

FINAL REPORT

JANUARY 2007

**PRELIMINARY STUDY FOR
SOLID WASTE MANAGEMENT
IN 3 CITIES: SAGAY, CALBAYOG
AND DAVAO CITIES**

MAIN REPORT



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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

This Study was a result of a proposal made by the National Solid Waste Management Commission (NSWMC), a government agency tasked to assist local government units to develop an appropriate, viable and sustainable solid waste management (SWM) system, to the Japan International Cooperation Agency (JICA) on suitable models for the integrated solid waste management system in the country.

In 2004, on the basis of the said proposal, JICA conducted a "Basic Study on the Selection on High Priority Cities/Municipalities for the Establishment of a Suitable Solid Waste Management System" in collaboration with the NSWMC, which selected 3 out of the 31 priority cities and municipalities. The three (3) cities selected for a technical assistance are Davao, Calbayog, and Sagay.

This Study therefore envisions to draw up a framework for the establishment of a suitable SWM system for the three (3) identified cities. To arrive at an ideal framework; data gathering on existing SWM system, socio-economic conditions and the level of capacity in handling waste disposal were undertaken on each study area. In addition, indicative cost estimates and financial and economic analyses on the proposed solid waste management projects such as sanitary landfills (SLFs), material recovery facilities (MRFs), and composting were prepared. A review of capabilities of said study areas in the implementation of SWM plan, in compliance with Republic Act 9003, otherwise known as the Ecological Solid Waste Management Act of 2000, were further undertaken.

A situational analysis for seven (7) major components of the ISWM system (i.e. waste generation, waste composition, collection and transport, pre-treatment/waste diversion, disposal, operation and maintenance, and organization and institutional arrangement) were conducted in order to have an in-depth assessment on the status and compliance of the three (3) study areas relative to RA 9003.

Results showed that of the 3 cities under study, only Davao has prepared a study on the proposed sanitary landfill project with an estimated project cost of PhP268 million. Operationally, they are efficient in their waste management activities as compared with Calbayog and Sagay Cities. They have already arranged a loan from Landbank of the Philippines for this particular project (SLF). What they only need is heavy equipment for the proposed SLF and capability-building assistance for their personnel and other stakeholders.

Furthermore, Calbayog and Sagay Cities would need more technical assistance in terms of the conduct of waste amount and composition surveys, preparation of a feasibility study for their proposed SWM projects, and capability-building. Funding support on the procurement of heavy equipment and collection trucks is likewise imperative.

It was noted that Calbayog has the lowest volume of garbage collected among the three (3) cities at only 12 tons per day, followed by Sagay (31 tons per day) and Davao (731 tons per day). Because of its geographical location, Calbayog cannot adopt the clustering approach unlike Sagay, which has Cadiz and Escalante as prospective partners. Moreso, Davao has an efficient garbage collection owing to the commissioning of a private contractor for this purpose and a high waste diversion rate of 55.99%.

It was observed that Calbayog has already introduced the MRF in two (2) barangays but would need massive information, education campaign for the adoption and replication of said facility in other barangays. Sagay is effective in its composting activity because of its good quality output which is being patronized by its local populace. On the basis of the data and information gathered

for the three (3) priority cities, each of them has a unique feature as to how they manage and implement their own ISWM plans and programs.

In general after the JICA Study in 2004, the three (3) cities covered by its project have improved a bit in their manner of compliance with RA 9003. One significant common denominator of these sites is their determination and commitment to improve their SWM Program as exemplified by their initiative to implement a sanitary landfill project, through at different stages of development. Davao has already prepared the feasibility study of their SLF and is scheduled to start construction this year in Brgy. New Carmen. Calbayog has so far prepared a conceptual design of their proposed SLF while Sagay has already identifies the site for their proposed SLF. More importantly, all covered LGUs have allocated budget for their future SWM plan and programs, though not sufficient enough except for Davao.

One positive outlook that may further enhance the realization of their SWM plans is the significant increases in their net borrowing capacity, which they could use as leverage.

The financial and economic analyses of four (4) options, namely: Option 1 - LGU operated SLF; Option 2 - Privately operated SLF; Option 3 - LGU operated SLF with Composting; and Option 4 - Privately operated SLF with Composting were presented in order to give an idea on the viability of each option if ever the LGUs of Calbayog and Sagay decide or venture in any one of these choices. It was found out that the most practical decision is to adopt Option 3, which means that the LGU should implement and operate the sanitary landfill project provided that they have to follow a strict standard operating procedure in order to ensure the success of the project.

The proposed SLF projects for the three (3) cities are required to secure an Environmental Compliance Certificated (ECC) prior to implementation. The proposed SLF in Calbayog City will fall under Category 1, while that in Sagay City under Category 2, in which only Initial Environmental Examination (IEE) Checklist is needed by both cities for ECC application as per DENR Memorandum Circular No. 06 Series of 2006 on the adoption of IEE Checklist and IEE Report on the ECC processing of Categorized Final Disposal Facilities (sanitary landfill). Pursuant to this memorandum circular, the proposed SLF in Davao, being under Category 4, must undergo the IEE as contained and mandated through Presidential Decree 586. An IEE Report must be prepared by Davao City for submission to the DENR-EMB Regional Office and will be the basis for the issuance of an ECC for its SLF project.

On its entirety, the study was able to review the relevant policies, legislations, and other legal requirements that would support and enhance a sound solid waste management system anchored on local authorities' capabilities and stakeholders' participation. What is needed is an accurate diagnosis of the overall components that comprise the whole system in order to identify strategic program and projects that would address development gaps that deter the attainment of an ideal ISWM system.

A strong advocacy is a must. The key development players (i.e. local chief executives, heads of government and non-government organizations, socio-civic organizations, rural-based organizations, and other stakeholders) have to converge and commit an equivocal support in the formulation of the strategic policy framework towards a usable and viable ISWM system that is socially and environmentally acceptable to everyone.

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LIST OF ABBREVIATIONS

BCR	Benefit Cost Ratio
BETF	Break-Even Tipping Fee
BEV	Break-Even Volume
BLGF	Bureau of Local Government Finance
BOT	Build-Operate-Transfer
CDF	Controlled Dump Facility
CENRO	City Environment and Natural Resources
CEO	City Engineering Office
CHED	Commission on Higher Education
COA	Commission on Audit
CSWMO	City Solid Waste Management Office
DA	Department of Agriculture
DBP	Development Bank of the Philippines
DENR	Department of Environment and Natural Resources
DepEd	Department of Education
DILG	Department of Interior and Local Government
DOF	Department of Finance
DOH	Department of Health
DOLE	Department of Labor and Employment
DOST	Department of Science and Technology
DPWH	Department of Public Works and Highways
DTI	Department of Trade and Industry
ECA	Environmental Critical Area
ECC	Environmental Compliance Certificate
ECP	Environmental Critical Project
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
EIS	Environmental Impact Statement
EISCP	Environmental Infrastructure Support Credit Program
EMB	Environmental Management Bureau
EMP	Environmental Management Plan
ENPV	Economic Net Present Value
FIRR	Financial Internal Rate of Return
GAGP	Grant Assistance for Grassroots Projects
GSO	General Services Office
IEC	Information Education Campaign
IEE	Initial Environmental Examination
IRA	Internal Revenue Allotment
IROW	Infrastructure Right-of-Way
IRR	Implementing Rules and Regulations
ISWM	Integrated Solid Waste Management
JICA	Japan International Cooperation Agency
JSS	Joint and Several Signatures
LBP	Land Bank of the Philippines
LCP	League of Cities of the Philippines
LGU	Local Government Unit
LGUSCP	Local Government Unit Support Credit Program
LMP	League of Municipalities of the Philippines
LPP	League of Provinces of the Philippines
MGB	Mines and Geosciences Bureau

MBUSSP	Mindanao Basic Urban Services Sector Project
MDFO	Municipal Development Fund Office
	Metropolitan Manila Development
MMDA	Authority
MOFA	Ministry of Foreign Affairs
MOOE	Maintenance, Operating and Overhead Expenses
MRF	Materials Recovery Facility
MSW	Municipal Solid Waste
NBC	Net Borrowing Capacity
NEDA	National Economic Development Authority
NGO	Non-Government Organization
NPV	Net Present Value
NSO	National Statistics Office
NSWMC	National Solid Waste Management Commission
PD	Presidential Decree
PIA	Philippine Information Agency
PIU	Project Implementation Unit
PMU	Project Management Unit
PP	Presidential Proclamation
RA	Republic Act
SLF	Sanitary Landfill Facility
SSWMP	Sustainable Solid Waste Management Program
SWM	Solid Waste Management
SWMC	Solid Waste Management Council
SWMP	Solid Waste Management Program
TA	Technical Assistance
TCT	Transfer of Certificate Title
TD	Technical Description
TESDA	Technical Education and Skills Development Authority
ToR	Terms of Reference
WACC	Weighted Average Cost of Capital
WACS	Waste Amount and Characterization Survey
WAECC	Weighted Average Economic Cost of Capital
WDDP	Water District Development Project

Chapter

1

Introduction

CHAPTER 1 INTRODUCTION

1.1 PROJECT BACKGROUND

1.1.1 The Japan International Cooperation Agency (JICA) Assistance

The National Solid Waste Management Commission (NSWMC) is tasked to assist Local Government Units (LGUs) to develop an appropriate, viable, and sustainable solid waste management system that maybe adopted by cities and municipalities, in accordance with the provisions of the Ecological Solid Waste Management Act of 2000 (RA 9003). With this mandate, the NSWMC in 2003 proposed to Japan International Cooperation Agency (JICA) the identification of cities/municipalities that would serve as models for waste management systems.

In 2004, JICA conducted the "Basic Study on the Selection of High Priority Cities/Municipalities for the Establishment of a Suitable Solid Waste Management System". The NSWMC selected 31 cities/municipalities for the study which focused on four aspects: Economic/Financial; Socio-Economic; Existing Solid Waste Management System and Local Conditions; and Initiatives to promote the introduction of SWM facilities. The LGUs were evaluated for all the indices developed in accordance with the objectives of the study. The NSWMC in 2005 requested the Japanese Government for the provisions of technical assistance to 3 LGUs proposed to be model cities/municipalities. These are Sagay City, Negros Occidental; Calbayog City, Samar; and the Municipality of Rodriguez, Rizal. However in June 2006, Rodriguez withdrew its request for technical assistance from JICA. The NSWMC replaced Rodriguez with Davao City. Upon field visit in Davao City, the JICA staff was informed that the LGU has applied for a loan with Land Bank for the construction of a sanitary landfill. Thus, Davao City requests that assistance be possibly focused in their equipment requirements and capacity building in the operation and maintenance of the landfill, and enhance management capability in its solid waste management program.

In 2006, JICA approved the request of NSWMC for technical cooperation for the Introduction of Suitable Solid Waste Management System in the three cities. JICA assistance will be in the form of technical cooperation to provide capacity development for LGUs to manage and operate sanitary landfills. It is understood that the LGUs will be responsible in securing development loans for the infrastructure component from government banks, like the Land Bank of the Philippines (LBP) and Development Bank of the Philippines (DBP). The technical cooperation of JICA for this project is proposed for a period of four (4) years for the establishment of a suitable Solid Waste Management System for these model LGUs.

It is in this regard that JICA contracted Woodfields Consultants, Inc. (WCI) to conduct a Preliminary Study for Solid Waste Management in Three Cities: Sagay, Calbayog, and Davao Cities.

1.1.2 National Strategy to Improve Solid Waste Management

In recent years, problems on solid waste management have attracted greater attention all over the world as solid waste generated increases both in volume and variety, causing ever-increasing adverse impacts on health and environment.

Solid waste management problems in any municipality are quite unique, requiring special attention by the decision-makers in charge of the solid waste management.

Solid waste management is one of the basic services provided by local government units (LGUs). Traditionally, the operational responsibility on the provision of basic services related to solid waste management has been placed on the municipal mayors.

National agencies have often had a direct interphase with LGUs in the provision of services on health, agriculture, infrastructure and water supply except on solid waste management. This is one of the areas where LGUs have been expected to operate within the framework of the environmental and sanitary codes. The passing of the Local Government Code has reinforced the role of LGUs in solid waste management, making the cities and municipalities responsible for system framework formulation.

The signing of the Ecological Solid Waste Management Act of 2000 (RA 9003), stipulates that the solid waste management system of LGUs should be as holistic and comprehensive as possible. As such, options such as composting, recycling, resource recovery and other alternative technologies should also be drawn up, not only the final disposal facility through sanitary landfilling.

RA 9003 necessitates the formulation of 10-year local government solid waste management plans consistent with the national solid waste management systems framework. General considerations of the plan include the following:

The plan shall be for the re-use, recycling and composting of waste while identifying the amount of landfill and transformation capacity that will be needed for solid waste, which cannot be recycled, re-use or composted.

The plan shall contain all components of Section 17 of the Act that includes:

1. *City/Municipal Profile*
2. *Waste Characterization*
3. *Collection and Transfer*
4. *Processing*
5. *Source Reduction*
6. *Recycling*

It shall be reviewed and updated every year by the provincial, city or municipal solid waste management board.

RA 9003 has initially drawn up the standard criteria of an ideal solid waste management plan. The act states that a good solid waste management program must be able to attain the following with respect to the different stages and systems:

- Generation - garbage at source should be reduced, reused, and/or recycled in a cost efficient and cost beneficial manner with economic returns.
- Collection - garbage collection must be done hygienically, effectively and regularly.
- Storage/Processing - as an intermediate step, waste storage and processing must be handled hygienically and effectively with the maximum range of economic return. The process must be environment friendly and socially acceptable.
- Transfer/Transport - the transfer of the garbage from one place to another must be done efficiently and hygienically and must be socially acceptable. A properly designed transfer and transport system must reduce overall cost of collection from on-site storage to final disposal site.
- Disposal - garbage disposal or technology must be hygienic, efficient, cost effective, environmentally sound and socially acceptable.

1.2 PROJECT OBJECTIVES

1.2.1 Overall Objective

The main objective of the project is to draw up a framework for the establishment of a suitable solid waste management system for the three cities.

1.2.2 Key Objectives

The key objectives include the following:

1. To conduct data gathering in the cities on the existing Solid Waste Management (SWM) system, socio-economic conditions and level of capacity in handling waste disposal.
2. To prepare rough cost estimates and financial analysis on the proposed sanitary landfills and materials recovery facilities in the 3 cities.
3. To review capabilities of the 3 cities in the implementation of solid waste management plan in compliance to RA 9003.

1.3 METHODOLOGY

The Study revolves within the context of an ideal Integrated Solid Waste Management (ISWM) System that should be put in place. In order to attain such vision and final output, an exhaustive assessment of the existing situation of the Study Areas, namely: Sagay, Calbayog, and Davao Cities, have been conducted.

The situational analysis covered the assessment of major components of an ISWM system in each Study Area (i.e. waste generation, waste disposal, operation and management, etc.). Identification of the various problems, issues and constraints and other underlying legal impediments that deter the efficient implementation and operation of an ISWM system were further analyzed.

A review of available literature on the ISWM system covering the mandates, operational guidelines, funding support, related studies and the likes, were also undertaken in order give a comprehensive outlook on the existing dynamics on environmental laws and concerns. After which, strategic options that would address the gaps were identified and evaluated as to their relevance, importance and magnitude for an ideal ISWM system.

Best options were chosen and further analyzed on their merits that are contributory to the implementation of the various programs and projects that would ultimately improve the implementation of RA 9003, thus, alleviating environmental degeneration. Shown in **Figure 1.1** is the process how this study was done.

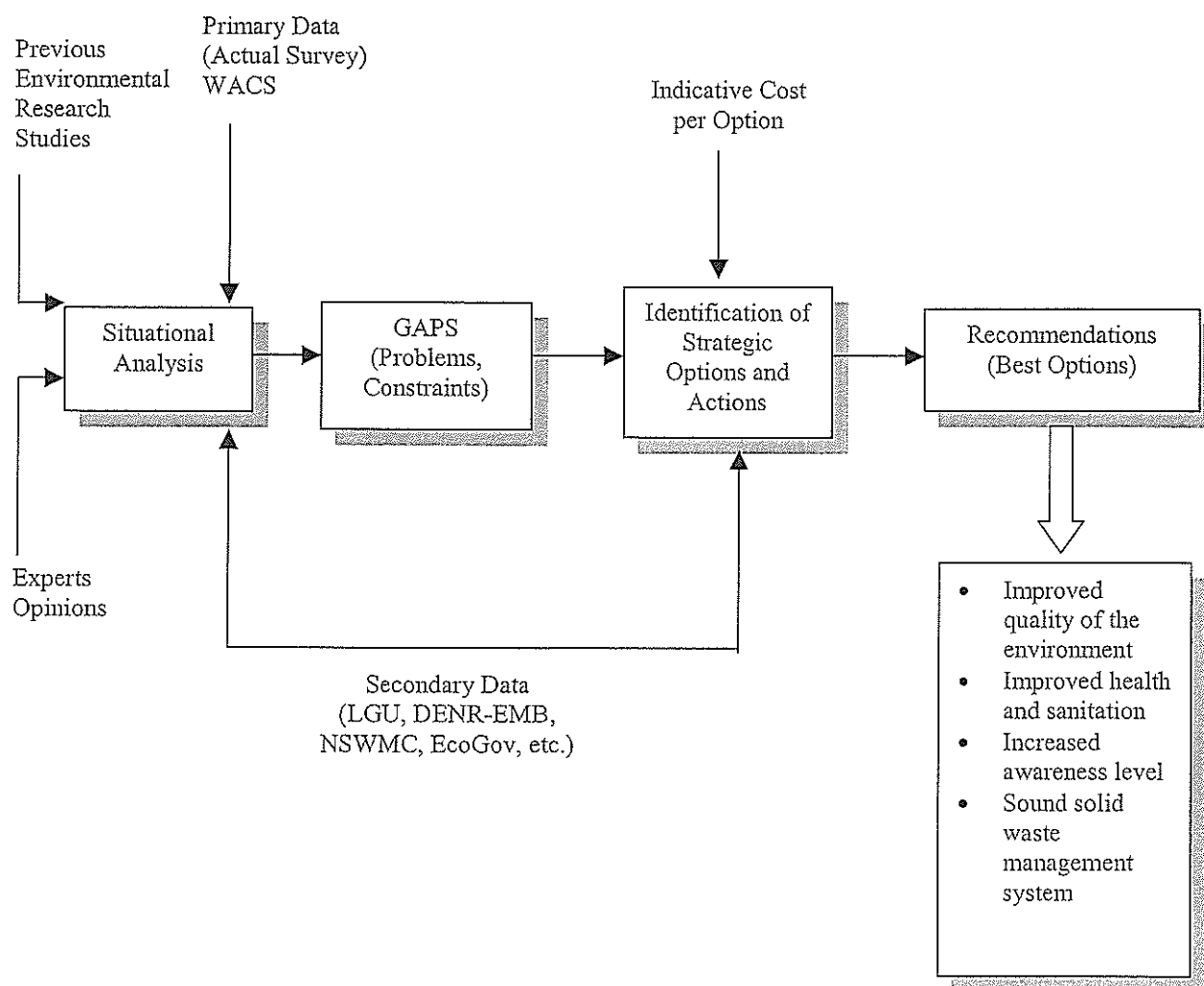


Figure 1.1 Methodology

Chapter 2

Review of Institutional, Legislative and Regulatory Framework for Ecological Solid Waste Management

CHAPTER 2 REVIEW OF INSTITUTIONAL, LEGISLATIVE AND REGULATORY FRAMEWORK FOR ECO- LOGICAL SOLID WASTE MANAGEMENT

2.1 GENERAL

This chapter reviews all pertinent institutional legislative and regulatory framework for ecological solid waste management in the Philippines in order to identify consistencies on the rules and regulations governing the implementation and enforcement of the Republic Act 9003 "Ecological Solid Waste Management Act". Likewise, this would supplement discussions on the relevant findings on the status of the three study areas i.e. Davao, Calbayog and Sagay Cities, in relation to their compliance on the said Act.

2.2 REPUBLIC ACT 9003

Better known as "*The Ecological Solid Waste Management Act*", it was passed into law in January 2001 and the first law signed by President Gloria M. Arroyo. Its Implementing Rules and Regulations (IRR) was published in December 2001.

The highlights of this Act are:

- provides comprehensive and integrated solution;
- starts with waste reduction at source;
- recognizes that some components of waste are still useful;
- mandates segregation at source;
- requires all barangays to set up Materials Recovery Facility (MRF), and collect segregated waste to encourage recycling and composting in the municipality or city only to collect residual waste;
- bans open burning;
- mandates collection of garbage fees from all generators;
- sets up solid waste management (SWM) Fund; and
- requires shift to controlled dumping in 3 yrs and to sanitary landfill (SLF) in 5 years.

Mandatory Requirements of the Act includes:

- Preparation of the 10-year Local Government Solid Waste Management Plan;
- 25% waste diversion goal;
- Volume reduction and waste reduction at source;
- Segregated waste collection;
- Establishment of Material Recovery Facility;
- Closure/conversion of open dumpsites into controlled disposal facility; and controlled dumpsites into categorized sanitary landfill.

Furthermore, Republic Act 9003 pertains specifically to solid waste management which consolidates all laws, decrees, rules and regulations which were previously enacted or issued. Section 65 of this Act provides for the repealing clause which states that "All laws, decrees, issuances, rules and regulations, or parts thereof inconsistent with the provisions of this Act are hereby repealed or modified accordingly". This means that previous laws, decrees, including that of all laws promulgated during the Martial Law regime are still enforceable in parts as long as they are not inconsistent with the provisions of RA 9003 until repealed by an act of Congress.

2.2.1 Functions / Mandates of Other Government Agencies / Institutions in the Implementation of RA 9003

The National Solid Waste Management Commission (NSWMC) was also created and tasked to be the overall agency to ensure the implementation of RA 9003.

The Commission is composed of fourteen (14) members from the government sector and three (3) members from the private sector. The heads of the following agencies, in their *ex-officio* capacity, represent the government sector:

- Department of Environment and Natural Resources (DENR);
- Department of Interior and Local Government (DILG);
- Department of Science and Technology (DOST);
- Department of Public Works and Highways (DPWH);
- Department of Health (DOH);
- Department of Trade and Industry (DTI);
- Department of Agriculture (DA);
- Metro Manila Development Authority (MMDA);
- League of Provinces of the Philippines (LPP);
- League of Cities of the Philippines (LCP);
- League of Municipalities of the Philippines (LMP);
- Liga ng Mga Barangay;
- Technical Education and Skills Development Authority (TESDA); and
- Philippine Information Agency (PIA).

2.2.2 Main Component of RA 9003

2.2.2.1 Education and Public Information

The education and public information component shall describe how the LGU will educate and inform its citizens about the source reduction, recycling, and composting programs.

2.2.2.2 Implementation of the Ecological Solid Waste Management Systems

The implementation of RA 9003 shall fundamentally take into account the management of waste in the following hierarchy:

- Source reduction and minimization of wastes generated at source;
- Resource recovery, recycling and reuse of wastes at the barangay;
- Efficient collection, proper transfer and transport of wastes by city/municipality; and
- Efficient management of residuals and of final disposal sites and/or any other related technologies for the destruction/reuse of residuals.

2.2.2.3 Waste Segregation and Volume Reduction at Source

Volume reduction at the source shall be the first priority of the ecological SWM system. All LGUs shall actively promote among its constituencies the reduction and minimization of wastes generated at source; responsibility for sorting and segregation of biodegradable and non-biodegradable wastes shall be at the household level and all other sources.

2.2.2.4 Research on Solid Waste Management

The DENR, in consultations with the cooperating agencies, shall encourage, cooperate with and may render financial and other assistance to appropriate government agencies, academe, private institutions and individuals in the conduct and promotion of researches, experiments, and other studies on solid waste management.

2.2.2.5 Environmental Education in the Formal and Non-formal Sectors

The Department of Education (DepEd), the Technical Education and Skills Development Authority (TESDA), the Commission on Higher Education (CHED), the Department of Environmental and Natural Resources (DENR), and other concerned government agencies, shall aggressively incorporate ecological waste management in the school systems at all levels, emphasizing the involvement of the school administrators, teaching and non-teaching staff, and studentry in school-wide and nearby community waste management actions, and in the strengthening of the waste management content in the curricula.

2.2.2.6 Public Education and Information

The Department of Interior and Local Governments (DILG) and its leagues, in coordination with the National Ecology Center and its local counterparts, shall ensure active education and public information on waste management of every local government unit, down to the barangay level.

2.2.2.7 The Mandates of the National Solid Waste Management Commission

Specifically, RA 9003 stipulates that the:

The Department of Environment and Natural Resources, through the Environmental Management Bureau, shall provide secretariat support to the Commission. An Executive Director who shall be nominated by the members of the Commission and appointed by the Chairman of the Commission shall head the Secretariat. The general functions of the Secretariat are the following:

- a) Prepare all pertinent documents for deliberation by the Commission;
- b) Record and document all the proceedings of the meetings;
- c) Handle all the administrative requisites of the Commission;
- d) Index and keep all records used and referenced by the Commission;
- e) Serve as the clearinghouse for all projects/programs for implementation by the LGUs and/or the public or private sector;
- f) Evaluate and review proposals submitted for funding support from the Solid Waste Management Fund; and
- g) Perform all other functions as may be deemed necessary by the Commission.

For the furtherance of the objectives of the Act, the Department shall have the following functions:

- a) Chair the Commission created pursuant to the Act;
- b) Prepare an annual National Solid Waste Management Status Report;
- c) Prepare and distribute information, education and communication materials on solid waste management;
- d) Establish methods and other parameters for the measurement of waste reduction, collection and disposal;

- e) Provide technical and other capability building assistance and support to the LGUs in the development and implementation of local solid waste management plans and programs;
- f) Recommend policies to eliminate barriers to waste reduction programs;
- g) Exercise visitorial and enforcement powers to ensure strict compliance with the Act;
- h) Issue rules and regulations to effectively implement the provisions of the Act; and
- i) Perform such other powers and functions necessary to achieve the objectives of the Act.

2.2.3 The Current Activities of the National Solid Waste Management Commission (NSWMC)

The current activities of NSWMC are centered on their Flagship Programs on Ecological Solid Waste Management. The Flagship Programs of the Ecological Solid Waste Management is divided into four (4) main categories/activities namely:

1. LGU-wide Eco-waste Management System
2. Technical Assistance in the in the closure and rehabilitation of open dumpsites and controlled disposal facilities (CDF);
3. Technical Assistance in the Categorized Compliance of waste disposal facilities;
4. Endorsement of regional reports for the filing of citizen suits against LGUs violating provisions of RA 9003.

