to document the actual reduction of wastes and assess the progress of the program.

8.1.5 Commercial Sector

Description: Commercial Sector or Trade and Services belong to the tertiary sector of the economy. The sector usually entails the selling of finished products and the provision of services in food, banking, lending, insurance, amusement, dressmaking, business requirements and personal hygiene. Makati is known as the financial and business capital of the Philippines. The Central Business District has their own waste collection done by contractors. While those establishments located outside the CBD are serviced by the city.

The 10-year SWM program for trade and services aims to integrate the CBD with the rest of the city as a whole. The program involves the implementation of ecological solid waste management at a city wide level and not only on those areas that are currently being serviced by the city. Though the plan acknowledge that the implementation of the program will probably take longer to take-off for a lot of coordination and consultations will be done in the preparation of a project built on consensus with the target beneficiaries. The program will pursue the implementation of segregation, recycling and composting but in a manner that is acceptable to the establishments but will pass the requirements of the law.

Also included in the commercial sector are the Informal Sector or the ambulant vendors that peddle their wares within the city. The SWM program involves the integration of the IS in the SWM system within the barangay they frequently ply their wares. The “Gulong-Sulong sa Kalinisan” is one priority project that involves the active participation of ambulant vendors in the segregation and waste reduction program of the city at the barangay level.

The program entails the informal organization of the ambulant vendors through the ID system. All ambulant vendors will be required to register at the local barangay and acquire an ID card to allow them to do business within the barangay. Through the ID system, all vendors will be required to undergo seminar on proper waste segregation and disposal. They will also be required to deliver any recyclable or compostable materials to the barangay as soon as they finish transacting business.

The program also involves educating the vendors on the benefits of sanitation especially in the handling of food products they are selling. The SWMD in collaboration with the CHO will conduct health and sanitation seminars for those vendors selling food products.
8.2 Diversion Projections

The project diversion of sorted wastes presented in the table below is based on the WACS results for February 2003. The limitation of the WACS is that the volume of wastes collected from the special operations of the city was not included. But nonetheless, we are using the results for the projection to give us the minimum amount of wastes that can be diverted for each type of waste for each waste generator.
## Diversion Projections of Sorted Wastes

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As of October 2, 2003
### Diversion Projections of Sorted Wastes (continued)

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## Diversion Projections of Sorted Wastes (continued)

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<th>2004 5% reduc. weight (Kg)</th>
<th>2005 10% reduc. weight (Kg)</th>
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<th>2005 10% reduc. weight (Kg)</th>
<th>2006 15% reduc. weight (Kg)</th>
<th>2007 25% reduc. weight (Kg)</th>
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### MONITORING FORM 1: BARANGAY DAILY WASTE SEGREGATION AND REDUCTION MONITORING REPORT

**BARANGAY __________________________**

| Name: ______________________________ | Date: ________________ |
| Zone: ______________________________ | Time: ____________ AM/PM |

<table>
<thead>
<tr>
<th>Waste Segregated Collected (weight in kg.)</th>
<th>Kitchen/Food Wastes</th>
<th>Yard/landscape</th>
<th>Mixed Papers</th>
<th>Others</th>
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</thead>
<tbody>
<tr>
<td>1. By Dumptruck</td>
<td></td>
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<tr>
<td>2. By Private Persons/Orgs.</td>
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<td></td>
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<table>
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<th>Kitchen/Food Wastes</th>
<th>Yard/landscape</th>
<th>Mixed Papers</th>
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## Wastes Segregation of Non-biodegradables

### Waste Segregated Collected (weight in kg.)

<table>
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<th>Bottles &amp; containers</th>
<th>Tin/steel cans</th>
<th>Aluminum cans</th>
<th>PET</th>
<th>HDPE</th>
<th>Film Plastics</th>
<th>Special wastes</th>
<th>Bulk wastes</th>
<th>Styro</th>
<th>Const wastes</th>
<th>Textile</th>
<th>Wood</th>
<th>Cardboard/paper</th>
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</thead>
<tbody>
<tr>
<td><strong>1. By Dumptruck</strong></td>
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<tr>
<td><strong>2. By Private Persons/Orgs.</strong></td>
<td>Name</td>
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### Waste Segregated Sold (weight in kg.)