Summary programs of the four main categories/activities are as follows:

1. LGU-wide Eco-waste Management System
 - Consolidation of reports on the Implementation of LGU-wide eco-waste management system in 48 model LGUs (2003 – 2007)
 - Segregation at source
 - Segregated collection
 - MRF establishment
 - Environmentally sound disposal facility
 - Coverage - Nationwide
 - 112 new model LGUs
 - 2008 – 2010
 - These LGUs will serve as models in the implementation of the ESWM Law.
2. Technical Assistance in the closure and rehabilitation of open dumpsites and controlled disposal facilities (CDF)
 - Coverage - Nationwide
 - 741 open dumpsites (as of September 2005)
 - Formulation of guidelines on the rehabilitation of open dumpsites and controlled disposal facilities
 - Capability building for the DENR CENROs and PENROs (2006)
 - Technical assistance will be extended in the closure of the identified open dumpsites and controlled dump facilities
3. Technical Assistance in the Categorized Compliance of waste disposal facilities
 - Coverage – Nationwide
 - Formulation of guidelines on the Categorized Compliance of waste disposal facilities

- Technical assistance will be extended to all LGUs in complying with the categorized compliance guidelines (2006)
 - Capability building for the DENR CENROs and PENROs (2006)
 - Technical assistance will be provided in the development of Sanitary Landfill Facilities for 159 SLF proposals (potential sites)
4. Endorsement of regional reports for the filing of citizen suits against LGUs violating provisions of RA 9003
- Coverage – Nationwide
 - Identification of LGUs per region repeatedly violating the following:
 - Section 21 - Segregation at Source
 - Section 22 - Segregated Collection
 - Section 32 - Materials Recovery Facility
 - Section 37 - Prohibition on Open Dumping

2.3 REPUBLIC ACT 6969

Republic Act 6969 also known as Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990 aims to regulate, restrict or prohibit the importation, manufacture, processing, sale, distribution, use and **disposal of chemical substances and mixtures that present unreasonable risk and/or injury to health or environment**. It also prohibits the entry or even in-transit of hazardous and nuclear waste and disposal in the Philippine territorial limits. The Act also provides for the advancement and conduct of research and studies on toxic chemicals.

To enforce the execution of this Act, the Department of Environment and Natural Resources (DENR) is designated as the implementing agency. Among the powers and responsibilities of DENR are:

- a) Conduct inventory of chemicals that are presently manufactured or used;
- b) Require chemical substances and mixtures which pose unreasonable risk for testing before and during the manufacture and imported for the first time;
- c) Evaluate the characteristics of the chemicals tested to determine its toxicity and its effects;
- d) Enter into contracts for research, development and monitoring of chemical substances or mixtures;
- e) Conduct inspection of any establishment in which chemicals are manufactured, processed, stored before and after distribution and recommends measures;
- f) Confiscate or impound chemicals found not within the standard of the rules and regulation of the Act;
- g) Monitor and prevent entry of hazardous and nuclear wastes and their disposal;
- h) Call government agencies and other instrumentalities for assistance in the discharge of its functions; and
- i) Disseminate information and educational awareness campaign on the effects of the chemical substances and mixtures and wastes on health and environment.

Also created under this law is the Inter-Agency Technical Advisory Council chaired by the Secretary of DENR which will assist DENR in the formulation of rules and regulations, updating of chemical inventory, and evaluation of chemical characteristics and determine its toxicity and impacts on health and environment. The Council is composed of representatives (department secretaries) from Department of Health, Philippine Nuclear Research Institute, Department of Trade and Industry, Department of Science and Technology, Department of National Defense,

Department of Foreign Affairs, Department of Labor and Employment, Department of Finance, Department of Agriculture, and Non-Government Organization.

DENR Administrative Order Series of 1992 (DAO 29) is the implementing rules and regulations of RA 6969. It stipulates the mechanics and requirements of management of toxic substances and hazardous wastes and provides the penalties for the violations of RA 6969.

DAO 29 provides the complete list of chemicals substances, toxic, and hazardous wastes. Among the hazardous wastes listed by class are: alkali, inorganic chemicals, reactive chemicals, paints, resins, lattices, adhesives, organic sludge, textile, oil putrescible organic waste, and others (medical, asbestos, pesticides, etc.).

The management of health care waste is implemented by the Department of Health (DOH). These guidelines for waste handling, treatment, and disposal were prepared by DOH. Health care wastes include wastes coming from hospitals, medical and dental clinics, veterinary hospitals and other clinics.

2.4 JOINT DENR-DOH ADMINISTRATIVE ORDER NO. 92 (JAO No. 92)

This administrative order which was issued on August 24, 2005 involves the policies and guidelines on the effective and proper handling, collection, transport, storage and disposal of health care wastes. The objectives of JAO No.92 are: to provide guidelines to generators, transporters, owners or operators of treatment, storage, and disposal (TSD) facilities of health care wastes on handling, collection, transport, storage and disposal; to clarify the jurisdiction, authority and responsibilities of DENR and DOH; and to harmonize efforts of both on health care waste management.

The guidelines and procedures include environmental compliance requirements in consonance with Toxic and Hazardous Act (RA 6969), Ecological Solid Waste Management Act (RA 9003), Clean Air Act (RA 8749), Sanitation Code of the Philippines (PD 856), Clean Water Act (RA 9275), EIS System (PD 1586), and Hospital Licensure Act (RA 4226).

For Sanitary Landfill Facility, a dedicated cell for treated health care waste should be built and developed prior to operation to avoid mixing with municipal solid waste and other wastes.

For the purpose of this Order, health care wastes are classified as: general waste; infectious waste; pathological waste; sharps; pharmaceutical waste; genotoxic waste, chemical waste, waste with high content of heavy metal; pressurized containers and radioactive waste.

2.5 NATIONAL LEGISLATION

The following legal documents are considered of importance in the context of this study:

1. *Presidential Decree 825*, the Garbage Disposal Law, which prohibits littering in public places and makes it the responsibility of residents, institutions, commercial and industrial establishments, etc. to clean their surroundings, including streets, and canals adjacent to their properties. It provides penalties for the improper disposal of garbage and other forms of unhygienic practices.
2. *Presidential Decree 856*, the Philippine Code of Sanitation, which prescribes sanitation requirements for food establishments and the refuse collection and disposal systems in cities and municipalities.

3. *Presidential Decree 984*, revising the Republic Act 3931, commonly known as the Pollution Control Law. It prescribes the general manner in which solid wastes shall be stored, collected, processed, transported and disposed of.
4. *Letter of Instruction 588*, addressing the Commissioner of the National Pollution Control Commission, presently the Director of the Environmental Management Bureau, heads of authorities, mayors of cities and municipalities, heads of government-owned or controlled corporations to appoint their respective Pollution Control Officers, to enforce the rules and regulations implementing Presidential Decree 984.
5. *Presidential Decree 9951*, declaring the Philippines Environmental Policy.
6. *Presidential Decree 1152*, consolidating the Philippine Environmental Code Title V refers to solid waste management and requires the preparation and implementation of a waste management program by all cities and municipalities. Specifically, it provides that solid waste disposal shall be by sanitary landfill, incineration, composting and other methods as may be approved by a competent government authority.
7. *Presidential Decree 1160*, vesting authority on barangay chairman to enforce pollution control and environmental laws.
8. *Presidential Decree 1586*, establishing an Environmental Impact Statement System including other environmental management related measures.
9. *Presidential Decree 2146*, defining scope and coverage of the Environmental Impact Statement System and providing that infrastructure, including solid wastes disposal projects, are considered environmentally critical projects and thus are subject to the Environmental Impact Statement System.
10. *General Order 13*, stating the responsibility of keeping the surrounding clean.
11. *Executive Order 32*, establishing national and local beautification committees to undertake beautification and cleanliness campaign.
12. *Section 2238 of the Revised Administrative Code*, stipulating the general powers of local councils to enact ordinances and make such regulations on health and safety for the comfort and convenience of the community and the protection of property therein.
13. *Republic Act 6969*, the toxic Substances and Hazardous and Nuclear Wastes Control Act.
14. *Republic Act 7160*, The Philippine Local Government Code, devolving certain powers and responsibilities to the local government units, including the preparation and enforcement of their respective solid wastes management programs and the enforcement of laws on cleanliness, sanitation and other environmental matters.
15. *Republic Act 6957*, amended by 7718, the Built-Operate-Transfer Law, providing that infrastructure and development projects normally financed by and operated by the public sector, such as solid waste management, maybe wholly or partially implemented by the private sector.
16. *Memorandum Circular 30*, creating the Presidential Task Force on Waste Management, the Project Management Office and the adoption of the Integrated National Solid Wastes Management Framework. This framework serves as the legal basis for the formulation of succeeding programs on solid wastes management in the Philippines including the

creation of the National Solid Waste Management Commission (NSWMC), and the formulation of RA 9003.

17. *Republic Act 6957, amended by 7718, The Built-Operate-Transfer Law*, providing that infrastructure and development projects normally financed and operated by the public sector, such as solid waste management, maybe wholly or partially implemented by the private sector.
18. *Technical Guidebook on Solid Waste Disposal Design and Operation, First Version 2005, National Solid Waste Management Commission (NSWMC)*, covers the development of new Sanitary Landfill in the Philippines and the Staged-Compliance Program for disposal facilities by local government units.
19. *Guidebook for Safe Closure of Disposal Sites, First Edition 2006, National Solid Waste Management Commission*, highlights the systems necessary for the safe closure of open dumpsites and controlled dump facilities. It also provides appropriate engineering measures on the post closure management and other recommendations on the post closure land use of all disposal sites.
20. *DENR Memorandum Circular No. 6*, the adaption of IEE Checklist and IEE Report on the ECC Processing of Categorized Final Disposal Facility. It is to streamline the requirements and procedures of the Environmental Impact Statement System as provided in the DAO 2003-30 and AO No. 42-2002.

It is emphasized that the laws issued during Martial Law (PDs, EOs, etc.) is still relevant at this point in time and were not superceded by RA 9003. Only parts or sections of the laws are amended, modified or superceded and not the entire PDs or EOs because of the Final Provisions under RA 9003 which states that:

“PART VII. FINAL PROVISIONS”

Section 1. Separability Clause

If any section or provision of these Rules and Regulations is held or declared unconstitutional or invalid by a competent court, the other sections or provisions hereof shall continue to be in force as if the sections or provisions so annulled or voided had never been incorporated herein.

Section 2. Repealing Clause

All Rules and Regulations or parts of said rules and regulations of pertinent laws inconsistent with these Rules and Regulations are hereby revised, amended, modified and/or superseded as the case may be by these Rules and Regulations.

Chapter 3

Review of JICA Basic Study on the Selection of
High Priority Cities / Municipalities
for the Establishment of a Suitable
Solid Waste Management System

CHAPTER 3 REVIEW OF JICA BASIC STUDY ON THE SELECTION OF HIGH PRIORITY CITIES / MUNICIPALITIES FOR THE ESTABLISHMENT OF A SUITABLE SOLID WASTE MANAGEMENT (SWM) SYSTEM

As part of the National Solid Waste Management Commission's (NSWMC) task of developing an "appropriate, viable and sustainable solid waste management" in the country, JICA in coordination with NSWMC conducted a study, which is aimed at determining priority areas for the establishment of solid waste management system. The NSWMC has selected 32 cities and municipalities, among them were the Cities of Davao, Calbayog and Sagay.

This chapter discusses the outcome of the mentioned basic study in 2004 and what changes have been made so far after two (2) years in consonance with RA 9003.

3.1 SELECTION CRITERIA

The 31 cities and municipalities and one area were evaluated using the following criteria: economic/finance, socio-economic, SWM system and local condition, and intention to promote the introduction of SWM facilities.

The economic and financial criteria grouped the cities and municipalities from A to D. Those LGUs which have good record of economic and financial performance in terms of ability to mobilize funding for large infrastructure projects like waste processing plants and disposal facilities are categorized as A, the highest level. The evaluation was based on the validated primary and secondary data pertaining CY 2004 budget, income and expenditures and borrowing capacities of the cities and municipalities.

The socio-economic indices include geographical location which measures the accessibility of the LGU to Metro Manila or Regional Center, population which measures potential beneficiaries and SWM interventions, economic development which measure the degree of the economic development, land use which is measured in terms of area devoted to residents and agricultural uses, infrastructure development which is indicative of readiness to undertake SWM interventions, tourism potential which measures the overall contribution and economic significance of tourism to the local economy, and political stability which measures the cooperation and unity among and between local and provincial officials.

The SWM system aspect refers to two categories: 1) the actual activities of the LGU which involve SWM Board, SWM Plan, SWM Organization, legal framework, IEC, other SWM programs and initiatives; and 2) the present condition of the SWM system which includes: service area, resource recovery, collection vehicles and final disposal site.

The local environment was evaluated based on four indices composed of: general sanitation condition of the LGU, physical condition of the final disposal site, socio-economic concerns about the operation of the disposal site, and proximity of the disposal site to the residential areas and water resources.

The intention aspect involves the degree of commitment of the local government unit to implement the provisions of RA 9003. Four indices were considered in evaluating this criteria namely: actions taken by the LGU such as policy pronouncement on SWM concerns, appropriating adequate funds for SWM, etc; financial schemes or arranging funding support for implementation of projects; plans that show cost recovery schemes for projects to be

implemented; and the ratio of cost for SWM services must be greater than 8% of the future budget or the concern of local officials to allocate adequate funds to sustain operation and maintenance of SWM facilities.

3.2 RESULTS OF THE STUDY

3.2.1 Davao City

In the Economic/Finance Aspect, Davao City was classified as Group A garnering 28 points out of the maximum points of 38, the highest among the top four cities (Batangas City, Cabuyao, and Puerto Princesa). It earned the distinction of having the highest net borrowing capacity and budget of PhP 2.billion plus among the 31 cities and municipalities. Its population in the NSO Survey of CY 2000 was recorded at 1,147,116.

Davao City which was classified as Group A got 38 points out of the 48 points maximum and ranked seventh in socio-economic ranking. As evaluated, Davao City had good performance in economic development except for the infrastructure aspect where it earned no point and only three points in land use due to its large land area (244,000 hectares), wherein infrastructures are located only in built-up areas and small percentage of the residential and commercial areas against the total area.

For SWM aspect, Davao City belonged to Group A, which is highly rated. This is attributed to its solid waste management activities, such as presence of SWM Board, SWM Office, SWM Plan, ordinances, and others, which were rated A, and SWM conditions like segregation, recycling, MRF and others, which were rated B.

Davao City was rated B in the local environment aspect, which means fairly good. Under this category are cities and municipalities, which earned scores from 31 points to 45 points.

For Intention aspect, four indices were used with ratings from A to D, with Rate A as the highest. The City of Davao got a rating of A, A, B and B. The A rating for the first two indices is due to the following: 1) the intention of the LGU to introduce suitable SWM facilities has been demonstrated, equipment have been purchased; and 2) local government has identified proposed sanitary landfill sites and has coordinated with DENR on the evaluation of these sites. The B ratings are due to the limited cost recovery and budgetary constraints.

3.2.2 Calbayog City

For the Economic/Finance evaluation, Calbayog City garnered 22 points, broken down as: budget per capita, PhP 2,702.92 (2 points); IRA share per capita, PhP 2,385.65 (3 points); annual expenditure per capita, PhP 1,211.96; income class, first class (12 points); net borrowing capacity, PhP 64 million (2 points); and ratio of SWM expenditure to total budget, 8% (1 point).

Calbayog City under Group B scored 31 points from: location (2 points); population (4 points); economic development (6 points); land use (3 points), infrastructures (2 points); tourism (8 points), and political stability (6 points).

Calbayog City was rated D in SWM activities because of the existence of the SWM Board, SWM Office, and rated A in SWM conditions due to segregation, recycling, and others. Overall, this means that Calbayog City had moderate compliance of SWM requirements and RA 9003.

The evaluation of Calbayog City on the local environment aspect yielded a rating of B, which means fairly good.

The City was rated A for the first Intention Index because of its readiness to accept a suitable SWM facility, and rated B, B, and B for the last three Intention indices due its limited financial capability. Under this group, LGUs are candidates for soft loans and grant component and technical assistance due to limited financial capabilities.

3.2.3 Sagay City

Sagay City was among the 18 LGUs, which fall under Group B (17-24 points) in the Economic/Finance Aspect. It accumulated 18 points from: budget per capita, Php1,946.34 (1 point); real property per capita, Php 217.42 (1 point); IRA share, Php 1,729.26 (2 points); annual expenditure, Php 1,224.95 (2 points); income class, second class (11 points); and net borrowing capacity, Php 31 million (1 point).

In socio-economic aspect of the Study, Sagay earned a total of 26 points under Group B from: location (2 points), population (2 points), economic development (5 points), land use (3 points), infrastructures (2 points), tourism (6 points), and political stability (6 points).

The City was rated B both in SWM activities and conditions. This rating is attributed to the presence of SWM Board, GSO, SWM Plan, source segregation, recycling, and others. This means that Sagay had moderate compliance with SWM requirements and RA 9003.

The City of Sagay got a rating of B for local environment criteria, which means fairly good.

The only City which got a rating of B, B, B, and B due to the fact that during field visit, the LGU did not have firm plans of introducing suitable SWM facilities.

3.3 COMPARATIVE RESULTS OF THE 2004 JICA BASIC STUDY ON THE SELECTION OF HIGH PRIORITY CITIES FOR THE ESTABLISHMENT OF A SUITABLE SOLID WASTE MANAGEMENT (SWM) SYSTEM TO THAT OF THE PRESENT SWM SITUATION (2007) IN JICA'S THREE (3) CITIES PROJECT

AREA	YEAR	ECONOMIC / FINANCIAL		ACTUAL ACTIVITIES OF THE LGU					
		Net Borrowing Capacity	Income Class	SWM Board	Actual SWM Plan	SWM Organization	Legal Framework	IEC	SWM Program
Davao City	2004	Php 399M - 350 M+	1st Class	√	√	CENRO	√	√	√ (sufficient)
	2006	Php 1.64B	1st Class	√	√	CENRO	√	√	√ (sufficient)
Calbayog City	2004	Php 64M - 350 M+	1st Class	√	x	√	√	√	√ (sufficient)
	2006	Php 269M	1st Class	√	√	√	√	√	√ (sufficient)
Sagay City	2004	Php 31M - 350M+	2nd Class	√	√	GSO	√	√	√ (sufficient)
	2006	Php 120M	2nd Class	√	√	√	√	√	√ (sufficient)

AREA	YEAR	CURRENT SOLID WASTE MANAGEMENT							INTENTION	
		Source Segregation	Recycling	MRF	Collection	Collection Vehicle	Equipment	Disposal System	Future Plans	Budget
Davao City	2004	√	√	√	√	√	√	√ (open dumpsite)	√	√
	2006	√	√	√	√	√	√	√ (open dumpsite)	SLF Plan w/ budget	
Calbayog City	2004	x	√	√	√	√	√	√ (open dumpsite)	x	√
	2006	x	√	√	√	√	√	√ (open dumpsite)	SLF Plan (conceptual)	
Sagay City	2004	√	√	√	√	√	√	√ (open dumpsite)	√	√
	2006	√	√	√	√	√	√	√ (open dumpsite)	No SLF Plan; site identification only	

The checklist/verification was done to COMPARE the 2004 SWM results made by JICA with the results gathered in this Preliminary Study for Solid Waste Management in Three Cities (Davao, Calbayog, and Sagay Cities). It is the intention of the matrix to show whether the LGU concerned had introduced changes or improvements on the overall solid waste management situation after two (2) years.

The verification considered three (3) important components of the 2004 JICA Basic Study, namely:

1. Economic/Financial Component

Under this component, two (2) indices were considered for comparison purposes, namely: net borrowing capacity and income class of the three (3) cities.

2. Existing SWM System Component

This component is divided into two (2) categories: (a) actual activities of the LGU and (b) current condition of the SWM System. The two (2) categories were further classified into several indices. For the actual activities, six (6) indices were considered, viz: 1) SWM Board; 2) SWM Plan; 3) SWM Organization; 4) Legal Framework; 5) Information, Education, and Communication; and 6) Other SWM Programs and Initiatives.

For the second category, seven (7) indices were considered: 1) Source Segregation; 2) Recycling; 3) Presence of MRF; 4) Collection Coverage; 5) Collection Vehicles; 6) Heavy Equipment in the disposal site; and 7) Disposal System.

3. Intention Component

This component focused on the future plans of the LGU and the corresponding budget that is allocated for these plans.

3.4 RESULTS OF EVALUATION

3.4.1 Economic/Financial Component

A. Net Borrowing Capacity

In the final report of JICA on the “Basic Study on the Selection of High Priority Cities/Municipalities for the Establishment of a Suitable Solid Waste Management (SWM) System” in 2004, Davao City had a net borrowing capacity of PhP 399M. This figure was relatively high as compared with the other cities and municipalities under study during that time. Calbayog City had only around PhP 64M net borrowing capacity while Sagay City, a lowly PhP 31M.

In 2006, the above figures leapfrogged to PhP 1.64B, PhP 269M, and PhP 120M for Davao, Calbayog, and Sagay, respectively. Their net borrowing capacities implied on increasing IRA and internally generated funds. This means that the three (3) cities could avail government financing with a higher ceiling, which translates to a better access to funding more development projects that redound to the improvement of basic services of their local constituents.

Moreover, there was no change on the income class for the three (3) cities as Davao and Calbayog Cities maintained their ranking as First Class while Sagay City, a Second Class City.

3.4.2 Existing SWM Component

A. Actual Activities of the LGU

1. SWM Board

For the three (3) cities under study (Davao, Calbayog, and Sagay), all had created their corresponding SWM Board since 2004 as per provisions of the Implementing Rules and Regulations of the RA 9003 (Ecological Solid Waste Management Act). The SWM Boards of the three (3) cities still exist at present.

2. SWM Plan

The above checklist shows that Davao and Sagay Cities have prepared their SWM plans and were approved by the National Solid Waste Management Commission (NSWMC) and are still valid at this moment.

Since 2002 Calbayog City had formulated their 10-year SWM Plan. The plan was submitted to the NSWMC for evaluation and approval in the same year, but the plan was insufficient thus, was not approved. It was returned back for further refinement. However, up to this time, the SWM plan is not yet finalized.

3. SWM Organization

Since the 2004 JICA Basic Study, Davao has yet to create its SWM organization/office to oversee all SWM concerns and activities. Right now, all SWM concerns are being handled by the CENRO. Sagay, on the other hand, has created its own SWM organization to handle its SWM activities, which was under the General

Services Office back in 2004. Calbayog City's SWM office was created parallel to the creation of its SWM Board and still exists at this point in time.

4. Legal Framework

The enactment of local SWM ordinance is a requirement of RA 9003, Section 12. The implementation of a successful SWM rests on the social cooperation guided by local ordinances.

The three (3) cities involved have enacted several SWM Ordinances since the 2004 JICA Study and are presently being implemented.

5. IEC Program

Section 17 of RA 9003 clearly states that there is a need to undertake IEC Program to any SWM Plans. It states that "Education and public information component shall describe further how the LGU will educate and inform its citizen about source reduction, recycling and composting programs." The said program must be a continuing activity of the LGU to sustain a successful implementation of any SWM Program. May it be sufficient or not, the three (3) cities have their own corresponding IEC Programs being implemented.

6. Other SWM Programs and Initiatives

Section 12 of RA 9003 states that "Part of the duties and responsibilities of the SWM Board would be to undertake programs related to SWM." The presence of these programs will indicate the dedication of the LGU to comply with RA 9003. The checklist shows that the three (3) cities have sufficient programs and initiatives in complying with RA 9003.

B. Current Conditions of SWM System

1. Source Segregation

One of the mandatory provisions in RA 9003 is waste reduction. This is on top of the SWM Hierarchy. RA 9003 defines it as "the reduction of solid wastes before it enters the waste stream." Source segregation is also referred to as waste reduction, which can be accomplished by recycling and this in turn be accomplished through "waste segregation at source." In the above checklist, only Davao and Sagay practice source segregation as observed in the 2004 JICA Study. Calbayog City, on the other hand, has yet to implement its own segregation at source program for its SWM.

2. Recycling

Recycling is also a mandatory requirement for any SWM system under RA 9003. Recycling program will be successful through the establishment and operation of a Materials Recovery Facility (MRF). MRF is a very effective option to recover useable materials from the waste stream. Composting and segregation are the main component of MRF, therefore composting can be done readily and the segregation of recyclable is also an easy task. In general, recycling is the collection of recyclable materials to transform or remanufacture these materials into useable or marketable products.

Based on the checklist above, the three (3) cities have their own MRF as noted during the 2004 JICA Study. Thus, recycling is still present up to now.

3. Materials Recovery Facility (MRF)

Section 32 of RA 9003 clearly stipulates the provisions of a Materials Recovery Facility in the barangays, which will be the initial processing of solid waste prior to final disposal in the dumpsite. The operation of a MRF is directly related to the recycling programs. The checklist shows that the three (3) cities have their own respective barangay-based MRF, which is still operational at this moment.

4. Collection Coverage

Based on the checklist, all three (3) cities is consistent on their collection services in their respective service areas of jurisdiction from 2004 up to the present.

5. Collection Vehicles

Collection vehicles are very important in the implementation of an effective collection and disposal activities in any SWM program.

In case of the three (3) cities, data from the 2004 JICA Study, Davao and Sagay Cities have adequate collection vehicles all in good conditions, whereas in Calbayog City only 50% of the collection vehicles are in good condition.

In the JICA Preliminary Study of 2006, all the three (3) cities involved are adequate in collection vehicles and all the vehicles are in good condition.

6. Heavy Equipment in the Disposal Site

Like the collection vehicles, heavy equipment is essential in the operation of the disposal facility. Except for Davao City, which have to be further verified, the cities involved in the study have sufficient and reliable heavy equipment for the efficient operation in their respective disposal facilities.

7. Disposal System

Since the 2004 JICA Study, the three (3) cities are still operating their own respective open dumpsites, which pose hazards and sanitation problems to nearby communities. It is the requirement of RA 9003 that at this time, open dumpsites are already closed, have been operated as controlled dumpsite and converted into sanitary landfills.

3.4.3 Intention Component

This component is considered as an indicator of the LGUs' determination to improve their SWM system. It also focuses on the future plans and projects of the LGUs and their commitment for an effective implementation of the said initiatives.

For the plans/programs to be pursued, the LGUs must have sufficient budget for these. The City of Davao has already prepared a plan, which would establish a sanitary landfill in Brgy. New Carmen. The city has also appropriated Php 268M for the development of the SLF. Calbayog City, on the other hand, has already prepared a project concept with conceptual drawings and estimates for their future SLF project. Sagay City has yet to prepare their SLF plan but they have already identified a site for further evaluation and assessment.

So far, compared with 2004 status, all three (3) cities have at the moment manifested their commitment to pursue a SWM system that would address their short and long-term needs for harmonized and sustainable ecology.

Chapter 4

Assessment of the Study Areas

CHAPTER 4 ASSESSMENT OF THE STUDY AREAS

4.1 General

This section describes and assesses the existing situation of the three cities under study relative to the implementation of the Republic Act 9003. This includes the discussion of the various components of solid waste management system such as waste generation, waste composition, collection and transport, pre-treatment/waste diversion, disposal, operation and maintenance, and organization and institutional arrangement. Each component has been dissected so as to identify problems and issues confronting the effective and efficient implementation of the said Act and come up with constructive assessment that would be of relevance to the decision makers and local chief executives for policy formulation.

4.2 DAVAO CITY

4.2.1 Profile of the Area

A. Demography

According to 2000 NSO census, Davao City has a total population of 1,147,116 people in 240,057 households. It has an average annual growth rate of 2.83 percent. The most populous district is Talomo with approximately 284,100 individuals, followed by Bucana district with more or less 193,519 residents. The least populous district is Baguio district with 24,379 persons.

B. Geographic Location

Davao City is situated in the west central part of Region XI, in the southeastern portion of the island of Mindanao, which is the southern end of the Philippine archipelago.

Geographically, the City is located near the equator lying in the grid squares of 6°58" to 7°34" north latitude, and 125°14" to 125°40" east longitude. It is bounded on the north by the province of Davao del Norte, on the east by Davao Gulf, on the south by the province of Davao del Sur, and on the west by the province of North Cotabato. **Figure 4.1** shows the location map of Davao City.

C. Land Area

Davao City, reputedly the largest city in the world, has an area of 244,000 hectares or 8% of the land area of southern Mindanao region or Region XI. It is divided into three congressional districts and further divided into 11 administrative districts. Poblacion and Talomo districts comprise Congressional District I; Congressional District II is composed of Agdao, Buhangin, Bunawan, and Paquibato districts; and Congressional District III consists of Toril, Tugbok, Calinan, Baguio and Marilog districts.



Figure 4.1 Location Map of Davao City

4.2.2 Waste Generation and Composition

A. Existing Situation

1. Waste Generation

The City with assistance from EcoGov, has conducted a city-wide Waste Amount and Composition Survey (WACS) from June to September 2006. Results of the survey show that the City of Davao is generating a total of 731 tons per day of MSW. The average per capita generation for residential is 0.42 kg/capita/day, while the average per capita generation for all sources is 0.56 kg/capita/day.

2. Waste Composition

As for the waste composition, biodegradable wastes is at 455 tpd or 62% of the total waste generated by the City. Other components are as follows: recyclables at 121 tpd or 17%; residual at 148 tpd or 20%; and special waste at 7 tpd or 1%. **Table 4.1** presents the waste amount and composition results for Davao City for year 2006. (*Special wastes include batteries, containers containing chemicals, etc.*)

B. Assessment

The City is more or less advanced as compared to other cities and municipalities in Mindanao Island in terms of identification of its waste amount and composition due to the assistance rendered by EcoGov. WACS data is a very good planning input in the preparation of an integrated solid waste management (ISWM) system for the City.

C. Identification of Strategic Options and Actions

In order to develop a more doable and sound ISWM plan for the City, its waste composition should be further classified as to the type of plastics (HDPE, LDPE, PET,

etc.), metals (aluminum, tin, scrap, etc.), paper (cardboard, white paper, mixed paper, etc), and glass (food bottles, clear bottles, colored bottles, etc.), among others. The determination of such information would give ideas on future prospects of investments of complementary businesses such as recycling plants, metal foundries, manufacturing plants, etc.

4.2.3 Collection and Transport

A. Existing Situation

1. Waste Collection Practices

Garbage collection in Davao City is done on a daily basis. City garbage collection trucks and private contractors collect a total of 1,000 m³ of MSW from various sources within the City limits. The City is spending an average of Php 120M annually for its garbage collection, which is roughly 85% of CENRO's annual budget.

As part of the City's effort to upgrade its solid waste collection system, a total of 20,250 mobile garbage bins (240 liters and 120 liters) were procured in 2006. These bins are currently placed all over the City to facilitate not only garbage collection but also segregation at source since the bins are properly labeled for biodegradable and non-biodegradable wastes.

2. Collection Equipment

In 2006, the City has procured a total of ten (10) compactor trucks with hydraulic lifting device to upgrade its garbage collection fleet. As mentioned earlier, the City has acquired the services of private contractor for garbage collection purposes. A total of 80 to 85 trips per day are made to collect garbage from the entire service area.

3. Service Area

The collection coverage is currently pegged at 65% covering a total of 160,611 households out of the City's 245,000 households. Garbage collection covers a total of 96 urban barangays out of the 182 barangays of the City.

4. Garbage Collection Routes

CENRO has obliged every barangay covered by garbage collection to prepare its own map showing the location of garbage collection points within its territory. The objective is to aid the garbage collectors on where to collect the barangay's garbage during the time allotted for collection. Also, the garbage collection points indicate the location of the garbage bins. However, these collection points are changing every now and then depending on the requirement of the barangay officials. It should be noted that residents are not supposed to dump their garbage in between garbage collection points. Because of this, CENRO has designated a number of personnel to monitor and validate these collection points on a regular basis.

MSW must be discharged inside the garbage bins only during the designated time of collection (usually from 6pm to 9pm daily). However, the City is currently having a hard time on the designation of garbage collection points per barangay because the garbage bins are not enough to accommodate all of the City's MSW. As per CENRO

information, a total of 50,000 garbage bins should be acquired by the City government to have a more efficient garbage collection system.

During the data gathering in Davao City, CENRO has not provided the Study Team with its maps showing the garbage collection points from each barangay because, according to them, the said maps are for their own consumption only and should not be given to anyone. Another reason is because the said maps contain temporary data and are subject to change from time to time.

B. Assessment

The City is generally clean. This can be attributed to the regular garbage collection and the presence of mobile garbage bins situated in strategic areas in the City. However, based on observations, some areas where these mobile bins are located are presently under utilized while in other areas over-utilized. This implies that there is lack of planning, design, monitoring and evaluation in the distribution and utilization of such bins and may also be due to the attitudes of some Davaoeños.

In addition, it has also been observed that proper disposal of biodegradable and non-biodegradable to the right garbage bins is not being practiced by the residents. Such is attributed to the lack of information, education campaign (IEC) on proper segregation and disposal of MSW among the populace.

C. Identification of Strategic Options and Actions

A revisit of the plans particularly on the distribution of garbage bins within the City is imperative. In addition, a sound monitoring and control system should be put in place so as to keep track of gray areas, i.e. collection scheduling, amount of garbage being disposed per area, proper segregation, etc.

As a move to sustain initiatives for an efficient and effective ISWM plan/program, a massive and relevant IEC program among Davao's residents should be undertaken so as to increase the level of awareness and commitment to support the City's efforts on ecological solid waste management system.

Since the present collection fleet will not be as efficient after long years in service, a vehicle assessment and replacement program must be initiated. The required hauling capacity as well as the required number of vehicles must be studied and evaluated carefully taking into consideration the type of collection vehicle and service areas (urban and rural).

The need of a transfer station must also be studied for Davao City. It was mentioned earlier that the City has opted to temporarily utilize a private lot located approximately 31.5 km from the service area in barangay Calinan and the present disposal site in barangay New Carmen is also quite far and will be full in less than 5 years.

Table 4.1 Waste Amount and Composition of Davao City (in kg/day), 2006

Source Sector	Total Contribution		Composition in Percent				Composition (kg/day)			
	Total Waste Estimate	% Of Total	Percent Biodegradable	Percent Recyclable	Percent Residual	Percent Special Waste	Biodegradable	Recyclable	Residual	Special Waste
Food Establishments (restaurants, bakeries)	18,902	2.8%	61%	10%	29%	0.0%	11,535	1,975	5,392	-
General Stores (malls and stores)	36,938	5.1%	26%	43%	30%	0.7%	9,618	16,042	11,036	242
Industries (municipal wastes)	11,668	1.6%	25%	17%	58%	0.1%	2,882	1,951	6,821	14
Farms (municipal wastes)	3,126	0.4%	53%	41%	7%	0.0%	1,648	1,272	205	1
Institutions	13,853	1.9%	35%	19%	45%	1.0%	4,855.25	2,628.78	6,225.54	143.25
Public Market	56,198	7.7%	83%	2%	15%	0.0%	46,638	1,150	8,387	24
Recreation Centers and Memorial Parks	2,352	0.3%	48%	18%	34%	0.3%	1,133	421	792	6
Residential	554,345	75.8%	66%	16%	18%	0.8%	365,913	86,654	97,360	4,418
Service Centers	12,259	1.7%	22%	27%	49%	2.4%	2,687	3,291	5,992	289
Slaughterhouses & Dressing Plants	5,781	0.8%	86%	1%	12%	0.0%	4,984	80	717	-
Special Waste Sources	15,781	2.2%	21%	36%	30%	13.5%	3,239	5,678	4,727	2,137
Total	731,203	100.0%	62%	17%	20%	1%	455,131	121,143	147,653	7,276

4.2.4 Recycling/Waste Diversion

A. Existing Situation

1. Materials Recovery Facility (MRF)

Recycling activities are being carried out in the City through the operation of materials recovery facility (MRF) and junkshops. A total of eleven (11) barangays and two (2) subdivisions have operational MRFs, namely: Barangays – 12-C, 24-C, 28-C, Dumoy, Calinan, Toril, Lapu-Lapu, W. Aquino, Matina Crossing, Daliao, and Matina Aplaya; Subdivisions – Elenita Heights, Phase II and Woodridge. In addition, seven (7) barangays have MRF structures but not yet operational. These barangays are as follows: 5-A, 8-A, 24-C, 32-D, 39-D, Bago Aplaya and Buhangin. Aside from these, the City also has MRF's established in ten (10) banana and pineapple plantations.

Also, 178 junkshops are operating within the City, which caters to paper, metal, plastic, and glass recyclable materials.

With regard to markets for recyclable materials, there are plastic and paper recycling industries located in the City. Glass and metal materials are brought to other areas within the Philippines and even exported to other countries.

Transaction prices are usually dictated by the present market figures. Some factors also affect decision on transaction prices such as the quality and quantity of recyclable materials. For Davao City, **Table 4.2** shows the prevailing transaction prices for different recyclable materials:

**Table 4.2 Prevailing Transaction Prices for Recyclable Materials in Davao City
(in Philippine Pesos)**

Materials		Buying Price	Selling Price
Paper	Old Newspapers	3.00 – 6.00 / kg	4.00 – 8.00 / kg
	Old Corrugated Cartons	1.00 – 7.00 / kg	3.00 – 8.50 / kg
	White Paper	1.50 / kg	3.00 / kg
	Mixed Paper (magazine, etc.)	1.50 – 2.00 / kg	3.00 – 5.00 / kg
Aluminum	Aluminum cans	50.00 – 60.00 / kg	65.00 / kg
Tin	Tin cans	3.00 – 4.00 / kg	5.00 / kg
Plastic	PET bottles	10.00 – 13.00 / kg	12.00 / kg
	Other plastics	12.00 / kg	15.00 – 16.00 / kg
Glass	Glass bottles	2.75 – 4.00 / pc	5.00 / pc
	Other glass	0.25 – 0.50 / pc	1.00 / pc

Source: Survey on Current Recycling System in the Philippines, Final Survey Report, December 2006 (JICA)

2. Composting

The City has a 350-m² centralized composting facility located in Maa, which caters to biodegradable wastes coming from markets and slaughterhouses. A total of 4,996 sacks of compost from the said facility has been harvested as part of the “Balik Inang Kalikasan Program” of the City. The program provides

compost to the greening project of the City, various organizations and institutions. Among the beneficiaries of the composts are the following: Philippine Air Force; small farmers; various churches; and 18 parks, 153 center islands, 6 monuments and 25 nurseries within the City. Various banana and pineapple plantations also practice composting of their biodegradable wastes.

B. Assessment

The City has an outstanding recycling and composting program as manifested by its high waste diversion rate of 55.98%, which is significantly high as compared with other local government units.

C. Identification of Strategic Options and Actions

The City of Davao should help in facilitating access in terms of funding so that new complementary industries shall be established. In particular, recycling industries and manufacturing plants are among the potential businesses that may be created as a multiplier effect.

In order to accommodate a considerable amount of compostable materials in the future, a large-scale composting and recycling operation must be studied. The present MRF is not enough for future operations. Section 20 of RA 9003 stipulates that MRF is mandatory to any SWM system. The section also identifies composting and recycling activities as a mean for diverting solid wastes from disposal facilities.

4.2.5 Disposal

A. Existing Situation

1. *Controlled Dumpsite Facility*

In August 1998, during the term of former mayor Hon. Benjamin de Guzman, the 9.75-ha New Carmen site became operational as an open dumpsite. However, on January 2005, with the current administration, under the City's dynamic mayor, Hon. Rodrigo Duterte, the once open dumpsite was transformed into a controlled dump facility (CDF), which covers on-site storage, collection, sorting, and final disposal. The DENR Region XI issued a Notice-to-Proceed (NTP) on September 27, 2004, covering the conversion of the open dumpsite into CDF and development of its related facilities. (**Annex I** of the Data Book shows the pictures taken at the New Carmen CDF.)

2. *Present Disposal Facility*

At present, the City is undergoing closure of its CDF by applying soil cover on the disposed garbage. Although the disposal site in New Carmen can still accommodate garbage for at least five (5) more years, the City has opted to temporarily utilize a private lot located in Brgy. Lacson, Calinan District as its garbage disposal area. The site is approximately 31.5 km from the City Hall. A total of six (6) hectares is temporarily being utilized by the City for disposal of its MSW. The dumpsite is accepting an estimated 1,000 m³ of MSW on a daily basis. (**Annex I** of the Data Book shows the pictures taken at the Lacson open dumpsite.)

3. Waste Pickers / Scavengers

The open dumpsite in Lacson area has an estimated total of one hundred (100) scavengers. The scavengers usually stay inside the facility, as shown by the presence of a number of shanties. Most of the scavengers come from Brgy. New Carmen (site of the former disposal facility of the City). As reported, the scavengers are controlled by the owner of the dumpsite, in which all of the recyclable materials recovered by the scavengers are sold to his junkshop situated inside the facility.

B. Assessment

The City has already prepared a plan, which would establish a sanitary landfill in Brgy. New Carmen with a budget of around PhP 268M. This plan has already been presented and approved by the City Council and the local chief executive, for implementation. However, the said amount is only intended for the development of the sanitary landfill. The cost does not include the purchase of pertinent equipment such as compactor, backhoe, bulldozer and grader.

The City has identified about four (4) sites as possible areas for its sanitary landfill. Selection criteria have been prepared and initial assessment has already been conducted to facilitate the selection of the most appropriate and suitable site for the SLF. (Annex II of the Data Book presents the selection matrix of the proposed SLF sites.)

C. Identification of Strategic Option and Actions

The City should be able to access funding for the procurement of the required equipment for landfill operation purposes. More importantly, it should be able to select the best SLF site following stringent criteria for selection.

Since the City, through its CENRO, boasts of sufficient manpower for the eventual operation of its SLF, only a training program would be needed by the City. Also, procurement of equipment for SLF operations such as compactor, bulldozer and backhoe would be needed since at present CENRO is using a borrowed bulldozer from CEO in its operations in Lacson.

4.2.6 Operation and Maintenance

A. Existing Situation

The CENRO has the main task of undertaking the City's SWM services from street cleaning, garbage collection and hauling to the eventual disposal site of MSW.

The City has acquired a total of ten (10) garbage compactor trucks with a capacity of 9 m³ each. These are operated and maintained by CENRO, which has its own motor pool located in Ma-a. CENRO has 10 mechanics handling maintenance works of its vehicles and equipment.

The private contractor of the City for garbage collection operates and maintains its own collection fleet.

B. Assessment

In general, the O&M system for SWM is efficiently functioning, except for the equipment being used at the present disposal site. It was observed that the required equipment, in particular a bulldozer, is not frequenting the area and in most cases, is malfunctioning.

C. Identification of Strategic Options and Actions

The City should prepare a procurement schedule for heavy equipment for future use in the proposed sanitary landfill in order to anticipate the increasing volume of waste disposal in the City due to the impending urbanization and population influx and the magnitude created by a strong trade and industry in the area and neighboring provinces.

4.2.7 Organization and Institutional Arrangement

A. Existing Situation

1. *Present Organizational Set-up*

SWM services are provided by the LGU to its constituents through the Solid Waste Management Program of the City, under the Environmental and Waste Management Division, which is handled by the City Environment and Natural Resources (CENRO) Officer. One of CENRO's functions is the handling of the City's MSW collection and disposal. (**Annex III** of the Data Book shows the Functional Chart of the CENRO.)

2. *Manpower*

For solid waste management, CENRO has 375 street sweepers and 531 garbage collectors. There are 1,372 contractual and 143 plantilla positions, of which 119 are skilled.

Procurement of equipment and hiring of manpower are handled by the General Services Office (GSO). With regard to the selection of the sanitary landfill and other SWM facilities, CENRO is the one in-charge for such task.

3. *IEC Programs and Awareness Level*

CENRO personnel are continuously implementing IEC programs in all of its barangays, focusing mainly on RA 9003. Compliance to RA 9003 regarding segregation at source and other stipulations of RA 9003 is regularly monitored by CENRO. IEC program in a barangay will not stop until the barangay shows readiness and confidence to implement RA 9003's stipulations on barangay-based SWM system.

The City is about to implement a segregated collection scheme in its 22 pilot barangays. With the addition of 9,000 garbage bins (on a bidding status at present) expected to be procured for these barangays, coupled with massive IEC and advocacy programs of the City, the segregated collection scheme is expected to be implemented as desired. Still, the City feels the need for more massive IEC

and advocacy programs to enable the City to implement its SWM projects in all of its barangays.

4. *Entities Involved in SWM Activities*

EcoGov - The Environmental Governance (EcoGov) of the USAID has provided assistance to the City in the conduct of its waste amount and composition survey (WACS) in 2006;

Davao City Chamber of Commerce and Industry Inc. (DCCCII) - supports market recyclable program in Toril;

Kadayawan Jaycees - partner in school based advocacy on solid waste management programs;

Rotary Club 2000 - provided financial assistance in the construction of Matina Aplaya Materials Recovery Facility (MRF);

Philippine Institute of Chemical Engineers (PIChE) Davao Chapter - has donated two sets of shredder for the composting project of the City;

Rotary Club of East Davao - has donated the following for the composting project of the City:

- 1 unit computer with table and chair
- 1 unit pressure cooker with gauge
- 1 unit air conditioner
- 1 unit weighing scale

Development of adequate waste disposal system is in collaboration with other public and private institutions.

5. *SWM Ordinances*

The list of ordinances related to SWM is presented in **Annex IV** of the Data Book.

Enforcement of the City's ordinances is done in coordination with the local police office, since the police force have the *letter of command* from the President of the GOP to enforce RA 9003. Also, a number of authorized personnel was organized by the City Mayor's office to enforce the City's SWM ordinances. In fact, more than 4,000 persons, majority of which were outsiders, were reported to have been caught and penalized by the City for violations in year 2006.

6. *Solid Waste Management Plan*

To date, CENRO is still in the process of completing its Ten (10) Year SWM Plan. (It was reported that the SWM Plan prepared with Eco-Gov has been submitted this January 2007 to the City.) During the conduct of data gathering, it was learned that out of twelve (12) chapters, only eight (8) chapters were completed for the SWM plan. (**Annex V** shows the accomplishment report of CENRO for SWM in 2006; **Annex VI** presents the highlights of major accomplishments of CENRO.)

B. Assessment

The present set-up for SWM is well-organized with a strong manpower complement. Capability building and training of personnel is being handled by CENRO itself.

C. Identification of Strategic Options and Actions

At this moment, the City should anticipate the manpower requirement of the proposed sanitary landfill. With this, the City should start training its personnel in the proper sanitary landfill operation and maintenance. Exposure and training programs should not only concentrate within the country but rather to successful SLFs in other countries such as in Germany and the United States among others so that local implementers would be able to assimilate state-of-the-art technologies on ISWM system.

4.2.8 Recommendations

- A periodic updating of the City's waste amount and composition is highly recommended considering that the City of Davao, being a highly urbanized center, is tantamount to generating large amount of MSW that varies in composition in a very swift manner.
- A strong Information, Education and Communication Program focused primarily on waste reduction through waste segregation at source is strongly recommended to complement the installation of separate garbage bins for biodegradable and non-biodegradable wastes throughout the City of Davao.
- The City should provide capability training programs that would enhance the skills and knowledge on waste segregation at the barangay level. Moreover, establishment of MRF at the barangay should not only be focused on the physical dimension (i.e. construction of MRF structure) but rather more on human capital. Trainings on the proper management and operation of MRFs should be undertaken to ensure sustainability at the barangay level.
- The City of Davao should create opportunities for investors to engage in recycling industries through incentives such as tax holidays, subsidy, and liberalization on the issuance of permits and other pertinent documents.
- In order to ascertain the sustainability of the plan to establish a sanitary landfill, the City should not only consider the funding of the SLF's construction cost but rather the procurement of equipment. It should be noted that the day-to-day operation of an SLF relies heavily on the availability of its heavy equipment. In this case, the City may avail of a loan from local or foreign lending institutions. It is therefore recommended that the City should procure the required heavy equipment for its sanitary landfill operations.
- Since a budget has already been set aside for SLF, the succeeding activities should be fast-tracked to enable the City to utilize its SLF in New Carmen in the soonest possible time.
- Since Davao has lately acquired quite a number of compactor trucks, it is recommended that a 10-year replacement plan be prepared.

- In order to ensure quality output and efficient delivery of public services of personnel, it is imperative to undertake training needs assessment (TNA) studies so as to determine the immediate training, seminars and workshops that have to be conducted for all personnel and stakeholders. A good training program, which will transform the critical mass of manpower resources for a successful ISWM program, should be prepared.
- With the sanitary landfill project at New Carmen expected to be completed in a few years time, the City is looking forward to operate and maintain its own disposal facility. CENRO is confident to have sufficient manpower to handle such undertaking. However, training and capacity building on how to operate and maintain an SLF is greatly needed by the City. Exposure on the operations of existing SLF's in the Philippines and even in neighboring countries will be needed to equip CENRO's personnel with the required knowledge and skills for this particular task.

4.3 CALBAYOG CITY

4.3.1 Profile of the Area

A. Demography

The population of Calbayog City in 2000 was nearly 150,000, equivalent to 23 percent of the total population of Samar Province. It is the most populated area in the entire Samar island.

As observed, the population of Calbayog City nearly doubled the figure it attained in 1960. However, compared with the average annual growth rates attained by the other cities in the region from 1960 to 2000 period, Calbayog's population growth is actually the lowest among cities, even much lower than the average of 1.79 percent annual growth rate of the four cities in Region 8. This is due to the high out-migration rate prevailing in the City, caused mainly by declining employment opportunities.

B. Geographic Location

The City is located on the far northwestern most of the Province of Samar. It is 183 kilometers from the regional center of Tacloban City and 70 kilometers north of Catbalogan, the provincial capital. It lies between 12° 3' 36" to 12° 20' 24" latitude and 126° 21' 36" to 126° 51' 0" longitude.

It is bounded on the North by the municipalities of San Isidro, Lope de Vega and Silvino Lobos, all of Northern Samar; on the South by the municipality of Santa Margarita and Samar Strait, on the East by the municipalities of Sta. Margarita and Gandara; and on the West by Samar Strait.

C. Land Area

Calbayog City is the fourth largest city in the country and occupies an area of 90,300 hectares, which is 16 percent of the total land area of the Province of Samar. It was surpassed only by Davao City with 221.1 thousand hectares, Puerto Princesa with 210.7 thousand hectares, and Zamboanga City with 141.5 thousand hectares. Calbayog City is comprised of 157 barangays, subdivided into three political districts. **Figure 4.2** shows the location map of Calbayog City.

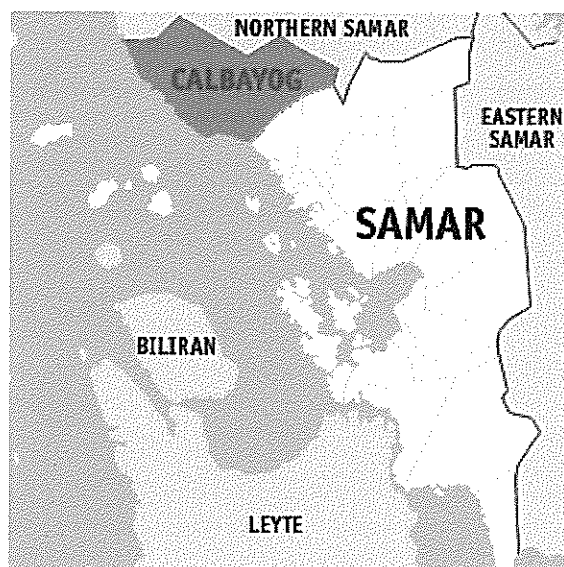


Figure 4.2 Location Map of Calbayog City

4.3.2 Waste Generation and Composition

A. Existing Situation

1. Waste Generation

The results of the waste amount and characterization survey (WACS) conducted in Calbayog City in January 2007 are presented in Table 4.3. As can be gleaned from this table, Calbayog City is generating a total of **93.611 tons** of MSW per day. Sample size of WACS is as follows: residential – 30 samples (high income – 10 samples, middle income – 10 samples, low income – 10 samples); commercial – 20 samples (restaurants – 5 samples, other shops – 10 samples, private offices – 5 samples); institution – 10 samples (schools – 5 samples, government offices – 5 samples); market – 1 sample; and street sweeping – 5 samples. These samples are located in urban barangays. Annex XIV of the Data Book shows the WACS Report of Calbayog City.

Table 4.3 Waste Generation Rates for Calbayog City, 2007

Category of Waste	Generation Source	Unit	Generation Rate	Quantity	Amount (kgs)
Residential Waste	Persons	kg/person/day	0.417	166,036	69,237
Commercial (Restaurants)	Restaurants	kg/restaurant/day	17.457	121	2,112
Commercial (Other Shops)	Other Shops	kg/shop/day	6.630	2,786	18,470
Institutional Waste	Gov't Offices	kg/employee/day	0.048	1,096	53
Schools	Schools	kg/person/day	0.043	40,850	1,757
Street Sweeping	Roads (with street sweeping activities only)	kg/km/day	17.222	11.50	198
Market	Market stalls	kg/stall/day	2.450	728	1,784
Total					93,611

2. Waste Composition

Table 4.4 presents the waste composition of Calbayog City.