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## Financial Requirements

### Personal Services

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<th>2007</th>
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<th>2012</th>
<th>2013</th>
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As of October 2, 2003
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As of October 2, 2003
### Budget Requirement for the Implementation of the Programs and Projects of the 10 Year Solid Waste Management Plan

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a. **Plan Implementation**

12.1 **Phases and Responsibilities**

10.1.1 PROJECT 1

I. Project Title: “Makiramay sa Kalinisan ng Ating Bayan”

II. Type of Project: Soft Project

III. Implementer: SWMD, EHS and Funeral Administrators, DOH, CHO

IV. Components and Activities:

A. Segregation:

a.1 Coordination with EHS and funeral administrators, CHO, DOH in the management and disposal of their waste.

a.2 Data gathering on the system of waste management implemented in their facility (number of personnel, waste collector and other policies)

a.3 Conduct IEC on their personnel on Solid Waste Management specifically waste segregation, recycling.

a.4 Identification of wastes according to their characteristics.

a.5 Require provision of receptacle

a.6 Creation of monitoring group and monitoring system for compliance

a.7 Formulation and enforcement of policies on solid waste

a.8 Recommend policy for mandatory segregation

a.9 establish linkage with junkshop if needed

B. Recycling:

b.1 Identification of waste that can be recycled

b.2 Establish linkage with junkshop

b.3 Establish monitoring system.

C. Collection and Disposal:

C.1 Coordination with funeral administration for the collection of segregated solid wastes

C.2 Identification of collection points and schedule of collection

10.1.2 PROJECT 2

I. Title: “Kalikasan at Kalusugan Tungo sa Kaunlaran”

II. Type of Project: Soft Project

III. Implementer: SWMD, CHO, DOH, EHS
IV. Components and Activities:

A. Segregation:

a.1 Conduct meeting with CHO and LIGA to establish coordination
a.2 Coordinate with Public Adm. Hospital to organize core group that will help in the implementation of the project
a.3 Conduct I.E.C. for the medical staff and maintenance
a.4 Conduct WACS with the core group
a.5 Conduct a dry run on the collection of segregated solid waste
a.6 Require provision of receptacles

B. Recycling:

b.1 Coordinate with CHO and LIGA
b.2 Coordinate with Public Adm. Hospital
b.3 Conduct I.E.C. staff hospitals
b.4 Provide T.A. (WACS)
b.5 Establish monitoring system
b.6 Establish linkage with Junkshop and Recycling Industries

C. Proper waste Collection and Disposal

c.1 Coordinate with Adm. Hospitals to identify collection point

10.1.3 PROJECT 3

I. Project Title: WWW.Com

II. Type of Project: Soft Project

III. Implementation: SWMD, DPWH, Barangay

IV. Components and Activities:

A. Segregation:

a.1 Identification of community residents living along waterways
a.2 Establish dialogs with concerned agencies to identify possible solutions on illicit dumping along waterways
a.3 Development of a comprehensive plan that is adaptable and sustainable for the community
a.4 IEC on proper waste disposal to minimized illicit dumping & introduction of segregation scheme.
a.5 Evaluation of segregation compliance
a.6 Coordination with the Barangay on enforcement
a.7 Monitoring
a.8 Integration of the collection schedule with private contractors & identification of a collection point
B. Recycling:

b.1 Conduct IEC regarding waste recycling method
b.2 Establish strong linkage with junkshop operator s & livelihood cooperative
b.3 Evaluation of the recycling method adapted by the community
b.4 Monitoring of the applied system for sustainability

C. Composting:

c.1 Identification of compostable waste & availability of composting area
c.2 Conduct of IEC to technical assistance regarding appropriate composting method
c.3 Coordination with the barangay regarding the applied composting method
c.4 Evaluation & monitoring of the applied composting method for sustainability

D. Collection:

d.1 Set-up Dialogues with the community, barangay & private contractors
d.2 Development of a collection scheme & identification of collection point
d.3 Evaluation of the installed collection scheme
d.4 Enforcement of the installed collection scheme
d.5 Monitoring of the collection scheme for sustainability