Table 4.4 Waste Composition of Calbayog City, 2007

Category	%
Paper	13.254%
Glass	2.781%
Metal	1.039%
Plastic	12.534%
Kitchen Waste	31.714%
Other Organic	0.851%
Other Inorganic	10.148%
Hazardous	0.351%
Special Waste*	5.462%
Yard Waste/Wood	19.808%
Textiles	1.384%
Rubber/Leather	0.673%
Other	0.00%
Total	100.00%

* Special Waste includes medical waste (syringe, sharps, gauze, etc.) and pathological wastes (tissue, sanitary napkin, diaper, cigarette butts, cotton, cotton buds). Also refer to Annex XIV of Databook for the description of the other categories

For the waste composition of Calbayog City, the three (3) categories with high percentages are: “kitchen waste” with 31.714%; followed by “yard waste/wood” with 19.808%; and “paper” with 13.254%.

B. Assessment

The Study Team has provided assistance to the LGU in the conduct of WACS as presented above to update the previous waste generation data of the City. With the new waste generation data at hand, the City could now plan and develop strategies for its SWM system, in particular for waste diversion activities, i.e. recycling and composting.

C. Identification of Strategic Options and Actions

The conduct of WACS should be done on a regular basis by the City in order to update its waste amount and composition data. Also, additional SWM surveys should be conducted such as recycling survey and knowledge, attitude and practices survey (KAPS) to further validate accuracy and reliability of the solid waste data generated.

4.3.3 Collection and Transport

A. Existing Situation

1. Waste Collection Practices

Of the total solid waste generated each year, only half or 50% are collected by the city government. The remaining uncollected solid wastes are perceived to be just thrown in waterways or in other inappropriate areas of the City.

The average daily collection is 32 cubic meters, or 967 cubic meters per month, and about 11,610 cubic meters per year. At present, the garbage collection is done by a private contractor since 2003. All collected garbage is directly brought to the existing disposal site. **Table 4.5** shows the number of trucks per trip and the volume of waste entering the dumpsite in 2006.

**Table 4.5 Number of Trucks/Trip and Volume of Waste Entering the
Dumpsite, 2006**

Month	Government Commissioned Trucks	Private	Total	Volume (cu. m.)
January	148		148	824
February	127		127	721
March	131	4	135	739
April	139	7	146	1,012
May	157	25	182	1,273
June	124	6	130	1,110
July	118	18	136	1,008
August	127	8	135	1,085
September	127	26	153	1,046
October	133	30	163	1,047
November	123	21	144	830
December	128	13	141	915
Total	1582	158	1740	11,610

Source: CSWMO

The collection rate of Calbayog City is pegged at 12.4%, which is quite low considering the City's 93.611 tpd waste generation.

2. Collection Equipment

The private contractor utilizes two (2) dump trucks with an average of 9 m³ in capacity per unit.

The City has two (2) open dump trucks with capacities ranging from 5 to 6 m³. However, the said equipment are used for garbage collection in emergency cases only, when the private contractor could not collect garbage. These trucks are often used to haul soil cover at the disposal site.

3. Service Area

At present collection of garbage by the private collectors is focused on the central business district and adjacent barangays comprising some 22 barangays of the City; 19 urban and 3 sub-urban barangays including public market. (Also refer to **Annex XVI** for the Summary Schedule for Barangay Collection)

4. Garbage Collection Points

Annex VIII of the Data Book shows the garbage collection route maps of the City. Unlike Davao City, Calbayog has no designated garbage collection points in its collection areas. Apparently, garbage is just taken out by residents during designated collection period for each area.

B. Assessment

The City has an annual spending of PhP 6,240,000 in 2004 on garbage collection including street sweeping, wherein both are outsourced to a private contractor.

Problems observed include lack of garbage receptacles for biodegradable and non-biodegradable wastes. Most often than not, mixed waste disposal is still practiced in Calbayog City.

C. Identification of Strategic Options and Actions

A collection route study should be conducted to assess the performance and efficiency of the private contractor. Another activity that could be considered by the City is to undertake IEC programs to address segregation-at-source among its constituents. The City may also opt to procure mobile garbage bins for disposal of biodegradable and non-biodegradable wastes.

Also, two (2) options must be considered and studied for the collection and transport of solid waste in the city. These include the following:

1. Continue the present scenario where collection and transport is serviced by a private contractor; and
2. Return the collection and transport service to the present CSWMO

4.3.4 Recycling / Waste Diversion

A. Existing Situation

1. *Materials Recovery Facility (MRF) and Composting*

There are two (2) barangay MRFs operating in Calbayog City and one (1) composting facility which is located in the existing dumpsite. The MRFs are located in barangays Panoypoy and Maguinoo. Barangay Panoypoy was a national silver awardee by the National Solid Waste Management Commission (NSWMC) in 2003-2004 for its Search for Model Barangay/SWM Category while Barangay Maginoo won a special citation for multiple MRF and Coastal Clean-up practices also from NSWMC.

2. *Junkshops*

The City has a total of eight (8) junkshops. Transaction prices for recyclable materials are presented in **Table 4.6**.

**Table 4.6 Transaction Prices for Recyclable Materials in Calbayog City
(in Philippine Pesos)**

Materials		Buying Price	Selling Price
Paper	Old Corrugated Cardboard	3.00 / kg	4.50 / kg
	White Paper	3.00 / kg	4.50 / kg
	Mixed Paper	2.00 / kg	4.50 / kg
Metal	Tin cans	3.00 / kg	6.00 / kg
	Aluminum cans	30.00 – 40.00 / kg	35.00 – 45.00 / kg
	Other metal scrap	9.50 / kg	11.00 / kg
Plastic	PET bottles	8.00 – 10.00 / kg	13.00 – 20.00 / kg
	Other plastic containers		
Glass	Glass bottles	0.75 / pc	0.95 / pc

* Based on actual junkshop survey conducted in Calbayog City

Recyclable materials are being bought from junkshops in Calbayog City by private individuals, big junkshops or recycling industries based in Metro Manila cities such as Caloocan, Valenzuela and Navotas.

B. Assessment

The limited number of established MRFs in the City goes to show that the barangays are not yet that supportive of the waste diversion goals of the City. There is a need for the City to encourage its barangays to put up their respective MRFs to increase awareness level in terms of segregation at source and waste diversion level.

C. Identification of Strategic Options and Actions

Since there are only few barangay-based MRFs that have been established, the City may consider establishing a centralized MRF which can be situated in its proposed sanitary landfill facility in Brgy. Dinagan.

Another alternative is for the City to provide support to its barangays in the establishment of barangay-based MRF as well as composting facility in terms of providing funding and capability building to ascertain sustainability of MRF operations.

4.3.5 Disposal

A. Existing Situation

1. Present Disposal Site

The City Government operates a two-hectare open dumpsite in Barangay Gadgaran, which is approximately 9 kilometers north of the City Proper. The current disposal area was observed to contain a significant amount of garbage, considering that the site has been utilized for the past 9 years. A total of 40 m³ of MSW is disposed at the present dumpsite. (Annex IX of the Data Book shows the site photos of Brgy. Gadgaran dumpsite.)

The topography of the site is rugged and sloping terrain with a ravine of 10 to 15 meters in depth, and site vegetation is composed of secondary growth such as

bananas, coconuts and some mangoes. Grasses and shrubs also predominate the area.

CSWMO is currently making initiatives to improve solid waste management in the area by shifting to controlled dumping operations. Lately, the City has purchased a bulldozer intended for use in the present open dumpsite.

2. Waste Pickers/Scavengers

At present, the existing scavengers operating at the site are not being given attention by the city government. An estimated 48 scavengers are present in the area but they are all ambulant and come from adjacent communities. They work at daytime and return to their own houses after scavenging. The LGU is very strict that no temporary shed is erected in the area. Scavengers are allowed only to search for recyclable materials. The recyclables are sold directly to any junkshops in the City Proper.

B. Assessment

With the environmental hazards and problems encountered by the presence of scavengers in the open dump, a safe closure and rehabilitation plan is imperative for the City to implement as soon as possible. In terms of establishing a sanitary landfill facility, the City has already prepared a project concept study complete with conceptual drawings and cost estimates. The acquisition of the 4.9 hectares, which can accommodate as much as 670,000 m³ of wastes as stated in the study, is under negotiation between the owner and the city government. As per initial assessment of the site, it is found that the proposed area at Brgy. Dinagan is suitable for sanitary landfill purposes.

A Preliminary Site Assessment for the suitability of the site for a SLF was also conducted by Study Team and the result is presented as follows:

1. Preliminary Site Assessment of the Proposed SLF Site

The preliminary site assessment matrix is presented in **Table 4.7**.

**Table 4.7 Preliminary Site Assessment Matrix of the Proposed SLF
in Calbayog City**

CRITERIA	DESCRIPTION	ACCEPTABILITY OF THE SITE (*)
1.Available Area	Total area is 4.9 hectares.	2
2.Land Availability	The area is owned by the LGU of Calbayog.	2
3. Accessibility	About 11 kms. from Calbayog city (the service area). Access to the site is via a two-lane concrete national road (Maharlika Hi-way) about 8 km. long. The provincial road gets off to a 2-lane dirt road, which leads to the site.	2
4.Site Topography	Gently sloping at the central portion of the proposed site, becoming steeper towards the northern fringes of the area. Slope is about 20-25 degrees and depth is about 20 meters to the deepest point.	2
5.Local Geology	The site is underlain by moderate to steeply dipping sedimentary formation compose of mudstone and tuffaceous siltstone interbeds which are believe to be part of early to middle Miocene Formation (a sandy-cleyey soil).	1
6.Local Hydrogeology	The nearest body of water is about 3 kilometers away, Hibatang river	2
7. Vegetation Cover	Vegetation is moderate and is characterized by secondary growth consisting mainly of coconuts and bananas. Bare parts are covered with grasses and patches of bushes and shrubs.	2
8.Social Acceptability	There are no houses within the actual area for the proposed facility.	2
9. Proximity to Airports	The nearest airport is the Calbayog City Airport which is about 6-7 kilometers (aerial distance) away from the site.	2

- *Highly suitable = 2; Suitable = 1, and; Unsuitable = 0*

From the assessment above, the proposed site located at Barangay Dinagan, Calbayog City is considered as suitable site for a sanitary landfill. (Annex X presents the Geological Assessment of the Proposed Landfill Site of Calbayog City.)

2. EIA Requirements

In the case of Calbayog City's proposed SLF, the City has a total garbage collection of 12 tpd. Therefore, it falls under Category 1 as per RA 9003. Category 1 disposal facility shall be applied to LGUs with net residual waste generated of less than or equal to 15 tons per day. It shall also apply to a cluster of LGUs with a collective disposable residual waste of less than or equal to 15 tpd.

C. Identification of Strategic Options and Actions

As per RA 9003 there are only two (2) types of facilities allowed for the final disposal of solid waste, namely: controlled dumpsite up to February 2006 and sanitary landfills thereafter. Incineration is not considered as an option because it is prohibited under the Clean Air Act.

Therefore, the only option that remains is the establishment of a Categorized Sanitary Landfill for the City.

The proposed SLF at Dinagan Site is a 4.9-hectare property located about 11 kilometers north of the City. The site is located in Barangay Dinagan in the Oquendo District. (**Annex IX** of the Data Book shows the site photos of the proposed SLF site of Calbayog City.) A project concept has been already prepared by the CSWMO for such facility. (**Annex XI** of the Data Book presents the Study on the Proposed Calbayog Sanitary Landfill.)

The establishment of a sanitary landfill is a must and should be implemented by the City in the soonest possible time. Pertinent studies such as preparation of feasibility study, environmental impact study and detailed engineering design would be required in the preparatory stages. However, the City must allocate funding for these studies or look for technical assistance from various agencies such as JICA.

4.3.6 Operation and Maintenance

A. Existing Situation

The CSWMO has its own motor pool to maintain the present fleet of collection trucks and the bulldozer that operates in the dumpsite. Garbage collection is rested in the hands of a private contractor.

B. Assessment

There seem to be no problem in the operation and maintenance of the City's equipment for SWM. The privatization of the collection system may have worked in favor of the City. In return, the City now has an easier time in dealing with garbage collection by just monitoring the private contractor's day-to-day operations.

C. Identification of Strategic Options and Actions

The City may just continue with the current set-up for garbage collection. Instead of allocating additional loans for the procurement of its own garbage collection fleet, the City may just use its resources in spending for the establishment of its proposed SLF, which would require some considerable amount of investment for the City.

4.3.7 Organization and Institutional Arrangement

A. Existing Situation

1. City Solid Waste Management Board (CSWMB)

Solid waste management issues are now in the forefront of public attention in the Philippines. With the passage of Republic Act 9003 otherwise known as the Ecological Solid Waste Management Act of 2000, the operation of open dumpsites for the disposal of solid wastes have been prohibited. This landmark legislation espouses the re-use, recovery and recycling of municipal solid wastes, with special emphasis on composting as against outright disposal of the same. On the other hand, existing open dumpsites are to be converted into controlled disposal sites. The operation of the controlled disposal sites was only allowed until February 2006. After which only sanitary landfills are be permitted as the final disposal sites for residual wastes.

In the case of Calbayog City, solid waste management is not new. In August 1964, the City Government passed Ordinance No. 49 prohibiting littering, throwing or dumping of garbage, refuse and other waste objects on any street, sidewalk, canal, plaza and other public places. Included in this ordinance was the provision that every household should have their own trashcans.

In 1993, the ordinance was amended and was coupled with strategies like anti-littering. It was at this time that Calbayog City was named the cleanest in the Region and one in the Philippines. In 1995, the Presidential Task Force on Waste Management (PTFWM) was created. Advocacy for proper waste management was then intensified, not only in the urban places but also in the rural areas. Later, Solid Waste Management was institutionalized with the enactment of *Sanguniang Panlungsod Ordinance No. 97-42-382*, otherwise known as the Budget of Calbayog City for the year 1998 and Executive Order No. 006 dated 26 June 1998, in pursuant to Title Three, Chapter 2 of Section 454 (2) of the Local Government Code of 1991. The passage of Republic Act 9003 otherwise known as the "Ecological Solid Waste Management Act of 2000" had even intensified the endeavor of the City Government to develop a more responsive and effective system.

2. City Solid Waste Management Office (CSWMO)

CSWMO was also created to serve as Secretariat to the CSWMB and operational arm of the City tasked mainly to oversee the collection and disposal of solid waste and prepare plans and programs related to such activities. The CSWMO also undertakes the maintenance and use of the city's solid waste disposal facilities including procurement of equipment.

The CSWMO has a total of 97 personnel, divided into: administrative staff – 20; collection and transport – 24; final disposal – 12; street sweeping – 30; others – 11. CSWMO receives an annual operational budget of PhP 6.22 million.

3. SWM Ordinances of the City

- **Ordinance No. 93-26-628**

An ordinance amending Ordinance no. 49/Resolution 126, Series of 1964 to read: "An ordinance prohibiting the littering, throwing of garbage, refuse, and other waste objects and materials on any street, sidewalk, canal, river, plaza and other public places, this city and providing violation.

- **A Proposed Ordinance under review for final passage through a resolution**

This Ordinance shall be known and cited as The Clean Environment Ordinance of Calbayog City or an Ordinance enacting the Comprehensive and Integrated Solid Waste Management System of the City of Calbayog or the City Comprehensive Anti-littering Ordinance (CALO).

City ordinances related to SWM are enforced by the local police. However due to lack of budget and manpower, these ordinances are not fully implemented. (Annex XII of the Data Book shows the ordinances and executive orders related to SWM of Calbayog City.)

4. IEC Programs

Although the City is implementing some IEC programs like lectures and distributions of fliers in all barangays on waste segregation, the following issues are still evident:

- In terms of household practices, it was evident that some residents in the City dispose their garbage as desired. They do not observe proper waste segregation and virtually ignore existing laws on solid waste management. Their actions maybe attributed to the lack of information, education and communication drive relative to RA 9003 and lack of strict enforcement of laws and ordinances.
- Corollary to this, the business and institutional sectors behave the way household does. They do not practice waste segregation. Because of the absence of receptacles for communal use, dumping of waste is everywhere. A unique practice of the institutional sector (i.e. schools, hospitals, offices, funeral parlors, etc.) is the traditional burning of wastes, which is prohibited under the Clean Air Act.

5. Entities Involved in SWM

The CSWMB will do the functions stipulated in RA 9003. At present, civil society representation in the Board has expanded to include personalities from the NGO, industry sector, business sector, junk dealers association, and the Rotary Club. On the government side, membership was expanded to include representatives from DepEd, DILG and the City Solid Waste Management Office.

6. Solid Waste Management Plan

By virtue of the mandate of Republic Act 9003, the incumbent City Mayor issued Executive Order #008, dated 28 February 2002, creating the Solid Waste Management Board of the City. The Board is tasked to formulate a Plan that will lay down the rudiments with which the City Government and its constituents will develop and implement its integrated solid waste management program. Since July 2002, the Board had been holding sessions, inviting non-member representatives that facilitated other related concerns. The output of these sessions led to the formulation of this 10-year SWM Development Plan. The Plan was submitted to the National Solid Waste Management Commission (NSWMC) for evaluation and approval, but the plan was insufficient for approval because there are significant information required that are not included and completely discussed in the plan in accordance with the provisions of RA 9003. (**Annex XIII** of the Data Book presents the proposed 10-Year SWM Development Plan of Calbayog City.)

B. Assessment

The City's CSWMO is functioning as it should be. However, it is limited by budgetary constraints causing some of its planned programs to be delayed in implementation. There is a need for training of personnel on SWM to further strengthen its capability.

The following are the main issues and concerns that have to be addressed by the City of Calbayog:

- Barangays and institutions rely mostly on the City Government for SWM programs and services that are extended for free;
- Lack of service vehicle for mobility of the Advocacy Group;
- Irregular enforcement of laws and ordinances; and
- Absence of an effective IEC program to ensure success of the ISWM system of the City

C. Identification of Strategic Options and Actions

Training programs for the CSWMO personnel should be undertaken. The City should allocate funds or look for technical assistance from various agencies for this purpose.

Also, garbage collection fees must be implemented through a City Ordinance. Lastly, development of a training center with all modern equipments and if possible a mobile multi-media vehicle/van is needed.

4.3.8 Recommendations

- The following are the recommended waste reduction and recycling goals for the City:

On waste reduction initiatives:

- Reduce per capita waste generation including waste materials discarded by residential and commercial establishments in the City; and
- Promote waste reduction through the use of strong, coordinated educational and public outreach programs on waste segregation at source.

On recycling initiatives:

- Implement a recycling program involving households, communities, civil society groups as well as commercial establishments in the City;
 - Provide collection and recycling opportunities so that majority of the citizens can participate; and
 - Establish model programs for the locality suited to their needs and support the communities in this noble undertaking.
- The CSWMO must continuously inform the public about sound solid waste management practices through various media outlet. Community dialogues and other forms of information dissemination campaign should be considered. The CSWMO should also work hand-in-hand with the barangays, NGOs, and other stakeholders in this effort.

The following is hereby recommended as inclusion in IEC for Waste Reduction:

- Waste reduction is sometimes referred to as “source” reduction. This term could also mean reducing the volume or even toxicity of the waste generated. Waste

reduction can be accomplished by “recycling” and this in turn can be accomplished through “waste segregation at source.”

- Informed consumers consider the type of products or packaging before buying them. Others buy products in bulk or with little or recyclable packing. Products made of concentrated solutions or materials also are beneficial as these would reduce the amount of packaging required.
- Waste reduction is primarily a recycling effort. It is one that collects a variety of recyclable materials at the place where the recyclable waste is generated. This could be at the residence or in a factory. The materials may be collected either in separate bins or in a recyclable bin. The separated bin system reduces the need for processing by relying on the generator to sort the materials. Whereas, the mixed bin system requires additional processing at a material recovery facility.
- The City may consider procuring garbage bins for disposal of biodegradable and non-biodegradable wastes just like in Davao City. This should be backed up by a massive IEC campaign to ensure success of the segregation-at-source program.
- It is recommended for the City to encourage its barangays to establish their own MRF to facilitate waste diversion activities. The operation of such facilities would enable the residents to be fully aware of the segregation-at-source scheme aside from the income that they would derive from this venture.
- The CSWMO must continuously inform the public about sound solid waste management practices through tri-media (radio, television, and newspapers). Community dialogues and other forms of information dissemination campaign shall be used. The CSWMO shall also work hand-in-hand with the barangays, other sectors such as NGOs, and even schools with regard to this effort.
- As described earlier, an MRF will be needed so that recyclable waste from the waste stream can be recovered and that the final disposal material will be substantially reduced. Appropriate size MRFs, primarily functioning as sheds where recyclable wastes are stored and are then later on collected shall be established in key and strategic barangays of the City. In addition, two small MRFs, primarily for storage of segregated waste use, will be established in the vicinity of the public market area.

Also, centralized MRFs must also be established in the following areas:

Tomalon Dumpsite. One MRF should be established and operated in the vicinity of the existing Tomalon dumpsite. MRF equipment include composters and shredders. To complement the facility, an eco-shed and an ecology garden must be established adjacent to the facility. The MRF will however be temporary as this will be made operational as long as the dumpsite is in use. In the medium term, the Tomalon Dumpsite will be closed once the new city landfill will be established.

Dinagan Site. One MRF shall be established along with the proposed Dinagan Landfill. Facilities in this proposed MRF will include an eco-shed (waste segregation shed) in combination with such other composting techniques like composters, shredders, etc. or the windrow type composting technique. The equipment used in the Tomalon dumpsite can be transferred to the MRF of the proposed SLF site. An eco-garden will also be established in the vicinity where composted biodegradable waste will be put to use.

The right infrastructure in any integrated solid waste management system is mandatory in tandem with waste reduction and composting initiatives.

- It is highly recommended that the City pursue the establishment of its proposed sanitary landfill at Brgy. Dinagan. An implementation plan should be prepared by the City to provide guidance and timeframe of activities relative to the establishment of the SLF.
- At this point in time, the existing dumpsite will continue to receive waste hand-in-hand with its closure and rehabilitation until such time that the proposed SLF will be operational. But it is emphasized that the garbage piles in the Tomalon Dumpsite shall be periodically covered with a layer of soil for sanitation purposes. Canals around the dumpsite must also be built to minimize water contact with the garbage during heavy rains.
- Also, for economic reason, the operation and construction of the proposed SLF shall be in phases. The general practice is to construct and operate an adequate cell for disposal requirement for a few years and succeeding cells will be built and operated after the initial cell will be full and this will be a continuous process.
- It is recommended for the City to maintain its present garbage collection system. However, improvements should be undertaken in terms of expanding its collection coverage to reach more of the rural barangays.
- It is recommended that a training program for CSWMO be undertaken to further boost its capabilities and skills in handling the SWM services for the City of Calbayog.

In addition the following are the recommended waste reduction and recycling programs for the City in order to comply completely with the provisions stipulated RA 9003.

1. Development Programs

To reduce the volume of waste generated in the City and recover recyclable materials of economic value from the waste stream, the city government shall implement strategic interventions including advocacy, recycling and composting programs, human resource development, infrastructure development and equipment acquisition relative to solid waste management initiatives.

2. Advocacy Program

Advocacy is the social marketing component of the SWM system to develop public awareness of the benefits and potential ill-effects of solid waste management practices. Advocacy programs will include the following:

- *Compiling Waste Statistics.* The CSWMO must compile waste generation data on a daily, monthly and annual bases, including but not limited to waste characterization studies, volume of recovered materials, volume of compost produced, and updating waste generation projections. These are important in the formulation of program and infrastructure intervention on solid waste management.

- *Human Resource Development.* The CSWMO shall send staff to attend training seminars, symposia, workshops, etc. on solid waste management to update themselves on the latest in sound practices, technology and equipment on solid waste management which may be of use to the City later on. HRD will also include study tours to other LGUs, which are implementing successful solid waste management practices.
- *Information and Education Campaign.* The CSWMO will continuously inform the public about sound solid waste management practices through various media. Community dialogues and other forms of information dissemination campaign shall be used. The CSWMO shall also work hand in hand with the barangays, other sectors such as NGOs, and even schools with regard to this effort.

3. Training Center for the CSWMO

This office must have their own training center equipped with all office needs and facilities in order to implement all programs for an ISWM in the City

4.4 SAGAY CITY

4.4.1 Profile of the Area

(Annex XVIII of the Data Book shows the general information of Sagay City.)

A. Demography

Based on the National Census of CY 2000 conducted by the National Statistical Office (NSO), the population of Sagay City is 129,765. It is growing at the rate of 3.912% annually. By CY 2007, the projected population is 142,855.

B. Geographic Location

Sagay City is geographically located between 10° 38' 24" to 10° 58' 12" latitude and 125° 13' 48" to 125° 31' 48" longitude. It is bounded on the north by the Asuncion Pass and the Visayan Sea, west by the Cities of Cadiz and Silay, east by the City of Escalante and the Municipality of Calatrava. It is about 84 kilometers from Bacolod City, the Provincial Capital of Negros Occidental. **Figure 4.3** shows the location map of Sagay City.

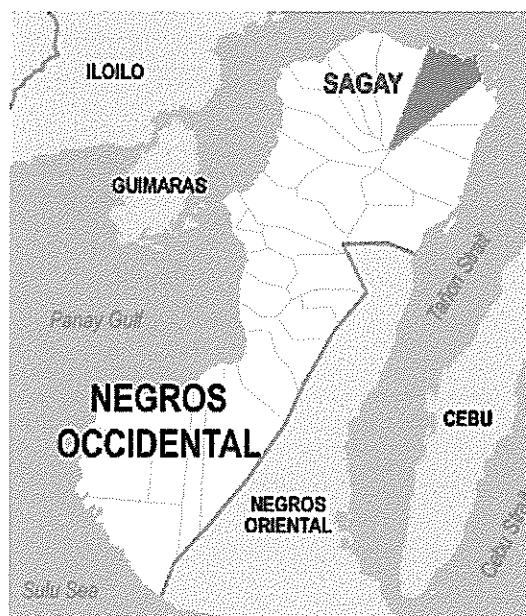


Figure 4.3 Location Map of Sagay City

C. Land Area

The total land area of Sagay City is 33,034 hectares with Barangay Puey having the largest area with 3,984 hectares and Barangay Molocaboc with the smallest area of 281.17 hectares. **Table 4.8** presents the land area per barangay of Sagay City.