10.1.4 PROJECT 4

I. Project Title: Home Along the Estero

II. Type of Project: Soft Project

III. Implementation: Liga Ng Mga Barangay

IV. Components and Activities:

A. Pre-Implementation:

a.1 Coordination with Liga ng mga Barangay, BSWMC, SSD to present the issue, concerning solid ways to the concerned barangay
a.2 Set-up dialogues with concerned agencies on jurisdictional problem on cleaning on water ways
a.3 Conduct consultative meeting with the liga ng mga barangay, BSWMC, SSD, to present the issue concerning solid waste to the concerned barangay.
a.4 Data gathering as to number of residents along water ways SWM
a.5 Education seminar provide to the resident along water ways concerning SWM, particularly waste segregation, recycling, composting, waste collection and disposal, national and local ordinance concerning water ways.
a.6 Draft a comprehensive and integrate plan
B. Implementation:

b.1 Conduct *Oplan Daan Tubig* in identified water ways per barangay with the participation of SWMD, LIGA, BSWMC, and residents along water ways.

C. Post Implementation:

c.1 Encourage BSWMC to formulate and implement policies in maintaining the cleanliness of waterways located within their jurisdiction

c.2 Organize/create monitoring group with in the Brgys.

c.3 Set-up enforcement justifying on violation with in body area

c.4 Provide incentives to the barangay complying and to the barangay with the cleanest and healthiest creek in Makati.

c.5 Establish monitoring system.

10.1.5 PROJECT 5

I. Project Title: “Gulong-Sulong sa Kalinisan”

II. Type of Project: Soft Project


IV. Components and Activities:

2. Organize Vendors and ambulant Vendors per Barangay (per cluster).
3. Determine the wastes generated.
4. Develop profile/policy/plan of SWMD.
5. Integrate action plan regarding activities of SWMD.
6. Encourage vendors to practice proper waste segregation and disposal
7. Integrate collection point with private contractor.
8. Coordinate with Barangay Officials regarding recyclable materials.
9. Establish linkage with junkshop operators
10. Monitoring and evaluation compliance
11. Enforcement.

10.1.6 PROJECT 6

I. Project Title: “Batang Bantay Basura (3B)”

II. Type of Project: Soft Project

III. Implementation: SWMD, DepEd, PTA and school orgs, high school students, Barangay
IV. Components and Activities:

A. Segregation:

a.1 Conduct waste identification on all identified public high schools
a.2 Creation of module for the solid waste management program for the school
a.3 Consultation for the development of the module:
   1.3.1 DepEd and school officials
   1.3.2 Brgy. & community officials
   1.3.3 Officers of school orgs. and PTA
   1.3.4 Canteen operators and non-teaching personnel
a.4 Conduct of IEC per school
a.5 Setting up and activation of waste management plan for identified high school
a.6 Implementation of project
a.7 Creation of incentive system for motivation

B. Recycling:

b.1 Coordination with the community where school is located
b.2 Establish strong linkage with junkshop operators & livelihood cooperative
b.3 Creation of outreach projects within the community where school is located for recycling activity
b.4 Implementation of the outreach project
b.5 Monitoring of the applied system for sustainability

C. Composting:

c.1 Identification of compostable waste & availability of composting area
c.2 Conduct of IEC to technical assistance regarding appropriate composting method
c.3 Coordination with the barangay regarding the applied composting method
c.4 Evaluation & monitoring of the applied composting method for sustainability

D. Collection:

d.1 Set-up Dialogues with the community, barangay & private contractors
d.2 Development of a collection scheme & identification of collection point
d.3 Evaluation of the installed collection scheme
d.4 Enforcement of the installed collection scheme
d.5 Monitoring of the collection scheme for sustainability

10.1.7 PROJECT 7

I. Project Title: “Klinikalinisan”

II. Type of Project: Soft Project

III. Implementation: SWMD, CHO, DOH, EHS
IV. Components and Activities:

A. Segregation:

a.1 Coordination with concerned agencies for profiling
a.2 Developing of profiles per cluster
a.3 Waste characterization with concerned agencies
a.4 Conduct of IEC, documentation and technical assistance
a.5 Identification of applicable segregation scheme
a.6 Activation and set-up of SWM for medical, dental and veterinary clinics
a.7 Enforcement of policies on SWM for monitoring and sustainability

B. Recycling:

b.1 Establish linkage with pharmaceuticals and laboratories for recyclables.