Table 4.8 Land Area per Barangay

Barangay	Area (hectares)	Elevation (meters)	Distance to Poblacion (kms)	Type of Soil
1. Andres Bonifacio	1,016.61	32	10.35	Fara-on Clay Complex
2. Bato*	819.47	100	13	Guimbala-on Clay, Silay Clay, Fara-on Clay Steep Phase
3. Baviera	1,876.33	166	17	Guimbla-on Clay, Rough Mountain Land.
4. Bulanon	1,843.45	10	10.8	Hydrosol, Fara-on Clay Complex
5. Campo Himogaan	1,202.24	80	15	Guimbala-on Clay
6. Colonia Divina	2,101.28	200	23	Guimbala-on Clay
7. Fabrica*	573.02	10	9	Manapla Bago Loam, Guimbalaon Clay
8. General Luna	1,466.07	43	4	Fara-on Clay Complex Rough Mountain Land
9. Himogaan Baybay	2,264.18	10	19	Fara-on Clay Complex, Manapla- Bago Loam Complex
10. Lopez Jaena	1,830.60	60	7	Manapla- Loam, Guimbala-on Clay, Cadiz Gravelly Loam, Silay Clay, Fara-on Clay Steep Phase
11. Maquiling	1,011.34	110	18.5	Guimbala-on Clay, Luciana Clay, Silay Clay, Fara-on Clay Steep Phase
12. Malubon	1,675.81	50	12	San Miguel Loam, Guibala-on Clay, Luciana Clay
13. Molocaboc	281.17	6	21.6	Hydrosol

Barangay	Area (hectares)	Elevation (meters)	Distance to Poblacion (kms)	Type of Soil
14. Old Sagay*	1,130.33	10	5.5	Hydrosol, Fara-on Clay
15. Paraiso*	1,098.00	10	8	Fara-on Clay Complex, Manapla-Bago Loam, San Miguel Loam, Luciana Clay
16. Plaridel	855.36	10	10.8	Fra-on Clay Complex
17. Poblacion 1*	550.00	33	0	Fra-on Clay Complex, Manapla Loam
18. Poblacion 2*	1,072.00	33	0	Fara-on Clay Manapla Loam
19. Puey	3,964.64	194	34	Guimbala-on Clay
20. Rizal*	1,561.85	50	3.5	Fara-on Clay Complex, Guimbala-on Clay, Luciana Clay
21. Sewahon I	768.82	108	22	Guimbala-on Clay
22. Taba-ao	1,427.24	10	8.5	Fara-on Clay complex, Manapla loam, Cadiz Gravely Loam, Silay Clay, hydrosol
23. Tadlong	1,904.45	40	11	Guimbala-on Clay, Luciana Clay
24. Vito*	719.94	10	14.10	Fara-on Clay

* Urban Barangays per CPDO classification

4.4.2 Waste Generation and Composition

A. Existing Situation

1. Waste Generation

The results of the waste amount and composition survey (WACS) conducted in Sagay City in January 2007 are presented in **Table 4.9**. Sample size of WACS is as follows: residential – 30 samples (high income – 10 samples, middle income – 10 samples, low income – 10 samples); commercial – 18 samples (restaurants – 5 samples, other shops – 9 samples, private offices – 4 samples); institution – 8 samples (schools – 3 samples, government offices – 5 samples); market – 1 sample; and street sweeping – 5 samples. **Annex XXIII** shows the WACS Report of Sagay City.

Table 4.9 Waste Generation Rates for Sagay City, 2007

Category of Waste	Generation Source	Unit	Generation Rate	Quantity	Amount (kgs)
Residential Waste	Persons	kg/person/day	0.401	142,855	57,285
Commercial (Restaurants)	Restaurants	kg/restaurant/day	6.168	82	506
Commercial (Other Shops)	Other Shops	kg/shop/day	2.637	1,022	2,695
Institutional Waste	Gov't Offices	kg/employee/day	0.049	1,500	74
Schools	Schools	kg/person/day	0.005	32,993	180
Street Sweeping	Roads (with street sweeping activities only)	kg/km/day	19.902	10.728	214
Market	Market stalls	kg/stall/day	9.785	292	2,857
Total					63,811

As can be gleaned from Table 4.9, Sagay City is generating a total of 63.811 tons of MSW per day.

2. Waste Composition

Table 4.10 presents the waste composition of Sagay City.

Table 4.10 Waste Composition of Sagay City, 2007

Category	%
Paper	17.46
Glass	3.70
Metal	1.51
Plastic	8.81
Kitchen Waste	23.39
Other Organic	0.19
Other Inorganic	3.25
Hazardous	0.12
Special Waste	2.64
Yard Waste/Wood	33.73
Textiles	1.82
Rubber/Leather	0.48
Other	2.91
Total	100.00%

* *Special Waste includes medical waste (syringe, sharps, gauze, etc.) and pathological wastes (tissue, sanitary napkin, diaper, cigarette butts, cotton, cotton buds). Also refer to Annex XXIII of Databook for the description of the other categories*

For the waste composition of Sagay City, the three (3) categories with high percentages are: “yard waste/wood” with 33.73%; followed by “kitchen waste” with 23.39%; and “paper” with 17.46%.

B. Assessment

The Study Team provided assistance to the LGU in the conduct of WACS. The City could now formulate or update its SWM Plan using the results of the WACS.

C. Identification of Strategic Options and Actions

Data derived from WACS is a very good planning input in preparing the development of an ISWM plan for the City. Appropriate SWM plans and programs can be formulated with the knowledge of the actual volume and composition of waste generated by the whole of Sagay City.

4.4.3 Collection and Transport

A. Existing Situation

1. Waste Collection Practices

Actual weight test conducted on August 7, 2006 by the City Government thru a privately-owned weighbridge. According to GSO, the total garbage amount of

30.96 tpd can be considered as the average incoming waste volume / disposal volume of the city. Table 4.11 shows the total waste collected/day of the four (4) garbage collection vehicles.(Also refer to Annex XXIV of Databook)

Table 4.11 Total Waste Collected/day of the 4 Garbage Collection Vehicles

Type of Vehicle	Plate No.	Service Area	No. of Trips per day	Weight of Garbage per Trip (kg)	Total Waste Collected / day (kg)
Hino Compactor	SDK 290	Poblacion II	2	3800	7,600
Isuzu Compactor	GGA 716	Poblacion I	2	3,940	7,880
Isuzu Compactor	GFA 453	New Public Market including Public Market of Brgy. Paraiso & Brgy. Old Sagay	3	2,360	7,080
Toyota Compactor	FEE 782	Various Barangays	4	2,100	8,400

(Actual weight tested by GSO on August 7, 2006)

Days of collection depend upon the barangay and the garbage collection vehicle. Collection in Poblacion I and Poblacion II is done everyday. In Brgy. Paraiso, collection is done two (2) times per week, Monday and Thursday; every Thursday for Old Sagay; every Monday and Friday for Brgys. Rizal and Lopez Jaena; every Tuesday in Brgys. Bulanon, Plaridel and Bonifacio; and every Wednesday in Brgy. Vito. In Brgy. Bato (proper) collection is on Tuesday while in Brgy. Bato (hospital) collection is every Wednesday. Collections are set from 5:00 am to 9:00am and from 2:00 pm to 6:00 pm. (Also refer to Annex XXIV of Databook)

The collection rate of Sagay City is high at 48.5%, considering the City's daily waste generation of 63.811 tons.

2. Collection Vehicles

The GSO Garbage Collection Unit has six (6) units of compactor trucks utilized for garbage collection and two dump trucks are used also for other purposes aside from garbage collection. (Refer to Annex XXIV of Databook)

All of the 5-tonner vehicles make two (2) trips per day while the 2.5- tonner vehicles, Toyota truck and Isuzu compactor, make three (3) and four (4) trips daily, thus the present total capacity of the garbage vehicles is 50 tons. If the Hino compactor will be utilized after repair, the total capacity will increase from 50 tons to 60 tons daily. Total collection as recorded is 31 tons daily. This means that the garbage collection vehicles are not optimized.

The Collection Section of GSO includes seven (7) drivers, 21 collection crew, 82 street cleaners and three (3) canal diggers for a total of 113 personnel. Each vehicle has a collection crew composed of one (1) driver and three (3) collectors.

The collection unit of the SWMC has one dump truck and a trailer for collecting biodegradable wastes in the market as well as in urban barangays.

3. *Service Area*

Garbage collection of the City is primarily the function of the General Services Office (GSO). The collection service area covers 11 barangays namely: Poblacion 1, Poblacion 2, Fabrica, Paraiso, Bato, Rizal, Old Sagay, Vito, Plaridel, Andres Bonifacio and Lopez-Jaena. Wastes in Barangays Poblacion 1 and Poblacion 2 are collected daily while the other urban barangays are collected at least once a week. The biodegradable wastes in the public markets are collected separately by the collection unit under the SWMC and brought to a composting plant run by the SWMC.

4. *Garbage Collection Routes*

The collection route maps of Sagay City are presented in **Annex XIX** of the Data Book. Like in Calbayog City, Sagay City has no designated garbage collection points within the City. However, the GSO head has mentioned his intention to establish collection points within the service areas in order to make garbage collection more efficient and easier.

B. Assessment

The garbage collection fleet of the City is relatively old. But because of the proper maintenance and upkeep provided the City's motor pool, under the City Engineer's Office, the collection fleet is always in good condition.

C. Identification of Strategic Options and Actions

The City's current garbage collection fleet is virtually in good shape until 2008. Beyond this, there is a need to replace some of the old units with new or reconditioned ones. However, this would entail additional expenses on the part of the City's budget. Thus, the only way to do it without drastic effect on the City's pocket is to prepare a procurement plan for its new fleet.

4.4.4 **Recycling / Waste Diversion**

A. Existing Situation

The biodegradable wastes collected in the public markets and tree cuttings and trimmings collected in the barangays are brought to a vermin composting plant located about a kilometer away from the City Hall at barangay Poblacion 2. The plant has ten composting beds and two breeding tables for the African night crawler worms with a total area of 100 square meters. Vermi composts are used in the Gulayan sa Barangay Projects.

The non-biodegradable wastes like the plastics and soft drinks straws collected by the SWMC are brought to households in barangays where they are made into mats and bags. Some are melted and molded into flower pots. Doy packs are processed and made into coin purse and bags. These projects are being assisted by the Department of Science and Technology (DOST) and the SWMC.

The City has an estimated thirty (30) junkshops in operation. **Table 4.12** presents the prevailing transaction prices for recyclable materials in the City.

**Table 4.12 Prevailing Transaction Prices for Recyclable Materials in Sagay City
(in Philippine Pesos)**

Materials		Buying Price	Selling Price
Paper	Old Corrugated Cardboard	1.00 / kg	2.00 / kg
Metal	Tin cans	3.00 / kg	4.00 / kg
	Aluminum cans	50.00 / kg	60.00 / kg
	Other metal scrap	10.00 / kg	11.00 / kg
Plastic	PET bottles	8.00 – 12.00 / kg	14.00 – 15.00 / kg
	Other plastic containers		
Glass	Glass bottles	0.25 – 1.00 / pc	0.40 – 1.25 / pc

Based on actual junkshop survey conducted in Sagay City

Recyclable materials are being bought from junkshops in Sagay City by private individuals or big junkshops based in Victorias and Bacolod cities.

B. Assessment

The City's program for composting is doing very well. Good quality compost is produced regularly which benefits Sagay City's populace. In terms of segregation-at-source and recycling activities, the City is having a hard time implementing its programs along this line due to lack of cooperation from the residents.

C. Identification of Strategic Options and Actions

The City should continue with its composting activities and may opt to produce organic composts on a large-scale basis. A centralized composting facility may be established in its proposed SLF in Brgy. Luna to cater not only to Sagay City's biodegradable materials but also to its neighboring towns such as Cadiz City and Escalante.

In terms of segregation-at-source schemes, the City will have to conduct massive advocacy campaigns to address such matter to the residents. IEC activities in schools and communities will have to be conducted regularly to raise awareness and encourage huge participation from local residents.

4.4.5 Disposal

A. Existing Situation

The solid wastes in Sagay are disposed of in an open dumpsite located in barangay Poblacion 2, which is about two (2) kilometers away from the City Proper and about five (5) kilometers away from the City Hall. The dumpsite has an area of about one (1) hectare. The site has no perimeter fence, no soil cover and is easily accessed by scavengers. It has no drainage system and ponding is noticeable in the area. The said area has been used by the City since 1996 through an agreement with private owner. (Annex XX presents the site photos of the present disposal site of the City.)

Disposal operation is handled by GSO, which uses a bulldozer for leveling and compaction of garbage.

During the ocular inspection of dumpsite, it was noticed that there were only ten (10) scavengers present. The waste pickers are grouped by family but are not organized as an NGO. The City plans to integrate them in the recycling activities of the City by

utilizing them as workers in the MRF. There are also no waste pickers residing inside the dumpsite.

B. Assessment

To date, there are still no plans for the safe closure of the City's existing open dumpsite in Brgy. Poblacion 2. However, steps are being undertaken in the establishment of the sanitary landfill such as negotiations on the acquisition of the 8-ha lot in Brgy. Luna and preliminary talks with Cadiz City and Escalante regarding the possibility of a cluster SLF. The City of Sagay intends to join with its neighboring LGUs in this endeavor and is interested in operating the cluster SLF. Initial assessment by the Study Team on the proposed SLF site shows that it is suitable for sanitary landfill purposes, as follows:

1. Preliminary Site Assessment of the Proposed Sanitary Landfill Site

An initial assessment of the proposed Sagay Sanitary Landfill site was undertaken by the Study Team after its ocular inspection on December 28, 2006. (**Annex XX** shows the site photos of the proposed SLF site.) The assessment is based on the siting criteria of the Implementing Rules and Regulations of Republic Act 9003 which is as follows:

- *Land Use*
The proposed landfill site is located in Barangay Luna, about three (3) kilometers from the seat of the City and about four (4) kilometers from the Poblacion. The present land use of the proposed sanitary landfill site is agricultural. At present the site is planted with sugarcane. Other vegetation includes vegetables and pineapple.
- *Accessibility*
From Poblacion, the site can be reached through a City road and a barangay road which is four (4) kilometers concrete paved from the City proper and intermittent unpaved road that finally leads to the site. The road traverses a sitio and passes Barangay Luna Elementary School.
- *Capacity of the Area*
The proposed site has an area of 13.3 hectares but still under negotiation between the owner and the city government. The area is capable of accommodating the City's waste for more than five (5) years. A sketch sourced from tax map is shown below in **Figure 4.4**.
- *Daily Soil Cover*
The soil characteristics at Barangay Luna and the proposed site is described as Fara-on Clay which can be used as soil cover. An abundance of this soil material is located within the proposed sanitary landfill.
- *Hydrology and Drainage*
There are five (5) rivers in the City of Sagay which are: Himoga-an River; Tan-ao River; Pacul River; and Bulanon River. The biggest river is Himoga-an River with a width of 90 meters and a length of 81,000 meters and a discharge of 3,850 liters per second while the shortest river is Bulanon River which has a length of 19,000 meters. There are creeks in Brgy. Luna that

confluence to Vito River. None of these five (5) traverses to the proposed site.

- *Other Concerns*

The proposed site is not located on a known active fault within 75 meters and is not located within two (2) kilometers of an airport. While its slope is between 0-5 degrees, the landfill site to be constructed is not situated on a floodplain area. There is also no indigenous people as well as known endangered species living in the area.

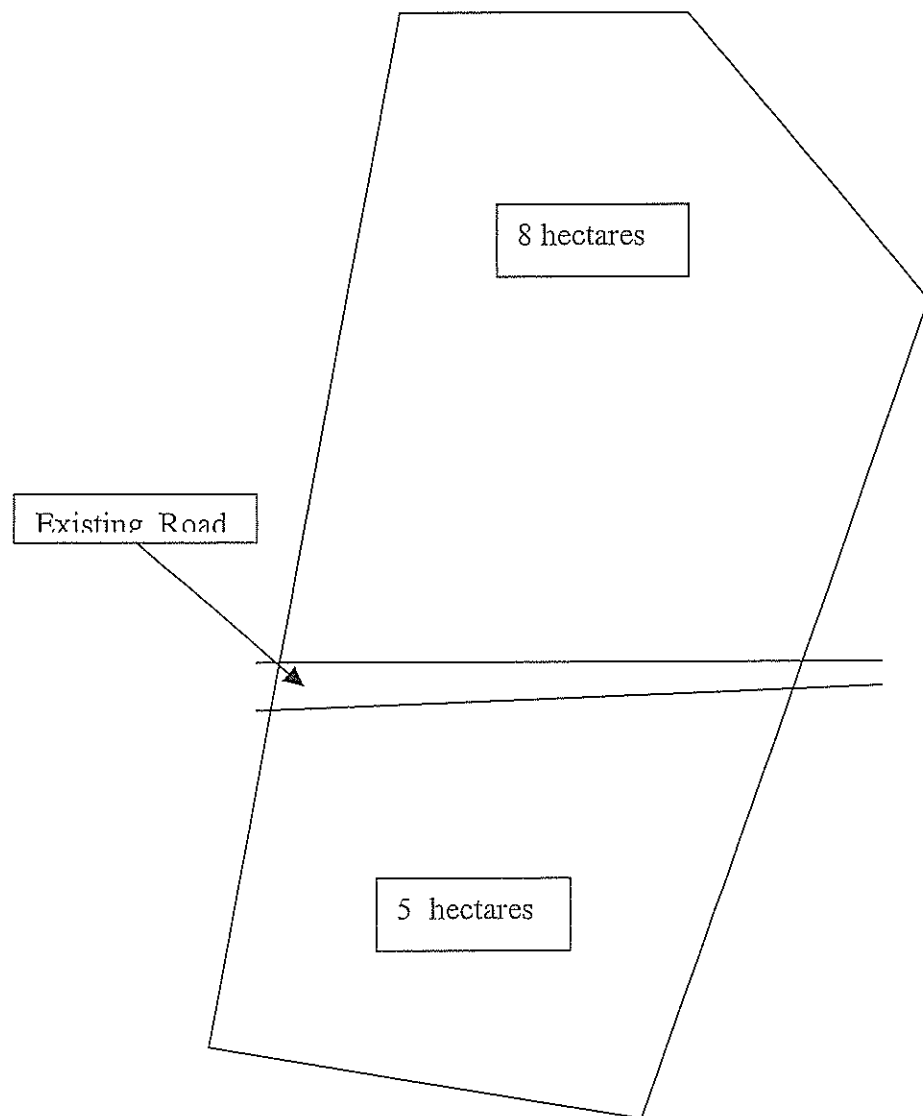


Figure 4.4 Sketch of Proposed SLF Area of Sagay City

The MGB assessed the area and favorably endorses the site. The MGB and the LGU will still need to undertake a groundwater quality test to establish baseline data.

2. EIA Requirements

The present waste collection of Sagay City is at 31 tons per day and its waste projection of 53 tons per day by 2020 places the City in Category Level 2, which means that an initial environmental examination (IEE) report is required before construction. Should the City decide to cluster with Cadiz City and the Municipality of Escalante for the use of its sanitary landfill, its category level will still be Category 2, which is not more than 75 tons per day of residual waste.

C. Identification of Strategic Options and Actions

The safe closure of the City's existing open dump should be undertaken in parallel with the preparations for the establishment of the proposed SLF in Brgy. Luna. The City intends to cluster with two (2) LGUs namely: Cadiz City and Escalante. Based on the NSO Survey in CY 2000, Cadiz City has population of 141,954 with an annual growth rate of 1.71%, while the Municipality of Escalante has a population of 79,098 with an annual growth rate of 0.85%. The garbage collection in Cadiz is recorded at 41 tons per day, and Escalante has a garbage collection of 8 tons per day. Adding these collections to that of Sagay, which is 31 tons per day, the total collection of the three LGUs is 80 tons per day. This doubles the waste acceptance at the proposed sanitary landfill of Sagay City.

4.4.6 Operation and Maintenance

A. Existing Situation

The collection and disposal of garbage are managed by the GSO, which has six collection vehicles; thus its operation and maintenance is also handled by the same department. The City Engineer's Office (CEO) takes charge of the repair of equipment. The operational cost is charged to the budget of GSO.

B. Assessment

In general, the City's SWM services are working well. All equipment is properly taken care of and the present manpower is sufficiently enough.

C. Identification of Strategic Options and Actions

The City should continue with its efficient collection system. In the event that it intends to increase its garbage collection coverage, the City must consider the acquisition of additional collection equipment.

4.3.7 Organization and Institutional Arrangement

A. Existing Situation

1. Sagay City Solid Waste Management Council

In consonance with the provisions of RA 9003, also known as the Ecological Solid Waste Management Act of 2000, an Executive Order was issued by Mayor

Joseph G. Marañon creating the Sagay City Solid Waste Management Council. The membership of the SWMC was updated in 2004 by the late City Mayor, Hon. Fortunato S. Javelosa, through Executive Order No.5. The Council is composed of the 22 members from the Sangguniang Bayan, City government agencies, and private organizations, with the City Mayor as the Chairperson.

Accomplishments of the SWMC since its establishment include among others: acquisition of shredders to reduce the biodegradable materials before composting, establishment of Materials Recovery Facility (MRF) in Barangays Rizal, Bato and Vito, waste segregation in pilot areas like the New Public Market, organization of Barangay Solid Waste Management Committees, establishment of Bio-Intensive Garden for the utilization of the organic fertilizer produced by the barangays, and expansion and promotion of vermi composting in other barangays and schools.

2. Solid Waste Management Structure

There is no single unit that handles the management and operation of the solid waste management system of Sagay City. Two agencies are coordinating with each other in the implementation of the Solid Waste Management Program (SWMP) of the City, namely: the Solid Waste Management Council (SWMC) and the General Services Office (GSO). **Figure 4.5** shows the current structure of SWMC.

The SWMC is in charge of the advocacy and monitoring of the Solid Waste Management Program particularly on recycling and composting. It is also in charge of the collection of the biodegradable materials of the City. SWMC is headed by an Executive Director who has one (1) secretary, one (1) operation officer, and six (6) workers under his supervision.

The GSO is responsible for the solid waste collection and disposal operations of the City. GSO is also in-charge of the procurement of equipment and vehicles necessary for the operation in the dumpsite. The collection crew, which includes the drivers and helpers, are under the supervision of the Head of GSO.

As discussed in the previous section, the SWM is implemented by the GSO, which takes charge of the collection and disposal of garbage, while the SWMC takes charge of the recycling and composting activities. GSO is responsible for the procurement of equipment and spare parts, which is conducted through competitive bidding. Procurement of civil works is done by the City Engineer's Office (CEO), which also adopts competitive bidding.

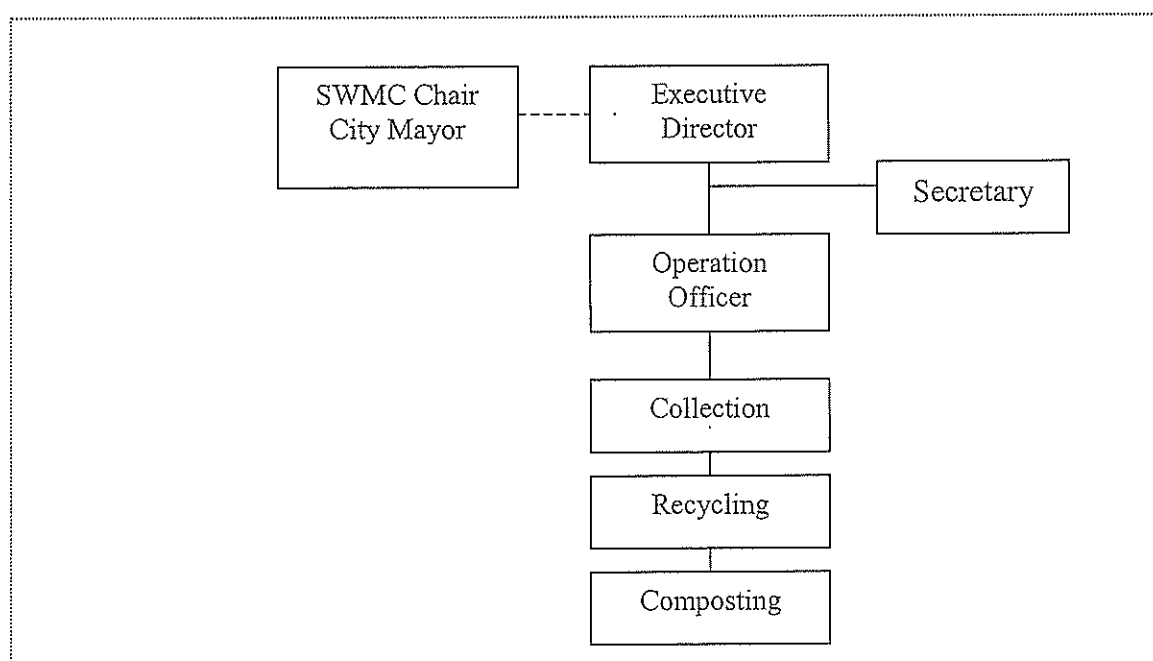


Figure 4.5 Present Structure of Sagay City Solid Waste Management Council

B. Assessment

1. Capacity Building Requirements

An interview with the Executive Director of SWMC revealed that personnel experience on sanitary landfill operation is quite low. The existing manpower complement needs strengthening or enhancement of management and technical skills in several aspects of sanitary landfill operation, particularly in record keeping, maintenance of the facilities e.g. waste treatment, drainage canals, weigh bridge operation, maintenance and traffic flow of equipment, and safety. The conduct of seminars and workshop on the provisions of RA 9003 on sanitary landfill operations is also recommended to cope up with the new facilities to be constructed. Training needs assessment should be done to determine priorities.

Further, the only noticeable task handled by the SWMC is the collection of biodegradable waste of markets for its vermin-composting activity and monitoring of its advocacy programs on SWM. Other than this, the SWMC has no other function with regards to SWM. The GSO handles the street cleaning, canal clearing, garbage collection and disposal operation.

2. Level of Capacity of LGU in SWM Operation

Daily collection of garbage is still confined to two urban barangays, Poblacion 1 and Poblacion 2. Other urban barangays are collected regularly twice or sometimes thrice a week. Segregation of waste is done on pilot areas, while majority of the residents are not yet practicing segregation. Recycling and composting are also done in some barangays. At the present disposal site, only one equipment is used and daily soil cover is wanting.

In fact in the 2004 JICA Study, Sagay City was evaluated as Category B which means that compliance of RA 9003 is moderate. On recycling and composting an intensive program has been in-place to date.