C. Collection:

c.1 Development of a collection scheme & identification of collection point
c.2 Evaluation of the installed collection scheme
c.3 Enforcement of the installed collection scheme
c.4 Monitoring of the collection scheme for sustainability

10.1.8 PROJECT 8

I. Program Title: Makati City Barangay Solid Waste Segregation and Resource Recovery Program

II. PROGRAM COMPONENTS:

PHASE 1: SEVEN (7) BARANGAYS FOR YEAR 1
District 1: Singkamas, Olympia, Valenzuela
District 2: Guadalupe Viejo, Cembo, Guadalupe Nuevo
Plush Subdivision/Bgy.: Bel-Air

Activities:
1. Orientation on RA9003 & City SWM Framework
2. Assist Bgys to set up:
   - WACS
   - Segregation scheme for households, schools, markets, commercial, health care providers
   - Collection scheme of segregated wastes
   - Linkages with junkshops, contractors and stakeholders
   - Recycling and Composting scheme
   - Mobile or on-site MRF
   - Creation of Barangay ordinances and enforcement
   - Documentation and Monitoring system
3. Monitoring and Evaluation of Barangay performance
PHASE 2: SEVEN (7) BARANGAYS FOR YEAR 2  
District 1: Tejeros, Carmona, Kasilawan  
District 2: Pinagkaisahan, Pitugo, South Cembo  
Plush Subdivision/Bgy.: Urdaneta

PHASE 3: SEVEN (7) BARANGAYS FOR YEAR 3  
District 1: San Antonio, La Paz, Sta. Cruz  
District 2: West Rembo, East Rembo, Pembo  
Plush Subdivision/Bgy.: San Lorenzo

10.1.9 PROJECT 9

I. Project Title: “Malinis na Tindahan, Bayan! (MTB)”

II. Type of Project: Soft Project

III. Implementation: SWMD, Liga ng mga Barangay, BSWMC, Permits Division, EEMO

IV. Components and Activities:

A. Segregation:

   a.1 Coordination with LIGA, BSWMC, Permit and EEMO to identify trade and services within target area.
   a.2 Conduct meeting with concerned agencies and identified trade and services (operation manager) to present the issue concerning Solid Waste
   a.3 Data gathering on the number of manpower, waste generated and existing waste management system they implement
   a.4 Conduct consultative meeting with concern agencies to schedule orientation seminar on SWM system specifically waste segregation, recycling, composting, proper waste disposal and ordinances
   a.5 Conduct IEC to develop and install the system of segregation and resource recovery
   a.6 Provide technical assistance (WACS)
   a.7 Encourage BSWMC, EEMO to formulate and implement policies on SWM concern
   a.8 Require provision of receptacles
   a.9 Set-up monitoring system
   a.10 Set-up incentives and award system
   a.11 Enforcement of policies on SWM for monitoring and sustainability
## 10.2. Implementation Schedule

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Annex 4 Approved Budgets for Community-Based Solid Waste Management Projects
## Annex 4

### Approved Budgets for Community-Based Solid Waste Management Projects

#### CBSWM Project Budget – Makati

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<th>Cost Element</th>
<th>Budget (Php)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRF Van</td>
<td></td>
</tr>
<tr>
<td>Van</td>
<td>500,000</td>
</tr>
<tr>
<td>PA system for van</td>
<td>7,000</td>
</tr>
<tr>
<td>Banner sticker for van</td>
<td>55,000</td>
</tr>
<tr>
<td>Sorting bins</td>
<td>100,000</td>
</tr>
<tr>
<td>Total – MRF van</td>
<td>662,000</td>
</tr>
<tr>
<td>MRF Pushcart</td>
<td></td>
</tr>
<tr>
<td>MRF pushcart (10)</td>
<td>300,000</td>
</tr>
<tr>
<td>PA system for MRF pushcarts (10)</td>
<td>50,000</td>
</tr>
<tr>
<td>Banner stickers for pushcarts (10)</td>
<td>100,000</td>
</tr>
<tr>
<td>Sorting bins (50)</td>
<td>163,000</td>
</tr>
<tr>
<td>Total – MRF pushcart</td>
<td>613,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,275,000</strong></td>
</tr>
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</table>