Under Memorandum Circular No.6, the City of Sagay is categorized as Level 2, which means it is accepting waste less than 75 tpd. For cities and municipalities under this category the following design features are required:

- a) Daily and intermediate soil cover
- b) Embankment/Cell Separation
- c) Drainage facility
- d) Leachate collection
- e) Leachate treatment through a ponding system
- f) Leachate circulation at a later stage
- g) Clay lining system of at least 75 cm thick and a permeability of 10^{-6} cm/sec

3. SWM Ordinances

Apart from the national laws on Solid Waste Management, Sagay City passed an ordinance banning the dumping and/or throwing of wastes in places not designated as dumping areas, and a resolution creating the position of an Executive Director from the SWMC to oversee all SWM program of the City.

City Ordinance No. 001, Series of 2000 – An ordinance prohibiting the dumping/ throwing of garbage, waste, refuse, non-biodegradable objects and other waste materials in any place in the street and other places not otherwise designated as dumping place, and providing penalties. Penalties under this ordinance include: for first offense, a fine of PhP200 or community service by cleaning the streets for two hours or picking cigarette butts; for second offense, a fine of PhP300 and imprisonment of not more than one month; and a fine of PhP1,000 and imprisonment of not more than two months. (**Annex U** of the Data Book shows the ordinances of the City related with SWM.)

Enforcement of this particular ordinance is very low due to lack of manpower and political will to do so. The local police force is designated to enforce the said ordinance.

Resolution No. 2002-001 – Resolution creating the position of an Executive Director from one of the members of the Sagay City Solid Waste Management Council which will oversee the plans and programs of Solid Waste Management. The resolution was passed on May 22, 2002.

4. Solid Waste Management Plan

The preparation of the Ten (10) year Solid Waste Management Plans as required under RA 9003 is still in progress to date. Among the projects to be undertaken under the SWM Plan are: (**Annex Q** presents the SWM programs of Sagay City.)

- Reorientation of all barangays officials and SWMC members on RA 9003 - March 2007
- Design of Sagay SLF - June 2007
- Expansion of Vermi composting to all barangays – 2007 to 2009
- Construction of SLF - 2007 to 2009

- Expansion of Waste Recycling – 2007 to 2012
- Procurement of Shredders for all barangays – 2007 to 2012
- Expansion of “Gulayan sa Barangay” to all barangays – 2007 to 2010
- Advocacy on RA 9003 - annually
- Annual Contest “Most Environment Friendly Puroks” - annually

The City has 24 barangays but only three barangays (Rizal, Bulanon and Fabrica) practice waste segregation. Mixed garbage is still collected from the remaining barangays. No garbage fee is collected from the residents, while the commercial establishments pay their garbage fee annually during payments of their business permits. Awareness on waste reduction, reuse, and recycling is still low as majority of the households are not practicing segregation.

5. IEC Programs

Through coordination with the Department of Education (DepEd), “Pulong Pulong sa Barangay on RA 9003” are conducted with the barangay kagawads (councilors), dump truck drivers, garbage collectors, eco-aides and street cleaners. The objective of the seminars is to strengthen the awareness of the stakeholders. Outreach programs on composting and recycling are also conducted in the barangays. Signs and posters are installed at strategic places to remind the residents of the practice on waste segregation.

In addition, the private sector participates actively in the IEC and promotion of composting. One member of Sagay Solid Waste Management Council is from Sagay Association of Ministers for Ecumenical Endeavors, Inc. (SAMEI), a non-government organization. In some barangays, local Senior Citizens are also active.

C. Identification of Strategic Options and Actions

There is a need to strengthen the organizational set-up of the current solid waste management structure to be more effective. Relative to the organization of a SWM unit is the allocation of a regular budget for the unit. For this to materialize, two options can be considered:

Option 1: Make the SWM unit a part of the GSO Department as a division composed of Collection Section, Disposal Operation, MRF and Composting Section, and IEC Section (see **Figure 4.6**).

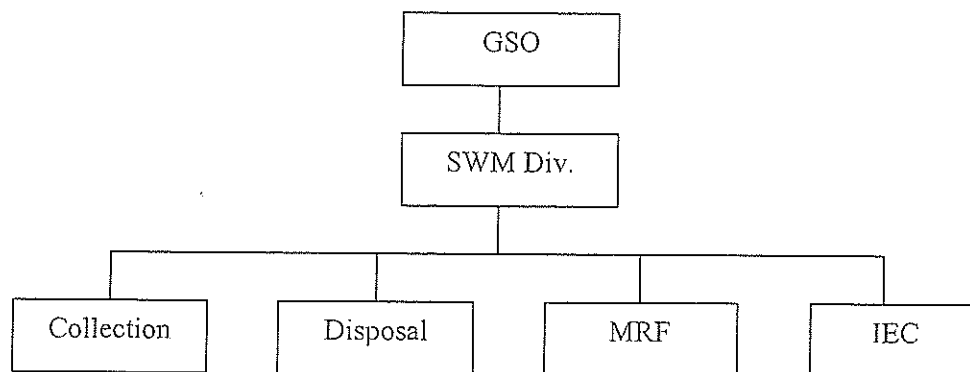


Figure 4.6 Proposed SWM Division (Option 1)

Option 2: Convert the current collection unit of the SWMC into a separate, regular unit that will take charge of the disposal operation, MRF, composting and IEC programs under the Office of the Mayor with regular budget every year. The collection of garbage of GSO shall be maintained including the collection of biodegradable and repair of equipment by the motor pool shall likewise be maintained (see Figure 4.7).

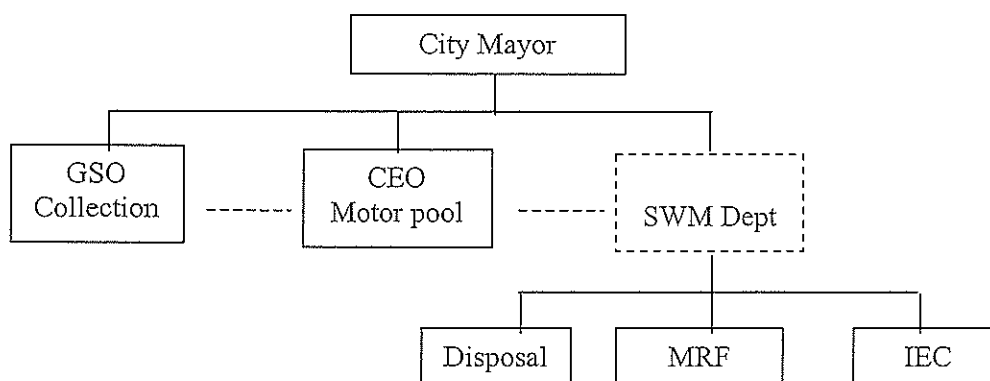


Figure 4.7 Proposed SWM Unit (Option 2)

4.4.8 Recommendations

- The conduct of WACS on a regular basis is recommended for the City to monitor the changes in its waste amount and composition. The Sagay City Solid Waste Management Council (SWMC) should be able to formulate more programs particularly on composting, since the City has vast agricultural lands, which produce large amounts of biodegradable wastes.
- To ascertain efficiency of garbage collection, it is recommended for the City to assess the condition and performance of its garbage collection fleet and prepare a procurement schedule for possible replacements of the old ones.
- It is recommended for the City to establish a centralized composting facility at its proposed SLF site in Brgy. Luna. It is also recommended that a massive and sound advocacy campaign be instituted to address segregation-at-source practices.
- It is recommended for the City to undertake the safe closure of its open dumpsite simultaneous with the activities in the establishment of the City's proposed SLF. A cluster LGU set-up should be further evaluated and assessed in the feasibility study to be prepared for the proposed SLF.
- It is recommended for the City to continue its own collection and disposal activities because it has enough equipment and manpower to operate and maintain its SWM services.
- The establishment and strengthening of a SWM Division under GSO is suggested considering capability, displacement of personnel, and annual budgetary allocation.

- A stronger and more massive IEC program should be in-place to raise the awareness of Sagay City residents on proper waste segregation.
- In consideration that the City intends to operate and maintain its cluster SLF, it is recommended for the City to hire additional personnel and provide the necessary trainings and capacity building activities for them to be equipped with the proper knowledge on the operation and maintenance of a sanitary landfill facility.
- Policy and decision making with regards to SWM should be the function of the SWMC.

Chapter 5

Financial Analysis

CHAPTER 5 FINANCIAL ANALYSIS

5.1 CALBAYOG CITY FINANCIAL ANALYSIS

5.1.1 General

The following describes the financial analysis for the various options on solid waste management system, which are based on the capacity of the local government unit or private investors to finance and implement a municipal solid waste management project, the sanitary landfill. It is treated as an income-generating venture for the **LGU-Calbayog City**, owing to the limited finances to operate the said project and in like manner, for the private investor who would probably opt to operate and manage such noble project if the former is disinterested.

The solid waste management project is assessed on the basis of financial parameters taken from the primary and secondary data gathered. The benefit-cost analysis technique was employed in order to quantify the anticipated streams of costs and benefits that would accrue to the proponent or investor given various options.

Basically, the discounted measures of project worth, viz: Benefit-Cost Ratio (BCR), Net Present Value (NPV), and the Financial Internal Rate of Return (FIRR), were used to gauge the commercial profitability and desirability of the solid waste management project. Decision criteria have to be satisfied for each of the investment parameter for the project to be considered financially viable.

Four (4) options are presented in this study namely:

- Option 1 LGU Operated Sanitary Landfill
- Option 2 Privately Operated Sanitary Landfill
- Option 3 LGU Operated Sanitary Landfill with Composting
- Option 4 Privately Operated Sanitary Landfill with Composting

The Material Recovery Facility (MRF) was not included in options 3 and 4 because it was observed that people are practicing waste segregation at source, hence, recyclables are already separated and picked before they reach the dumpsite. If there are any recyclables in the waste stream, they are already negligible.

5.1.2 Options 1 & 2

Project Cost and Source of Financing

For Options 1 and 2, the project shall require an initial capital outlay of **Php29,661,688** at 2007 prices as shown in **Table 5.1**. These are the items on site development/ earth works, leachate control, gas control, support structures, etc.

It shall be funded through a loan from a funding institution on a 90-10% (LGU) and 80-20% (private) loan-equity arrangement, option 1 has a total loan of **Php26,661,688** while option 2, a total loan of **Php23,818,317**. A fixed interest rate of 10% annually, payable in 10 years with a two-year grace period are assumed for both for this purpose. The equity covers land acquisition and part of the MOOE for option 1, whereas, option 2's equity would cover land, landfill closure and miscellaneous expense. Likewise, miscellaneous expenses represent the overhead, contingencies, taxes, and other related expenses on direct cost.

The project shall be concentrated on a **4.9-hectare** lot at Barangay Dinagan, a new dumpsite of **LGU-Calbayog City**. Because of its distance and geographic location, clustering is not possible, hence the proposed SLF shall be solely used by the LGU.

The bulk of the initial capital investment shall be spent on the gestation period (implementation phase) wherein the landfill structures and other related facilities are assumed to be constructed / installed a year before the operation phase. Maintenance and operating expenses which include salaries and wages, fuel, etc amounting to **PhP4,374,424** yearly shall be allocated starting on the first year of operation and thereafter. Option 2 is assumed to have a **3%** sales tax while option 1 does not have since it is a government operated venture.

Table 5.1 Initial Capital Outlay, Options 1 & 2

items	Option 1			Option 2		
	Loan	Equity	Total	Loan	Equity	Total
Land Acquisition	0	1,000,000	1,000,000	0	1,000,000	1,000,000
Site Development/Earthworks	1,639,926	0	1,639,926	1,639,926	0	1,639,926
Leachate Controls	4,913,181	0	4,913,181	4,913,181	0	4,913,181
Gas Controls	357,304	0	357,304	357,304	0	357,304
Support Structures	1,831,956	0	1,831,956	1,831,956	0	1,831,956
Utilities	600,000	0	600,000	600,000	0	600,000
Access Roads/Parking Area	601,526	0	601,526	601,526	0	601,526
Misc Expense	4,377,557	0	4,377,557	0	4,377,557	4,377,557
Landfill Closure	465,815	0	465,815	0	465,815	465,815
Equipment for Operation	9,500,000	0	9,500,000	9,500,000	0	9,500,000
MOOE (wages, fuel, etc : first year)	2,374,424	2,000,000	4,374,424	4,374,424	0	4,374,424
Total	26,661,688	3,000,000	29,661,688	23,818,317	5,843,372	29,661,688

(BASIS: refer to Annex XVII for the Budgetary Cost Estimate for Calbayog City)

Projected Income, Funds Flow and Cash Flow Statements

Options 1 and 2's commercial profitability and viability are determined through a **25-year** projected income statement, funds flow and cash flow. The projection would show us the financial performance of both within the maturity period of the loan. Its revenue shall be generated from a tipping fee (pegged at **PhP1,255.00** per ton) to be shouldered by the clients (populace) for the former while option 2 would derive its income from the LGU-Calbayog City through a tipping fee of **PhP1,506.00**.

The assumed LGU tipping fee of **PhP1,255.00** was derived from the average breakeven point tipping fee of **PhP965.00** per ton plus 30% representing the mark-up price per ton. Similarly, the assumed tipping fee for the privately operated SLF (option 2) was based on a 20% mark-up from option 1's tipping fee.

Based from the Projected Income Statement, option 1 shall generate an average net income of **PhP3,992,134** per annum while option 2, **PhP5,786,597** per annum which both indicate a decent profit for both options (see Table 5.2 and Table 5.3).

Similarly, the **Projected Funds Flow Statement** generally shows encouraging results for both options as the project is expected to accumulate positive cash balances after paying-off project obligations and accountabilities. The project so far will not encounter any liquidity problem in its entire operation because of the availability of cash before the beginning of each year up to the end of project life (see Table 5.4 and Table 5.5).

A **Projected Cash Flow Statement** showing the total benefits and costs for options 1 and 2 has been prepared to provide a picture of the project's financial performance in terms of the net benefits that would accrue to the proponent (see **Table 5.6** and **Table 5.7**).

Financial Feasibility Measures and Sensitivity

An ex-ante evaluation of options 1 and 2 has been conducted using the discounted measures of project worth viz: Benefit-Cost Ratio (BCR), Net Present Value (NPV), and Financial Internal Rate of Return (FIRR) using an opportunity cost of 10%.

The Benefit-Cost Ratios (BCR) are calculated at 1.03 and 1.23 for options 1 and 2, respectively which suggests that the project is financially viable since its value is greater than 1. Meaning, for every peso invested, a net benefit of 0.03 and 0.23 is generated by options 1 and 2, respectively. Further, the NPVs likewise show positive values of **PhP1,959,056** and **PhP17,070,213**, respectively since they are greater than zero. The Financial Internal Rates of Return (FIRR) are computed at 11% and 17% for options 1 and 2, respectively, implying that both are financially viable since the values are greater than the opportunity cost of investment at 10% (see **Table 5.8**).

Furthermore, a standard sensitivity analysis with respect to possible fluctuations in anticipated project benefits and costs were also conducted to determine the project's performance under extreme conditions. This way, the risks and uncertainties due to environmental and economic abnormalities can be captured. One of the viability indicators of the project is its ability to absorb nominal shocks such as increase in prices of project inputs and decrease in project outputs.

Three (3) cases were considered for this analysis, namely: Case A: A reduction in revenue by 10% while capital investments and operating costs are unchanged; Case B: An increase in capital investments and operating costs by 10% while revenue is unchanged; Case C: A combination of cases A and B which is a reduction in revenue by 10% and a simultaneous increase in capital investments and operating costs by 10%.

Table 5.2 Projected Income Statement (Option 1)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
GROSS REVENUE																									
Tipping Fee*	5,495,342	5,770,109	6,058,615	6,361,545	6,679,623	7,013,604	7,364,284	7,732,498	8,119,123	8,525,079	8,951,333	9,398,900	9,868,845	10,362,287	10,880,401	11,424,421	11,995,642	12,595,425	13,225,196	13,886,456	14,580,778	15,309,817	16,075,308	16,879,073	17,723,027
Total Revenue	5,495,342	5,770,109	6,058,615	6,361,545	6,679,623	7,013,604	7,364,284	7,732,498	8,119,123	8,525,079	8,951,333	9,398,900	9,868,845	10,362,287	10,880,401	11,424,421	11,995,642	12,595,425	13,225,196	13,886,456	14,580,778	15,309,817	16,075,308	16,879,073	17,723,027
OPERATING EXPENSES																									
Landfill Closure	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815
Operation Personnel	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000
Fuel and Lubricants	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424
Contingencies	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000
Operating Expenses Before Dep'n	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239
Add: Depreciation ³	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492
Total Operating Expenses	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731
Net Income Before Interest	(310,389)	(35,622)	252,884	555,814	873,892	1,207,873	1,558,553	1,926,767	2,313,392	2,719,348	3,145,602	3,593,169	4,063,114	4,556,556	5,074,670	5,618,690	6,189,912	6,789,694	7,419,465	8,080,725	8,775,047	9,504,086	10,269,577	11,073,343	11,917,296
Less: Interest	2,666,169	2,666,169	2,666,169	2,332,898	1,999,627	1,666,356	1,333,084	999,813	666,542	333,271															
NET INCOME	(2,976,558)	(2,701,791)	(2,413,285)	(1,777,083)	(1,125,735)	(458,483)	225,469	926,954	1,646,850	2,386,077	3,145,602	3,593,169	4,063,114	4,556,556	5,074,670	5,618,690	6,189,912	6,789,694	7,419,465	8,080,725	8,775,047	9,504,086	10,269,577	11,073,343	11,917,296

Table 5.3 Projected Income Statement (Option 2)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
GROSS REVENUE																									
Tipping Fee*	6,594,410	6,924,131	7,270,337	7,633,854	8,015,547	8,416,324	8,837,141	9,278,998	9,742,948	10,230,095	10,741,600	11,278,680	11,842,614	12,434,744	13,056,482	13,709,306	14,394,771	15,114,509	15,870,235	16,663,747	17,496,934	18,371,781	19,290,370	20,254,888	21,267,633
Total Revenue	6,594,410	6,924,131	7,270,337	7,633,854	8,015,547	8,416,324	8,837,141	9,278,998	9,742,948	10,230,095	10,741,600	11,278,680	11,842,614	12,434,744	13,056,482	13,709,306	14,394,771	15,114,509	15,870,235	16,663,747	17,496,934	18,371,781	19,290,370	20,254,888	21,267,633
OPERATING EXPENSES																									
Landfill Closure	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815
Operation Personnel	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000
Fuel and Lubricants	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424
Contingencies	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000
Operating Expenses Before Dep'n	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239
Add: Depreciation ³	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492
Total Operating Expenses	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731	5,805,731
Net Income Before Interest	788,680	1,118,400	1,464,607	1,828,123	2,209,816	2,610,594	3,031,410	3,473,267	3,937,217	4,424,364	4,935,869	5,472,949	6,036,883	6,629,013	7,250,751	7,903,575	8,589,040	9,308,779	10,064,504	10,858,016	11,691,203	12,566,050	13,484,639	14,449,157	15,461,902
Less: Interest	2,381,832	2,381,832	2,381,832	2,084,103	1,786,374	1,488,645	1,190,916	893,187	595,458	297,729															
Tax	197,832	207,724	218,110	229,016	240,466	252,490	265,114	278,370	292,288	306,903	322,248	338,360	355,278	373,042	391,694	411,279	431,843	453,435	476,107	499,912	524,908	551,153	578,711	607,647	638,029
NET INCOME	(1,790,984)	(1,471,156)	(1,135,335)	(884,995)	(618,976)	(348,541)	(78,506)	1,575,380	3,049,470	4,613,621	6,255,912	7,988,189	9,799,106	11,682,765	13,648,055	15,695,094	17,825,813	19,940,225	22,039,337	24,114,249	26,166,061	28,195,772	30,207,383	32,200,994	34,177,605

Table 5.4 Projected Funds Flow Statement (Option1)

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
A. Sources of Funds (Cash Inflow)																										
Net Income from Operations	-	(2,976,558)	(2,701,791)	(2,413,285)	(1,777,083)	(1,125,735)	(458,483)	225,469	926,954	1,646,850	2,386,077	3,145,602	3,593,169	4,063,114	4,556,556	5,074,670	5,618,690	6,189,912	6,789,694	7,419,465	8,080,725	8,775,047	9,504,086	10,269,577	11,073,343	11,917,296
Add Back : Depreciation	-	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492
Add: BL / E	29,661,688																									
Total	29,661,688	(2,011,066)	(1,736,299)	(1,447,793)	(811,591)	(160,243)	507,009	1,190,961	1,892,446	2,612,342	3,351,569	4,111,094	4,558,661	5,028,606	5,522,048	6,040,162	6,584,182	7,155,404	7,755,186	8,384,957	9,046,217	9,740,539	10,469,578	11,235,069	12,038,835	12,882,788
B. Uses of Funds (Cash Outflow)																										
Principal Amortization		-	-	3,332,711	3,332,711	3,332,711	3,332,711	3,332,711	3,332,711	3,332,711	3,332,711	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Facilities / Accessories	11,857,722																9,500,000									
Total	11,857,722	-	-	3,332,711	3,332,711	3,332,711	3,332,711	3,332,711	3,332,711	3,332,711	3,332,711	-	-	-	-	-	9,500,000	-	-	-	-	-	-	-	-	-
C. Net Cash Flow	17,803,967	(2,011,066)	(1,736,299)	(4,780,504)	(4,144,302)	(3,492,954)	(2,825,702)	(2,141,750)	(1,440,265)	(720,369)	18,858	4,111,094	4,558,661	5,028,606	5,522,048	6,040,162	(2,915,818)	7,155,404	7,755,186	8,384,957	9,046,217	9,740,539	10,469,578	11,235,069	12,038,835	12,882,788
Add: Beg. Cash Balance	-	17,803,967	15,792,901	14,056,602	9,276,098	5,131,796	1,638,842	(1,186,860)	(3,328,610)	(4,768,876)	(5,489,245)	(5,470,387)	(1,359,293)	3,199,368	8,227,974	13,750,022	19,790,185	16,874,367	24,029,771	31,784,956	40,169,913	49,216,130	58,956,669	69,426,248	80,661,317	92,700,152
Net Cash Balance, Ending	17,803,967	15,792,901	14,056,602	9,276,098	5,131,796	1,638,842	(1,186,860)	(3,328,610)	(4,768,876)	(5,489,245)	(5,470,387)	(1,359,293)	3,199,368	8,227,974	13,750,022	19,790,185	16,874,367	24,029,771	31,784,956	40,169,913	49,216,130	58,956,669	69,426,248	80,661,317	92,700,152	105,582,940

Table 5.5 Projected Funds Flow Statement (Option2)

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
A. Sources of Funds (Cash Inflow)																										
Net Income from Operations	-	(1,790,984)	(1,471,156)	(1,135,335)	(484,995)	182,976	869,459	1,575,380	2,301,710	3,049,470	3,819,732	4,613,621	5,134,588	5,681,604	6,255,971	6,859,056	7,492,296	8,157,197	8,855,343	9,588,397	10,358,103	11,166,295	12,014,896	12,905,928	13,841,511	14,823,873
Add Back : Depreciation	-	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492
Add: BL / E	29,661,688																									
Total	29,661,688	(825,492)	(505,664)	(169,843)	480,497	1,148,468	1,834,951	2,540,872	3,267,202	4,014,962	4,785,224	5,579,113	6,100,080	6,647,096	7,221,463	7,824,548	8,457,788	9,122,689	9,820,835	10,553,889	11,323,595	12,131,787	12,980,388	13,871,420	14,807,003	15,789,365
B. Uses of Funds (Cash Outflow)																										
Principal Amortization		-	-	2,977,290	2,977,290	2,977,290	2,977,290	2,977,290	2,977,290	2,977,290	2,977,290	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Facilities / Accessories	11,857,722																9,500,000									
Total	11,857,722	-	-	2,977,290	2,977,290	2,977,290	2,977,290	2,977,290	2,977,290	2,977,290	2,977,290	-	-	-	-	-	9,500,000	-	-	-	-	-	-	-	-	-
C. Net Cash Flow	17,803,967	(825,492)	(505,664)	(3,147,133)	(2,496,792)	(1,828,822)	(1,142,339)	(436,418)	289,912	1,037,673	1,807,935	5,579,113	6,100,080	6,647,096	7,221,463	7,824,548	(1,042,212)	9,122,689	9,820,835	10,553,889	11,323,595	12,131,787	12,980,388	13,871,420	14,807,003	15,789,365
Add: Beg. Cash Balance	-	17,803,967	16,978,474	16,472,811	13,325,678	10,828,885	9,000,064	7,857,725	7,421,308	7,711,220	8,748,893	10,556,828	16,135,940	22,236,021	28,883,117	36,104,580	43,929,128	42,886,916	52,009,605	61,830,440	72,384,329	83,707,925	95,839,712	108,820,100	122,691,520	137,498,523
Net Cash Balance, Ending	17,803,967	16,978,474	16,472,811	13,325,678	10,828,885	9,000,064	7,857,725	7,421,308	7,711,220	8,748,893	10,556,828	16,135,940	22,236,021	28,883,117	36,104,580	43,929,128	42,886,916	52,009,605	61,830,440	72,384,329	83,707,925	95,839,712	108,820,100	122,691,520	137,498,523	153,287,887

Table 5.6 Projected Cash Flow Statement (Option1)

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
BENEFITS																										
Tipping Fee	-	5,495,342	5,770,109	6,058,615	6,361,545	6,679,623	7,013,604	7,364,284	7,732,498	8,119,123	8,525,079	8,951,333	9,398,900	9,868,845	10,362,287	10,880,401	11,424,421	11,995,642	12,595,425	13,225,196	13,886,456	14,580,778	15,309,817	16,075,308	16,879,073	17,723,027
Residual Value																										
Total Benefits	-	5,495,342	5,770,109	6,058,615	6,361,545	6,679,623	7,013,604	7,364,284	7,732,498	8,119,123	8,525,079	8,951,333	9,398,900	9,868,845	10,362,287	10,880,401	11,424,421	11,995,642	12,595,425	13,225,196	13,886,456	14,580,778	15,309,817	16,075,308	16,879,073	17,723,027
COST																										
Investment	29,661,688																									
Operating Expenses	-	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239
Total Cost	29,661,688	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239
NET BENEFITS (BF)	(29,661,688)	655,103	929,870	1,218,376	1,521,306	1,839,384	2,173,365	2,524,045	2,892,259	3,278,884	3,684,840	4,111,094	4,558,661	5,028,606	5,522,048	6,040,162	6,584,182	7,155,404	7,755,186	8,384,957	9,046,217	9,740,539	10,469,578	11,235,069	12,038,835	12,882,788
FINANCING																										
Loan	26,661,688																									
Debt Service		2,666,169	2,666,169	5,998,880	5,665,609	5,332,338	4,999,067	4,665,795	4,332,524	3,999,253	3,665,982	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Net Financing	26,661,688	(2,666,169)	(2,666,169)	(5,998,880)	(5,665,609)	(5,332,338)	(4,999,067)	(4,665,795)	(4,332,524)	(3,999,253)	(3,665,982)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NET BENEFITS (AF)	(3,000,000)	(2,011,066)	(1,736,299)	(4,780,504)	(4,144,302)	(3,492,954)	(2,825,702)	(2,141,750)	(1,440,265)	(720,369)	18,858	4,111,094	4,558,661	5,028,606	5,522,048	6,040,162	6,584,182	7,155,404	7,755,186	8,384,957	9,046,217	9,740,539	10,469,578	11,235,069	12,038,835	12,882,788

Table 5.7 Projected Cash Flow Statement (Option2)

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
BENEFITS																										
Tipping Fee	-	6,594,410	6,924,131	7,270,337	7,633,854	8,015,547	8,416,324	8,837,141	9,278,998	9,742,948	10,230,095	10,741,600	11,278,680	11,842,614	12,434,744	13,056,482	13,709,306	14,394,771	15,114,509	15,870,235	16,663,747	17,496,934	18,371,781	19,290,370	20,254,888	21,267,633
Residual Value																										
Total Benefits	-	6,594,410	6,924,131	7,270,337	7,633,854	8,015,547	8,416,324	8,837,141	9,278,998	9,742,948	10,230,095	10,741,600	11,278,680	11,842,614	12,434,744	13,056,482	13,709,306	14,394,771	15,114,509	15,870,235	16,663,747	17,496,934	18,371,781	19,290,370	20,254,888	21,267,633
COST																										
Investment	29,661,688																									
Operating Expenses	-	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239
Total Cost	29,661,688	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239	4,840,239
NET BENEFITS (BF)	(29,661,688)	1,754,172	2,083,892	2,430,099	2,793,615	3,175,308	3,576,086	3,996,902	4,438,759	4,902,709	5,389,856	5,901,361	6,438,441	7,002,375	7,594,505	8,216,243	8,869,067	9,554,532	10,274,271	11,029,996	11,823,508	12,656,695	13,531,542	14,450,131	15,414,649	16,427,394
FINANCING																										
Loan	23,818,317																									
Debt Service		2,381,832	2,381,832	5,359,121	5,061,392	4,763,663	4,465,934	4,168,205	3,870,476	3,572,747	3,275,019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Net Financing	23,818,317	(2,381,832)	(2,381,832)	(5,359,121)	(5,061,392)	(4,763,663)	(4,465,934)	(4,168,205)	(3,870,476)	(3,572,747)	(3,275,019)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NET BENEFITS (AF)	(5,843,372)	(627,660)	(297,940)	(2,929,023)	(2,267,777)	(1,588,355)	(889,649)	(171,304)	568,282	1,329,961	2,114,838	5,901,361	6,438,441	7,002,375	7,594,505	8,216,243	8,869,067	9,554,532	10,274,271	11,029,996	11,823,508	12,656,695	13,531,542	14,450,131	15,414,649	16,427,394

Shown in **Table 5.8** is the summary of the sensitivity analysis which basically shows that the project is viable only in option 2 except for Case C following the decision criteria of the measures of project worth. Unfortunately, all cases in option 1 failed the sensitivity test.