#### CBSWM Project Budget – Muntinlupa

<table>
<thead>
<tr>
<th>Cost Element</th>
<th>Budget (Php)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Expansion of MRF</td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>400,000</td>
</tr>
<tr>
<td>Equipment (compactor, computer, printer, power washer sprayer)</td>
<td>219,000</td>
</tr>
<tr>
<td>Personnel</td>
<td>252,000</td>
</tr>
<tr>
<td>Supplies and materials</td>
<td>70,190</td>
</tr>
<tr>
<td>Total – Expansion of MRF</td>
<td>941,190</td>
</tr>
<tr>
<td>B Shredding of Buko Shells</td>
<td></td>
</tr>
<tr>
<td>Construction of catch basin</td>
<td>13,000</td>
</tr>
<tr>
<td>Personnel</td>
<td>144,000</td>
</tr>
<tr>
<td>Supplies and materials</td>
<td>7,700</td>
</tr>
<tr>
<td>Total – Shredding of buko shells</td>
<td>164,700</td>
</tr>
<tr>
<td>C IEC</td>
<td></td>
</tr>
<tr>
<td>Equipment (video cam, digital camera, PA system, megaphone)</td>
<td>77,400</td>
</tr>
<tr>
<td>Supplies and materials</td>
<td>54,500</td>
</tr>
<tr>
<td>Miscellaneous expense</td>
<td>46,000</td>
</tr>
<tr>
<td>Total – IEC</td>
<td>177,900</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>1,283,790</strong></td>
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CBSWM Project Budget – Pasig

<table>
<thead>
<tr>
<th>Cost Element</th>
<th>Budget (Php)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composting</td>
<td>330,000</td>
</tr>
<tr>
<td>MRF</td>
<td>275,000</td>
</tr>
<tr>
<td>Livelihood project – Doy packs</td>
<td>275,000</td>
</tr>
<tr>
<td>Livelihood project – gardening</td>
<td>110,000</td>
</tr>
<tr>
<td>IEC/case study</td>
<td>275,000</td>
</tr>
<tr>
<td>Subtotal</td>
<td>1,265,000</td>
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<tr>
<td>Contingency</td>
<td>110,000</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>1,375,000</strong></td>
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</tbody>
</table>

CBSWM Project Budget – Quezon City

<table>
<thead>
<tr>
<th>Cost Element</th>
<th>Budget (Php)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong> Capital</td>
<td></td>
</tr>
<tr>
<td>Shredder (1)</td>
<td>193,750</td>
</tr>
<tr>
<td>Rotary composter drum(1)</td>
<td>137,500</td>
</tr>
<tr>
<td>Composter bin (1)</td>
<td>140,000</td>
</tr>
<tr>
<td>Rotary screen (1)</td>
<td>187,500</td>
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<tr>
<td>Greenhouse eco-center</td>
<td>300,000</td>
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<tr>
<td><strong>Total Capital</strong></td>
<td>958,750</td>
</tr>
<tr>
<td><strong>B</strong> Operating Expenses</td>
<td></td>
</tr>
<tr>
<td>Salaries of additional personnel</td>
<td>243,000</td>
</tr>
<tr>
<td>IEC expenses</td>
<td>127,500</td>
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<tr>
<td><strong>Total Operating Expenses</strong></td>
<td>370,500</td>
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<tr>
<td><strong>Subtotal</strong></td>
<td>1,329,250</td>
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<tr>
<td>Contingency</td>
<td>47,938</td>
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<td><strong>Total</strong></td>
<td><strong>1,377,188</strong></td>
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CBSWM Project Budget – Valenzuela

<table>
<thead>
<tr>
<th>Cost Element</th>
<th>Budget (Php)</th>
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</thead>
<tbody>
<tr>
<td>Social mobilization</td>
<td>23,700</td>
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<tr>
<td>Training</td>
<td>137,830</td>
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<tr>
<td>Mini dump truck (incl. 1 yr maint.)</td>
<td>367,500</td>
</tr>
<tr>
<td>Pedicabs (incl. 1 yr maint.)</td>
<td>30,200</td>
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<tr>
<td>Construction of MRF</td>
<td>350,000</td>
</tr>
<tr>
<td>Compost shredder</td>
<td>250,000</td>
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<tr>
<td>Composting tools and materials</td>
<td>27,300</td>
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<tr>
<td>Production of IEC materials</td>
<td>45,000</td>
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<td><strong>Subtotal</strong></td>
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<td>Contingency</td>
<td>18,470</td>
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<td><strong>Total</strong></td>
<td><strong>1,250,000</strong></td>
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