Table 5.8. Summary of Sensitivity Analysis

Items	Option 1				Option 2			
	Base	Case A	Case B	Case C	Base	Case A	Case B	Case C
IRR	11%	8%	8%	6%	17%	13%	13%	10%
NPV	1,959,056	(5,596,523)	(5,400,617)	(12,956,196)	17,070,213	8,003,519	9,710,540	643,846
BCR	1.03				1.23			

Profit Analyses

The volume or the unit tipping fee at which the project will just break even may be established. Consequently, the proponent will have some ideas on how to decide when to increase or decrease the price or focus on the volume requirements of the enterprise given the various market forces and existing market environment.

In the computation for the Break-Even Point Volume or the volume of garbage to be delivered to the landfill site and the Break-Even Point Tipping Fee for both options, the volume commitment is **12 tons** per day. This is the actual total amount of garbage from Calbayog City. The **Break-Even Volume (BEV)** and the **Break-Even Tipping Fee (BETF)** actually vary from year to year. For option 1, the BEV ranges from 5 to 56 tons per day while the BETF, ranges from **PhP434.00** to **PhP2,008.00** per ton. In like manner, for option 2, the BEV ranges from 5 to 25 tons per day while the BETF, ranges from **PhP479.00** to **PhP1,989.00** per ton. Nonetheless, to give the proponent an idea of the average for the 25-year project life for both parameters as a reference point, the BEV is around 14 and 9 tons per day and the BETF is roughly **PhP965.00** and **PhP996.00** per ton for options 1 and 2, respectively. In this analysis, an initial tipping fee of **PhP1,255.00** and **PhP1,506.00** per ton for options 1 and 2, respectively shall be used over the 25-year period at current 2007 prices.

Theoretically, if the volume collected will be lower than the BEV per day for that particular year, the project will stand to lose, and if it will be higher, its otherwise. For analysis work, the BEV should be compared with the projected volume and the maximum attainable landfill capacity.

The computed BEV for both options from year 1 to 25 shows a declining volume as the costs (fixed and variable cost) decline over the years. In this particular project, a conservative estimate of an initial **12 tons** per day which is assumed to increase 5% every year is less than the average BEV of **14 tons** for option 1. However, in the succeeding years of operation, the volume is expected to surpass the **14 tons** average. For option 2, the **9 tons** BEV per day is less than the initial **12 tons** of garbage per day, thus, the project stands to gain.

Furthermore, the Break-Even Tipping Fee (BETF) varies from **PhP434.00** to **PhP2,008.00** per ton for option 1 and **PhP479.00** to **PhP1,989.00** per ton for option 2 over the project life. In order to have a specific comparison of these figures from a reference point, we get the average BETF at **PhP965.00** and **PhP996.00** per ton for options 1 and 2, respectively. Using these figures, theoretically, the project neither gains nor loses. At an assumed tipping fee of **PhP1,255.00** and **PhP1,506.00** per ton for options 1 and 2, respectively, the project is robust. The difference of **PhP290.00** and **PhP510.00** per ton would be able to defray the cost of other incidental expenses to be incurred relative to project operation not captured in this computation. Further, from year 1 onwards, a decreasing BETF is noted implying that the project becomes more profitable as it matures. This can be attributed to the declining interest expense, and a minimal increase in variable costs (see **Table 5.9**).

Therefore, an initial tipping fee of **PhP1,255.00** and **PhP1,506.00** per ton for options 1 and 2, respectively are a good price to start with as shown in the above discussions and substantiated by the computations (see **Table 5.11** and **Table 5.12**).

Table 5.9 Summary of Breakeven Point Values

	Option 1		Option 2	
TIPPING FEE		1,255		1,506
AVERAGE BREAKEVEN TIPPING FEE (per ton)		965		996
AVERAGE BREAKEVEN VOLUME (per day)		14		9
AVERAGE BREAKEVEN TIPPING FEE (range)	434	2,008	479	1,989
AVERAGE BREAKEVEN VOLUME (range)	5	56	5	25

Furthermore, the Weighted Average Cost of Capital (WACC) was also computed in order to have an idea of how debt financing imposes a financial risk to both proponents who would then want to be compensated, at a minimum, by the tax shield on the periodic interest payment. Under an imperfect market which characterizes the present local market environment in the Philippines, taxes are introduced as a market imperfection. The WACC is the benchmark discount rate at which projects are assessed to determine which of a set of financially feasible project is most desirable. The WACC is currently set by the National Economic Development Authority at 15%. At this scenario, the over-all cost of capital will decrease with the use of debt because the interest tax shield benefits the stockholders. **Table 5.10** shows the WACC. The figure shows that WACC (Weighted Real Rate) for equity and loan is 10% while the WACC (Weighted Nominal Rate) is 18.80% for both options.

Table 5.10 Weighted Average Cost of Capital

Description	option 1		option 2	
	Weighted Real Rate	Weighted Nominal Rate	Weighted Real Rate	Weighted Nominal Rate
Equity	6.72%	12.64%	7.07%	13.29%
Loan	3.28%	6.16%	2.93%	5.51%
Total	10.00%	18.80%	10.00%	18.80%

5.1.3 Options 3 (LGU with composting) & 4 (Private with composting)

Project Cost and Source of Financing

Options 3 and 4 have an indicative initial capital outlay of **PhP29,901,856** at 2007 prices as shown in **Table 5.13**. Around 81% of the initial capital outlay are allocated for the development costs which include site development / earth works, leachate control, gas control, support structures, among others. Only 16% is allocated for the MOOE.

The same arrangement for options 1 and 2 are employed in these options: 90-10% (LGU) and 80-20% (private) loan-equity arrangement, 10% interest rate, 10 years to pay and a 2-year grace period, for option 3 and 4, respectively. Relative to this, option 3 has a total loan of **PhP26,901,856** whereas option 4 has a total loan of **PhP24,058,485** only.

Maintenance and operating expenses, which include salaries and wages, fuel, etc amounting to **PhP4,614,592** yearly shall be allocated starting on the first year of operation and thereafter. For both options, an additional manpower complement for the composting was incorporated.

Table 5.11 Breakeven Point (Option1)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Fixed Cost																									
Landfill Closure (annualized)	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000
Site Development/Earthworks (annualized)	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597
Landfill Closure depreciation	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815
Interest	2,666,169	2,666,169	2,666,169	2,332,898	1,999,627	1,666,356	1,333,084	999,813	666,542	333,271	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Fixed Cost	4,203,073	4,203,073	4,203,073	3,869,802	3,536,531	3,203,259	2,869,988	2,536,717	2,203,446	1,870,175	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904
Variable Cost																									
Misc Expense (annualized)	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878
Contingencies	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000
Operation Personnel	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000
Fuel and Lubricants	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424
Total Variable Cost	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302
GRAND TOTAL	8,796,375	8,796,375	8,796,375	8,463,103	8,129,832	7,796,561	7,463,290	7,130,019	6,796,748	6,463,477	6,130,206	6,130,206	6,130,206	6,130,206	6,130,206	6,130,206	6,130,206	6,130,206	6,130,206	6,130,206	6,130,206	6,130,206	6,130,206	6,130,206	6,130,206
Expected Sales / Collection (tons/day)	12	13	13	14	15	15	16	17	18	19	20	21	22	23	24	25	26	28	29	30	32	33	35	37	39
Expected Sales / Collection (tons/year)	4,380	4,599	4,829	5,070	5,324	5,590	5,870	6,163	6,471	6,795	7,135	7,491	7,866	8,259	8,672	9,106	9,561	10,039	10,541	11,068	11,621	12,203	12,813	13,453	14,126
Break-even Tipping Fee (P/ton)	2,008	1,913	1,822	1,669	1,527	1,395	1,272	1,157	1,050	951	859	818	779	742	707	673	641	611	582	554	527	502	478	456	434
average tipping fee	965																								
Break Even Point Sales Volume																									
Variable Unit Cost (P/ton)	1,049	999	951	906	863	822	783	745	710	676	644	613	584	556	530	504	480	458	436	415	395	376	358	341	325
Fixed Cost	4,203,073	4,203,073	4,203,073	3,869,802	3,536,531	3,203,259	2,869,988	2,536,717	2,203,446	1,870,175	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904
tipping fee	1,255	1,255	1,255	1,255	1,255	1,255	1,255	1,255	1,255	1,255	1,255	1,255	1,255	1,255	1,255	1,255	1,255	1,255	1,255	1,255	1,255	1,255	1,255	1,255	1,255
tipping fee	1,255																								
BEPSV Per year	20,409	16,426	13,851	11,097	9,025	7,398	6,079	4,980	4,044	3,232	2,516	2,396	2,292	2,200	2,120	2,049	1,985	1,928	1,877	1,830	1,788	1,750	1,715	1,683	1,654
BEPSV per month	1,701	1,369	1,154	925	752	617	507	415	337	269	210	200	191	183	177	171	165	161	156	153	149	146	143	140	138
BEPSV per day	56	45	38	30	25	20	17	14	11	9	7	7	6	6	6	6	5	5	5	5	5	5	5	5	5
average	14																								

Table 5.12 Breakeven Point (Option2)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Fixed Cost																									
Land Acquisition	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000
Site Development/Earthworks (annualized)	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597
Landfill Closure	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815
depreciation	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492
Interest	2,381,832	2,381,832	2,381,832	2,084,103	1,786,374	1,488,645	1,190,916	893,187	595,458	297,729	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tax	197,832	207,724	218,110	229,016	240,466	252,490	265,114	278,370	292,288	306,903	322,248	338,360	355,278	373,042	391,694	411,279	431,843	453,435	476,107	499,912	524,908	551,153	578,711	607,647	638,029
Total Fixed Cost	4,116,568	4,126,459	4,136,846	3,850,022	3,563,744	3,278,038	2,992,934	2,708,461	2,424,650	2,141,536	1,859,152	1,575,264	1,292,182	1,009,946	728,598	448,183	168,747	-112,339	-401,011	-699,912	-1,008,816	-1,328,057	-1,656,615	-1,994,851	-2,342,880
Variable Cost																									
Misc Expense (annualized)	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878
Contingencies	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000
Operation Personnel	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000	1,344,000
Fuel and Lubricants	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424
Total Variable Cost	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302	4,593,302
GRAND TOTAL	8,709,870	8,719,761	8,730,148	8,443,324	8,157,046	7,871,340	7,586,236	7,301,763	7,017,952	6,734,838	6,452,454	6,170,564	5,889,482	5,609,896	5,331,704	5,054,912	4,779,519	4,504,535	4,230,001	3,955,912	3,682,276	3,408,191	3,133,657	2,858,672	2,583,238
Expected Sales / Collection (tons/day)	12	13	13	14	15	15	16	17	18	19	20	21	22	23	24	25	26	28	29	30	32	33	35	37	39
Expected Sales / Collection (tons/year)	4,380	4,599	4,829	5,070	5,324	5,590	5,870	6,163	6,471	6,795	7,135	7,491	7,866	8,259	8,672	9,106	9,561	10,039	10,541	11,068	11,621	12,203	12,813	13,453	14,126
Breakeven Tipping Fee (P/ton)	1,789	1,896	1,808	1,665	1,532	1,408	1,292	1,185	1,084	991	904	863	825	787	752	718	686	656	627	599	573	548	524	501	479
average tipping fee	996																								
tipping fee (50%)	1,294																								
BEPSV Per year	9,010	8,142	7,462	6,420	5,544	4,793	4,140	3,562	3,047	2,581	2,157	1,801	1,493	1,212	976	796	620	476	352	248	164	94	52	28	16
BEPSV per month	751	678	622	535	462	399	345	297	254	215	180	150	124	101	81	66	51	39	29	20	13	8	4	2	1
BEPSV per day	25	22	20	18	15	13	11	10	8	7	6	5	4	3	2	2	1	1	1	1	1	1	1	1	1
average	9																								

Table 5.13. Initial Capital Outlay, Options 3 & 4

items	Option 3			Option 4		
	Loan	Equity	Total	Loan	Equity	Total
Land Acquisition	0	1,000,000	1,000,000	0	1,000,000	1,000,000
Site Development/Earthworks	1,639,926	0	1,639,926	1,639,926	0	1,639,926
Leachate Controls	4,913,181	0	4,913,181	4,913,181	0	4,913,181
Gas Controls	357,304	0	357,304	357,304	0	357,304
Support Structures	1,831,956	0	1,831,956	1,831,956	0	1,831,956
Utilities	600,000	0	600,000	600,000	0	600,000
Access Roads/Parking Area	601,526	0	601,526	601,526	0	601,526
Misc Expense	4,377,557	0	4,377,557	0	4,377,557	4,377,557
Landfill Closure	465,815	0	465,815	0	465,815	465,815
Equipment for Operation	9,500,000	0	9,500,000	9,500,000	0	9,500,000
MOOE (wages, fuel, etc : first year)	2,614,592	2,000,000	4,614,592	4,614,592	0	4,614,592
Total	26,901,856	3,000,000	29,901,856	24,058,485	5,843,372	29,901,856

(BASIS: refer to Annex XVII for the Budgetary Cost Estimate for Calbayog City)

Projected Income, Funds Flow and Cash Flow Statements

The commercial profitability and viability of options 3 and 4 were determined through a **25-year** projected income statement, funds flow and cash flow. The **25-year** projection for both options would show us the financial performance of the project within the maturity period of the loan. The revenues shall be generated from tipping fees (pegged at **PhP1,298.00** and **PhP1,558.00** per ton, for options 3 and 4, respectively), and organic fertilizers (composting). The organic fertilizer production sale is pegged at 7 bags per day priced at 150.00 per bag.

The assumed LGU tipping fee of **PhP1,298.00** was derived from the average breakeven point tipping fee of **PhP999.00** per ton. This is 30% higher than the average breakeven point tipping fee representing the mark-up price per ton. Likewise, the assumed tipping fee for the privately operated SLF (option 4) was based on a 20% mark-up from option 3's tipping fee.

As gleaned from the **Projected Income Statement**, option 3 is expected to generate an average net income of **PhP4,843,587** per annum which is **PhP1,832,572** short of option 4's average at **PhP6,676,159** per annum (see Table 5.14 and Table 5.15).

The **Projected Funds Flow Statement** for both virtually suggests a robust picture as the project is expected to build-up positive cash balances after defraying project obligations and accountabilities. More importantly, the project will not encounter any liquidity problem during its entire operation because of an assured cash balances every start of the year (see Table 5.16 and Table 5.17).

Moreover, a **Projected Cash Flow Statement** showing the total benefits and costs for options 3 and 4 has been prepared to present the project's financial performance relative to the net benefits that would accrue to the proponent or investor (see Table 5.18 and Table 5.19).

Financial Feasibility Measures and Sensitivity

A financial evaluation for options 3 and 4 using the discounted measures of project worth viz: Benefit-Cost Ratio (BCR), Net Present Value (NPV), and Financial Internal Rate of Return (FIRR) at an opportunity cost of 10% were employed.

The discounted measures of project worth such as Benefit-Cost Ratio (BCR) were computed at **1.10** and **1.30** for options 3 and 4, respectively, suggesting that the project is financially viable

and 0.30 are generated by options 3 and 4, respectively. Similarly, the NPVs show positive values of **PhP7,445,603** and **PhP23,084,241**, respectively. Likewise, the Financial Internal Rates of Return (FIRR) at an opportunity cost of 10% were employed for both options and were estimated at 13% and 19%, respectively, implying that both are financially viable since the values are greater than the opportunity cost of investment at 10% (see **Table 5.20**).

Furthermore, a sensitivity analysis with respect to possible variations in anticipated project benefits and costs were also conducted to determine the project's performance under abnormal conditions. Expectedly, the risks and uncertainties due to environmental and market distortions could be incorporated. One of the viability indicators of the project is its ability to absorb nominal shocks such as increases in prices of project inputs and decreases in project outputs.

Theoretically, three (3) cases were considered in this study, to wit: Case A: A reduction in revenue by 10% while capital investments and operating costs are unchanged; Case B: An increase in capital investments and operating costs by 10% while revenue is unchanged; Case C: A combination of cases A and B which is a reduction in revenue by 10% and a simultaneous increase in capital investments and operating costs by 10%.

Table 5.14 Projected Income Statement (Option 3)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
GROSS REVENUE																									
Tipping Fee*	5,687,166	5,971,525	6,270,101	6,583,606	6,912,786	7,258,425	7,621,347	8,002,414	8,402,535	8,822,661	9,263,795	9,726,984	10,213,333	10,724,000	11,260,200	11,823,210	12,414,371	13,035,089	13,686,844	14,371,186	15,089,745	15,844,232	16,636,444	17,468,266	18,341,680
ORGANIC	383,250	402,413	422,533	443,660	465,843	489,135	513,592	539,271	566,235	594,547	624,274	655,488	688,262	722,675	758,809	796,749	836,587	878,416	922,337	968,454	1,016,876	1,067,720	1,121,106	1,177,161	1,236,020
Total Revenue	6,070,416	6,373,937	6,692,634	7,027,266	7,378,629	7,747,560	8,134,938	8,541,685	8,968,770	9,417,208	9,888,068	10,382,472	10,901,595	11,446,675	12,019,009	12,619,959	13,250,957	13,913,505	14,609,181	15,339,640	16,106,622	16,911,953	17,757,550	18,645,428	19,577,699
OPERATING EXPENSES																									
Landfill Closure	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815
Operation Personnel	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168
Fuel and Lubricants	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424
Contingencies	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000
Operating Expenses Before Dep'n	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407
Add: Depreciation ³	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492
Total Operating Expenses	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899
Net Income Before Interest	24,517	328,038	646,735	981,367	1,332,730	1,701,662	2,089,040	2,495,786	2,922,871	3,371,309	3,842,170	4,336,573	4,855,697	5,400,776	5,973,110	6,574,061	7,205,059	7,867,606	8,563,282	9,293,741	10,060,723	10,866,054	11,711,651	12,599,529	13,531,800
Less : Interest	2,690,186	2,690,186	2,690,186	2,353,912	2,017,639	1,681,366	1,345,093	1,008,820	672,546	336,273															
NET INCOME	(2,665,668)	(2,362,147)	(2,043,451)	(1,372,546)	(684,909)	20,295	743,947	1,486,967	2,250,324	3,035,036	3,842,170	4,336,573	4,855,697	5,400,776	5,973,110	6,574,061	7,205,059	7,867,606	8,563,282	9,293,741	10,060,723	10,866,054	11,711,651	12,599,529	13,531,800

Table 5.15 Projected Income Statement (Option 4)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
GROSS REVENUE																									
Tipping Fee*	6,824,599	7,165,829	7,524,121	7,900,327	8,295,343	8,710,111	9,145,616	9,602,897	10,083,042	10,587,194	11,116,553	11,672,381	12,256,000	12,868,800	13,512,240	14,187,852	14,897,245	15,642,107	16,424,212	17,245,423	18,107,694	19,013,079	19,963,733	20,961,919	22,010,015
ORGANIC	383,250	402,413	422,533	443,660	465,843	489,135	513,592	539,271	566,235	594,547	624,274	655,488	688,262	722,675	758,809	796,749	836,587	878,416	922,337	968,454	1,016,876	1,067,720	1,121,106	1,177,161	1,236,020
Total Revenue	7,207,849	7,568,242	7,946,654	8,343,987	8,761,186	9,199,245	9,659,208	10,142,168	10,649,276	11,181,740	11,740,827	12,327,869	12,944,262	13,591,475	14,271,049	14,984,601	15,733,832	16,520,523	17,346,549	18,213,877	19,124,571	20,080,799	21,084,839	22,139,081	23,246,035
OPERATING EXPENSES																									
Landfill Closure	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815
Operation Personnel	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168
Fuel and Lubricants	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424
Contingencies	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000
Operating Expenses Before Dep'n	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407
Add: Depreciation ³	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492
Total Operating Expenses	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899	6,045,899
Net Income Before Interest	1,161,951	1,522,343	1,900,755	2,298,088	2,715,287	3,153,347	3,613,309	4,096,269	4,603,378	5,135,841	5,694,928	6,281,970	6,898,363	7,545,576	8,225,150	8,938,703	9,687,933	10,474,624	11,300,650	12,167,978	13,078,672	14,034,900	15,038,940	16,093,182	17,200,136
Less : Interest	2,405,848	2,405,848	2,405,848	2,105,117	1,804,386	1,503,655	1,202,924	902,193	601,462	300,731															
Tax	216,235	227,047	238,400	250,320	262,836	275,977	289,776	304,265	319,478	335,452	352,225	369,836	388,328	407,744	428,131	449,538	472,015	495,616	520,396	546,416	573,737	602,424	632,545	664,172	697,381
NET INCOME	(1,460,133)	(1,110,553)	(743,493)	(57,349)	648,065	1,373,714	2,120,608	2,889,811	3,682,437	4,499,658	5,342,704	6,212,134	7,117,035	8,050,035	9,017,919	10,020,165	11,057,918	12,131,009	13,240,254	14,385,662	15,568,135	16,788,776	18,047,601	19,345,719	20,684,140

Table 5.16 Projected Funds Flow Statement (Option 3)

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
A. Sources of Funds (Cash Inflow)																										
Net Income from Operations	-	(2,665,688)	(2,362,147)	(2,043,451)	(1,372,546)	(684,909)	20,295	743,947	1,486,967	2,250,324	3,035,036	3,842,170	4,336,573	4,855,697	5,400,776	5,973,110	6,574,061	7,205,059	7,867,606	8,563,282	9,293,741	10,060,723	10,866,054	11,711,651	12,599,529	13,531,800
Add Back : Depreciation	-	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492
Add: BL / E	29,901,856																									
Total	29,901,856	(1,700,176)	(1,396,655)	(1,077,959)	(407,054)	280,583	985,787	1,709,439	2,452,459	3,215,816	4,000,528	4,807,662	5,302,065	5,821,189	6,366,268	6,938,602	7,539,553	8,170,551	8,833,098	9,528,774	10,259,233	11,026,215	11,831,546	12,677,143	13,565,021	14,497,292
B. Uses of Funds (Cash Outflow)																										
Principal Amortization		-	-	3,362,732	3,362,732	3,362,732	3,362,732	3,362,732	3,362,732	3,362,732	3,362,732															
Facilities / Accessories	12,097,890																9,500,000									
Total	12,097,890	-	-	3,362,732	3,362,732	3,362,732	3,362,732	3,362,732	3,362,732	3,362,732	3,362,732	-	-	-	-	-	9,500,000	-	-	-	-	-	-	-	-	-
C. Net Cash Flow	17,803,967	(1,700,176)	(1,396,655)	(4,440,691)	(3,769,786)	(3,082,149)	(2,376,945)	(1,653,293)	(910,273)	(146,916)	637,796	4,807,662	5,302,065	5,821,189	6,366,268	6,938,602	(1,960,447)	8,170,551	8,833,098	9,528,774	10,259,233	11,026,215	11,831,546	12,677,143	13,565,021	14,497,292
Add: Beg. Cash Balance	-	17,803,967	16,103,790	14,707,135	10,266,444	6,496,659	3,414,509	1,037,565	(615,729)	(1,526,002)	(1,672,918)	(1,035,122)	3,772,540	9,074,605	14,895,793	21,262,062	28,200,664	26,240,216	34,410,767	43,243,865	52,772,639	63,031,872	74,058,086	85,889,632	98,566,776	112,131,796
Net Cash Balance, Ending	17,803,967	16,103,790	14,707,135	10,266,444	6,496,659	3,414,509	1,037,565	(615,729)	(1,526,002)	(1,672,918)	(1,035,122)	3,772,540	9,074,605	14,895,793	21,262,062	28,200,664	26,240,216	34,410,767	43,243,865	52,772,639	63,031,872	74,058,086	85,889,632	98,566,776	112,131,796	126,629,089

Table 5.17 Projected Funds Flow Statement (Option 4)

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
A. Sources of Funds (Cash Inflow)																										
Net Income from Operations	-	(1,460,133)	(1,110,553)	(743,493)	(57,349)	648,065	1,373,714	2,120,608	2,889,811	3,682,437	4,499,658	5,342,704	5,912,134	6,510,035	7,137,832	7,797,019	8,489,165	9,215,918	9,979,009	10,780,254	11,621,562	12,504,935	13,432,476	14,406,395	15,429,010	16,502,755
Add Back : Depreciation	-	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492
Add: BL / E	29,901,856																									
Total	29,901,856	(494,641)	(145,061)	221,999	908,143	1,613,557	2,339,206	3,086,100	3,855,303	4,647,929	5,465,150	6,308,196	6,877,626	7,475,527	8,103,324	8,762,511	9,454,657	10,181,410	10,944,501	11,745,746	12,587,054	13,470,427	14,397,968	15,371,887	16,394,502	17,468,247
B. Uses of Funds (Cash Outflow)																										
Principal Amortization		-	-	3,007,311	3,007,311	3,007,311	3,007,311	3,007,311	3,007,311	3,007,311	3,007,311	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Facilities / Accessories	12,097,890																9,500,000									
Total	12,097,890	-	-	3,007,311	3,007,311	3,007,311	3,007,311	3,007,311	3,007,311	3,007,311	3,007,311	-	-	-	-	-	9,500,000	-	-	-	-	-	-	-	-	-
C. Net Cash Flow	17,803,967	(494,641)	(145,061)	(2,785,311)	(2,099,168)	(1,393,753)	(668,105)	78,790	847,992	1,640,619	2,457,840	6,308,196	6,877,626	7,475,527	8,103,324	8,762,511	(45,343)	10,181,410	10,944,501	11,745,746	12,587,054	13,470,427	14,397,968	15,371,887	16,394,502	17,468,247
Add: Beg. Cash Balance	-	17,803,967	17,309,325	17,164,265	14,378,953	12,279,786	10,886,032	10,217,928	10,296,718	11,144,710	12,785,329	15,243,168	21,551,364	28,428,990	35,904,517	44,007,841	52,770,352	52,725,009	62,906,418	73,850,919	85,596,665	98,183,718	111,654,145	126,052,113	141,424,000	157,818,502
Net Cash Balance, Ending	17,803,967	17,309,325	17,164,265	14,378,953	12,279,786	10,886,032	10,217,928	10,296,718	11,144,710	12,785,329	15,243,168	21,551,364	28,428,990	35,904,517	44,007,841	52,770,352	52,725,009	62,906,418	73,850,919	85,596,665	98,183,718	111,654,145	126,052,113	141,424,000	157,818,502	175,286,749

Table 5.18 Projected Cash Flow Statement (Option 3)

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
BENEFITS																										
Tipping Fee	-	5,687,166	5,971,525	6,270,101	6,583,606	6,912,786	7,258,425	7,621,347	8,002,414	8,402,535	8,822,661	9,263,795	9,726,984	10,213,333	10,724,000	11,260,200	11,823,210	12,414,371	13,035,089	13,686,844	14,371,186	15,089,745	15,844,232	16,636,444	17,468,266	18,341,680
mrf	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
organic	-	383,250	402,413	422,533	443,660	465,843	489,135	513,592	539,271	566,235	594,547	624,274	655,488	688,262	722,675	758,809	796,749	836,587	878,416	922,337	968,454	1,016,876	1,067,720	1,121,106	1,177,161	1,236,020
Residual Value																										
Total Benefits	-	6,070,416	6,373,937	6,692,634	7,027,266	7,378,629	7,747,560	8,134,938	8,541,685	8,968,770	9,417,208	9,888,068	10,382,472	10,901,595	11,446,675	12,019,009	12,619,959	13,250,957	13,913,505	14,609,181	15,339,640	16,106,622	16,911,953	17,757,550	18,645,428	19,577,699
COST																										
Investment	29,901,856																									
Operating Expenses	-	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407
Total Cost	29,901,856	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407
NET BENEFITS (BF)	(29,901,856)	990,009	1,293,530	1,612,227	1,946,859	2,298,222	2,667,153	3,054,532	3,461,278	3,888,363	4,336,801	4,807,662	5,302,065	5,821,189	6,366,268	6,938,602	7,539,553	8,170,551	8,833,098	9,528,774	10,259,233	11,026,215	11,831,546	12,677,143	13,565,021	14,497,292
FINANCING																										
Loan	26,901,856																									
Debt Service		2,690,186	2,690,186	6,052,918	5,716,644	5,380,371	5,044,098	4,707,825	4,371,552	4,035,278	3,699,005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Net Financing	26,901,856	(2,690,186)	(2,690,186)	(6,052,918)	(5,716,644)	(5,380,371)	(5,044,098)	(4,707,825)	(4,371,552)	(4,035,278)	(3,699,005)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NET BENEFITS (AF)	(3,000,000)	(1,700,176)	(1,396,655)	(4,440,691)	(3,769,786)	(3,082,149)	(2,376,945)	(1,653,293)	(910,273)	(146,916)	637,796	4,807,662	5,302,065	5,821,189	6,366,268	6,938,602	7,539,553	8,170,551	8,833,098	9,528,774	10,259,233	11,026,215	11,831,546	12,677,143	13,565,021	14,497,292

Table 5.19 Projected Cash Flow Statement (Option 4)

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
BENEFITS																										
Tipping Fee	-	6,824,599	7,165,829	7,524,121	7,900,327	8,295,343	8,710,111	9,145,616	9,602,897	10,083,042	10,587,194	11,116,553	11,672,381	12,256,000	12,868,800	13,512,240	14,187,852	14,897,245	15,642,107	16,424,212	17,245,423	18,107,694	19,013,079	19,963,733	20,961,919	22,010,015
mrf	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
organic	-	383,250	402,413	422,533	443,660	465,843	489,135	513,592	539,271	566,235	594,547	624,274	655,488	688,262	722,675	758,809	796,749	836,587	878,416	922,337	968,454	1,016,876	1,067,720	1,121,106	1,177,161	1,236,020
Residual Value																										
Total Benefits	-	7,207,849	7,568,242	7,946,654	8,343,987	8,761,186	9,199,245	9,659,208	10,142,168	10,649,276	11,181,740	11,740,827	12,327,859	12,944,262	13,591,475	14,271,049	14,984,601	15,733,832	16,520,523	17,346,549	18,213,877	19,124,571	20,080,799	21,084,839	22,139,081	23,246,035
COST																										
Investment	29,901,856																									
Operating Expenses	-	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407
Total Cost	29,901,856	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407	5,080,407
NET BENEFITS (BF)	(29,901,856)	2,127,443	2,487,835	2,866,247	3,263,580	3,680,779	4,118,839	4,578,801	5,061,761	5,568,870	6,101,333	6,660,420	7,247,462	7,863,855	8,511,068	9,190,642	9,904,195	10,653,425	11,440,116	12,266,142	13,133,470	14,044,164	15,000,392	16,004,432	17,058,674	18,165,628
FINANCING																										
Loan	24,058,485																									
Debt Service		2,405,848	2,405,848	5,413,159	5,112,428	4,811,697	4,510,966	4,210,235	3,909,504	3,608,773	3,308,042	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Net Financing	24,058,485	(2,405,848)	(2,405,848)	(5,413,159)	(5,112,428)	(4,811,697)	(4,510,966)	(4,210,235)	(3,909,504)	(3,608,773)	(3,308,042)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NET BENEFITS (AF)	(5,843,372)	(278,406)	81,987	(2,546,912)	(1,848,848)	(1,130,918)	(392,127)	368,566	1,152,257	1,960,097	2,793,292	6,660,420	7,247,462	7,863,855	8,511,068	9,190,642	9,904,195	10,653,425	11,440,116	12,266,142	13,133,470	14,044,164	15,000,392	16,004,432	17,058,674	18,165,628

Table 5.20 shows the summary of the sensitivity tests, which basically shows that the project is financially viable in all cases for option 4 only following the decision criteria of the measures of project worth. For option 3, all cases failed the sensitivity test, thus, the project is very susceptible to nominal shocks, which means that the LGU has to be extra careful in its management and control of the project.

Table 5.20 Summary of Sensitivity Analysis

items	Option 3				Option 4			
	Base	Case A	Case B	Case C	Base	Case A	Case B	Case C
IRR	13%	10%	10%	7%	19%	15%	15%	12%
NPV	7,445,603	(900,648)	(156,088)	(8,502,339)	23,084,241	13,174,126	15,482,550	5,572,435
BCR	1.10				1.30			

Profit Analyses

In the calculation for the Break-Even Point Volume or the volume of garbage to be delivered to the landfill site and the Break-Even Point Tipping Fee for both options, the volume commitment is **12 tons** per day. The **Break-Even Volume (BEV)** and the **Break-Even Tipping Fee (BETF)** generally vary from year to year. For option 3, the BEV ranges from 4 to 59 tons per day while the BETF, ranges from **PhP451.00** to **PhP2,069.00** per ton. Likewise, for option 4, the BEV ranges from 5 to 25 tons per day while the BETF, ranges from **PhP500.00** to **PhP2,053.00** per ton. Nonetheless, to give the proponent an idea of the average for the 25-year project life for both parameters as a reference point, the BEV is around 14 and 9 tons per day and the BETF is around **PhP999.00** and **PhP1,034.00** per ton for options 3 and 4, respectively. In this particular analysis, an initial tipping fee of **PhP1,298.00** and **PhP1,558.00** per ton for options 3 and 4, respectively shall be used over the 25-year period at current 2007 prices. These are figures higher than the computed BETF.

The computed BEV for both options from year 1 to 25 shows a declining volume as the costs (fixed and variable cost) decline over the years. In this particular project, a conservative estimate of an initial **12 tons** per day, which is assumed to increase 5% every year, is less than the average BEV of **14 tons** for option 1. However, in the succeeding years of operation, the volume is expected to surpass the 13-ton average. For option 2 the BEV of **9 tons** per day is less than the initial 12 tons of garbage per day, thus, the project stands to gain.

Furthermore, the Break-Even Tipping Fee (BETF) varies from **PhP451.00** to **PhP2,069.00** per ton for option 3 and **PhP500.00** to **PhP2,053.00** for option 4 over the project life. In order to have a specific comparison of these figures from a reference point, we get the average BETF at **PhP999.00** and **PhP1,034.00** per ton, respectively. Using these figures, theoretically, the project neither gains nor loses. At an assumed tipping fee of **PhP1,298.00** and **PhP1,558.00** per ton, respectively, the project is robust. The difference of **PhP300.00** and **PhP525.00** per ton would be able to defray the cost of other incidental expenses to be incurred relative to project operation not captured in this computation. Further, from year 1 onwards, a decreasing BETF is noted implying that the project becomes more profitable as it matures. This can be attributed to the declining interest expense, and a minimal increase in variable costs (see Table 5.21).

Therefore, an initial tipping fee of **PhP1,298.00** and **PhP1,558.00** per ton for options 3 and 4, respectively are a good price to start with as shown in the above discussions and substantiated by the computations (see Table 5.25 and Table 5.26).

Table 5.21 Summary of Breakeven Point Values

	Option 3		Option 4	
TIPPING FEE		1,298		1,558
AVERAGE BREAKEVEN TIPPING FEE (per ton)		999		1,034
AVERAGE BREAKEVEN VOLUME (per day)		14		9
AVERAGE BREAKEVEN TIPPING FEE (range)	451	2,069	500	2,053
AVERAGE BREAKEVEN VOLUME (range)	4	59	5	25

Furthermore, the Weighted Average Cost of Capital (WACC) was also computed in order to have an idea of how debt financing imposes a financial risk to both proponents who would then want to be compensated, at a minimum, by the tax shield on the periodic interest payment. Under an imperfect market, which characterizes the present local market environment in the Philippines, taxes are introduced as a market imperfection. The WACC is the benchmark discount rate at which projects are assessed to determine which of a set of financially feasible project is most desirable. The WAC is currently set by the National Economic Development Authority at 15%. At this scenario, the over-all cost of capital will decrease with the use of debt because the interest tax shield benefits the stockholders. **Table 5.22** shows the WACC. The figure shows that WACC (Weighted Real Rate) for equity and loan is 10% while the WACC (Weighted Nominal Rate) is 18.80% for both options.

Table 5.22 Weighted Average Cost of Capital

Description	option 3		option 4	
	Weighted Real Rate	Weighted Nominal Rate	Weighted Real Rate	Weighted Nominal Rate
Equity	6.80%	12.79%	7.14%	13.42%
Loan	3.20%	6.01%	2.86%	5.38%
Total	10.00%	18.80%	10.00%	18.80%

Estimation of Household Garbage Fee

This study tries to have an estimate of the collection fee or tipping fee for household once the project operates. At an initial tipping of fee of **PhP1,298.00** per ton (option 3), the estimated garbage fee per household is around **PhP0.53** per day or **PhP15.88** per month. This does not cover the tipping fee that could be charged for business establishment or commercial areas. These estimates increase over time because of the increase in population and urbanization. **Table 5.23** shows the details on the estimate of this household tipping fee.

Collection of Tipping / Garbage Fee

Households shall be charged with a monthly garbage fee of **PhP15.88** per month. This shall be collected by a LGU collector who is connected full time with the project. Another option is for the LGU –Calbayog City to deputize or commission the barangay councils as collectors of the household garbage fee with a corresponding incentive. To ensure full cooperation and collection, a memorandum of agreement between the LGU and the clients shall be executed following prescribed rules and regulations.

Table 5.23 Estimation of Household Garbage Fee

Year	Population	projected (tons per day)	pax/ton	price/ton (P)	price/pax (P)	fee per household per day (P)	fee per household per month (P)
1	147,187	12	12,266	1,298	0.11	0.53	15.88
2	151,352	13	12,012	1,298	0.11	0.54	16.21
3	155,636	13	11,764	1,298	0.11	0.55	16.56
4	160,040	14	11,521	1,298	0.11	0.56	16.91
5	164,569	15	11,283	1,298	0.12	0.58	17.26
6	169,227	15	11,049	1,298	0.12	0.59	17.63
7	174,016	16	10,821	1,298	0.12	0.60	18.00
8	178,940	17	10,597	1,298	0.12	0.61	18.38
9	184,004	18	10,378	1,298	0.13	0.63	18.77
10	189,212	19	10,164	1,298	0.13	0.64	19.16
11	194,566	20	9,954	1,298	0.13	0.65	19.57
12	200,073	21	9,748	1,298	0.13	0.67	19.98
13	205,735	22	9,547	1,298	0.14	0.68	20.40
14	211,557	23	9,349	1,298	0.14	0.69	20.83
15	217,544	24	9,156	1,298	0.14	0.71	21.27
16	223,701	25	8,967	1,298	0.14	0.72	21.72
17	230,031	26	8,782	1,298	0.15	0.74	22.18
18	236,541	28	8,600	1,298	0.15	0.75	22.65
19	243,235	29	8,422	1,298	0.15	0.77	23.12
20	250,119	30	8,248	1,298	0.16	0.79	23.61
21	257,197	32	8,078	1,298	0.16	0.80	24.11
22	264,476	33	7,911	1,298	0.16	0.82	24.62
23	271,961	35	7,747	1,298	0.17	0.84	25.14
24	279,657	37	7,587	1,298	0.17	0.86	25.67
25	287,571	39	7,431	1,298	0.17	0.87	26.21

Projected Income from Sale of Fertilizers

Shown in Table 5.24 is the projected income and volume of sales of organic fertilizers generated from the SLF. It is assumed that a 5% increase yearly for the production volume of fertilizer shall take place. Initially, a minimal amount of 7 bags per day is projected for the first year of operation and to increase in the next succeeding years as volume commitment for garbage increases over time.

Table 5.24 Projected Income from Fertilizers

Year	Volume (bags)	P / bag	Total Revenue
1	2,555	150	383,250
2	2,683	150	402,413
3	2,817	150	422,533
4	2,958	150	443,660
5	3,106	150	465,843
6	3,261	150	489,135
7	3,424	150	513,592
8	3,595	150	539,271
9	3,775	150	566,235
10	3,964	150	594,547
11	4,162	150	624,274
12	4,370	150	655,488
13	4,588	150	688,262
14	4,818	150	722,675
15	5,059	150	758,809
16	5,312	150	796,749
17	5,577	150	836,587
18	5,856	150	878,416
19	6,149	150	922,337
20	6,456	150	968,454
21	6,779	150	1,016,876
22	7,118	150	1,067,720
23	7,474	150	1,121,106
24	7,848	150	1,177,161
25	8,240	150	1,236,020

5.1.4 Recommendation

Foregoing discussions considered, it is recommended that if the Local Government Unit of Calbayog (Option 3) would operate the Proposed Sanitary Landfill, it should find ways and means to increase the volume commitment of garbage to be disposed at the proposed site so that the tipping fee will decrease. In addition, the management should be able to reduce the cost of operation significantly. If a private contractor manages and operates the project, the LGU would be forced to pay more than the expected tipping fee if they themselves operate, thus, to the detriment of the local populace who will shoulder the high cost of disposing their wastes.

5.2 SAGAY CITY FINANCIAL ANALYSIS

5.2.1 General

The following describes the financial analysis for the various options on solid waste management system, which are based on the capacity of the local government unit or private investors to finance and implement a municipal solid waste management project, the sanitary landfill. It is treated as an income-generating venture for the **LGU-Sagay City**, owing to the limited finances to operate the said project and in like manner, for the private investor who would probably opt to operate and manage such noble project if the former is disinterested.

The solid waste management project is assessed on the basis of financial parameters taken from the primary and secondary data generated. The benefit-cost analysis technique was employed in order to quantify the anticipated streams of costs and benefits that would accrue to the proponent or investor given various options.

Basically, the discounted measures of project worth, viz: Benefit-Cost Ratio (BCR), Net Present Value (NPV), and the Financial Internal Rate of Return (FIRR), were used to gauge the commercial profitability and desirability of the solid waste management project. Decision criteria have to be satisfied for each of the investment parameter for the project to be considered financially viable.

There are four (4) options presented in this study namely:

- Option 1 LGU Operated Sanitary Landfill
- Option 2 Privately Operated Sanitary Landfill
- Option 3 LGU Operated Sanitary Landfill with Composting
- Option 4 Privately Operated Sanitary Landfill with Composting

The Material Recovery Facility (MRF) was not included in options 3 and 4 because it was observed that people are practicing waste segregation at source, hence, recyclables are already separated and picked before they reach the dumpsite. If there are any recyclables in the waste stream, they are already negligible.

5.2.2 Options 1 & 2

Project Cost and Source of Financing

For Options 1 and 2, the project shall require an initial capital outlay of **Php61,761,115** at 2007 prices as shown in **Table 5.27**. These are the items on site development / earth works, leachate control, gas control, support structures, etc.

Table 5.25 Breakeven Point (Option 3)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Fixed Cost																									
Land Acquisition	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000
Site Development/Earthworks (annualized)	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597
Landfill Closure	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815
depreciation	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492
Interest	2,690,186	2,690,186	2,690,186	2,353,912	2,017,439	1,681,366	1,345,093	1,008,820	672,546	336,273	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Fixed Cost	4,227,090	4,227,090	4,227,090	3,890,816	3,554,543	3,218,270	2,881,997	2,545,723	2,209,450	1,873,177	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904
Variable Cost																									
Misc Expense (annualized)	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878
Contingencies	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000
Operation Personnel	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168
Fuel and Lubricants	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424
Total Variable Cost	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470
GRAND TOTAL	9,060,559	9,060,559	9,060,559	8,724,286	8,388,013	8,051,740	7,715,467	7,379,193	7,042,920	6,706,647	6,370,374	6,370,374	6,370,374	6,370,374	6,370,374	6,370,374	6,370,374	6,370,374	6,370,374	6,370,374	6,370,374	6,370,374	6,370,374	6,370,374	6,370,374
Expected Sales / Collection (tons/day)	12	13	13	14	15	15	16	17	18	19	20	21	22	23	24	25	26	28	29	30	32	33	35	37	39
Expected Sales / Collection (tons/year)	4,380	4,599	4,829	5,070	5,324	5,590	5,870	6,163	6,471	6,795	7,135	7,491	7,866	8,259	8,672	9,106	9,561	10,039	10,541	11,068	11,621	12,203	12,813	13,453	14,126
Breakeven Tipping Fee (P/ton)	2,069	1,970	1,876	1,721	1,576	1,440	1,314	1,197	1,088	987	893	850	810	771	735	700	666	635	604	576	548	522	497	474	451
average tipping fee	999																								
Break Even Point Sales Volume																									
Variable Unit Cost (P/ton)	1,104	1,051	1,001	953	908	865	823	784	747	711	677	645	614	585	557	531	506	481	459	437	416	396	377	359	342
Fixed Cost	4,227,090	4,227,090	4,227,090	3,890,816	3,554,543	3,218,270	2,881,997	2,545,723	2,209,450	1,873,177	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904	1,536,904
tipping fee	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298
tipping fee	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298	1,298
BEPSV Per year	21,688	17,082	14,209	11,272	9,101	7,419	6,068	4,951	4,006	3,191	2,475	2,353	2,247	2,155	2,074	2,002	1,938	1,881	1,830	1,783	1,741	1,703	1,668	1,636	1,607
BEPSV per month	1,807	1,424	1,184	939	758	618	506	413	334	266	206	196	187	180	173	167	162	157	152	149	145	142	139	136	134
BEPSV per day	59	47	39	31	25	20	17	14	11	9	7	6	6	6	6	5	5	5	5	5	5	5	5	4	4
average	14																								

Table 5.26 Breakeven Point (Option 4)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Fixed Cost																									
Land Acquisition	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000
Site Development/Earthworks (annualized)	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597	65,597
Landfill Closure	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815	465,815
depreciation	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492	965,492
Interest	2,405,848	2,405,848	2,405,848	2,105,117	1,804,386	1,503,655	1,202,924	902,193	601,462	300,731	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tax	216,235	227,047	238,400	250,320	262,836	275,977	289,776	304,265	319,478	335,452	352,225	369,836	388,328	407,744	428,131	449,538	472,015	495,616	520,396	546,416	573,737	602,424	632,545	664,172	697,381
Total Fixed Cost	4,158,988	4,169,800	4,181,152	3,892,341	3,604,126	3,316,537	3,029,604	2,743,362	2,457,844	2,173,087	1,889,129	1,906,740	1,925,232	1,944,648	1,965,035	1,986,442	2,008,919	2,032,520	2,057,300	2,083,320	2,110,641	2,139,328	2,169,449	2,201,076	2,234,285
Variable Cost																									
Misc Expense (annualized)	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878	218,878
Contingencies	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000
Operation Personnel	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168	1,584,168
Fuel and Lubricants	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424	2,780,424
Total Variable Cost	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470	4,833,470
GRAND TOTAL	8,992,458	9,003,269	9,014,622	8,725,811	8,437,596	8,150,006	7,863,074	7,576,832	7,291,314	7,006,557	6,722,599	6,740,210	6,758,702	6,778,118	6,798,505	6,819,912	6,842,389	6,865,989	6,890,770	6,916,790	6,944,111	6,972,798	7,002,919	7,034,546	7,067,755
Expected Sales / Collection (tons/day)	12	13	13	14	15	15	16	17	18	19	20	21	22	23	24	25	26	28	29	30	32	33	35	37	39
Expected Sales / Collection (tons/year)	4,380	4,599	4,829	5,070	5,324	5,590	5,870	6,163	6,471	6,795	7,135	7,491	7,866	8,259	8,672	9,106	9,561	10,039	10,541	11,068	11,621	12,203	12,813	13,453	14,126
Breakeven Tipping Fee (P/ton)	2,053	1,958	1,867	1,721	1,585	1,458	1,340	1,229	1,127	1,031	942	900	859	821	784	749	716	684	654	625	598	571	547	523	500
average tipping fee	1,034	310	30%																						
tipping fee	1,344																								
BEPSV Per year	9,149	8,222	7,504	6,435	5,543	4,782	4,124	3,545	3,030	2,566	2,145	2,089	2,040	1,999	1,964	1,934	1,909	1,888	1,871	1,858	1,848	1,841	1,837	1,836	1,837
BEPSV per month	762	685	625	536	462	399	344	295	252	214	179	174	170	167	164	161	159	157	156	155	154	153	153	153	153
BEPSV per day	25	23	21	18	15	13	11	10	8	7	6	6	6	6	5	5	5	5	5	5	5	5	5	5	5
average	9																								

It shall be funded through a loan from a funding institution on a 90-10% (LGU) and 80-20% (private) loan-equity arrangement, for option 1 and option 2, respectively. In this arrangement, option 1 has a total loan of **PhP55,461,115** while option 2, a total loan of **PhP49,531,690**. A fixed interest rate of 10% annually, payable in 10 years with a two-year grace period are assumed for both for this purpose. The equity covers part of the MOOE (wages, fuel etc.) for the first year of operation for option 1, whereas, option 2's equity would cover site development / earthworks and part of the MOOE. Likewise, miscellaneous expenses represent the overhead, contingencies, taxes, and other related expenses on direct cost.

The project shall be concentrated on a **8-hectare** lot located at Brgy. Luna, a new dumpsite of **LGU-Sagay City**. The clustering for the three cities namely Sagay, Cadiz, and Escalante shall be adopted.

The bulk of the initial capital investment shall be spent on the gestation period (implementation phase) wherein the landfill structures and other related facilities are assumed to be constructed / installed a year before the operation phase. Maintenance and operating expenses, which include salaries and wages, fuel, etc amounting to **PhP6,372,040** yearly shall be allocated starting on the first year of operation and thereafter. Option 2 is assumed to have a 3% sales tax while option 1 does not have since it is a government operated venture.

Table 5.27 Initial Capital Outlay, Options 1 & 2

items	Option 1			Option 2		
	Loan	Equity	Total	Loan	Equity	Total
Land Acquisition	0	1,800,000	1,800,000	0	1,800,000	1,800,000
Site Development/Earthworks	5,921,912	0	5,921,912	5,921,912	0	5,921,912
Leachate Controls	10,625,816	0	10,625,816	10,625,816	0	10,625,816
Gas Controls	952,810	0	952,810	952,810	0	952,810
Support Structures	4,177,273	0	4,177,273	4,177,273	0	4,177,273
Utilities	3,250,000	0	3,250,000	3,250,000	0	3,250,000
Access Roads/Parking Area	4,223,396	0	4,223,396	4,223,396	0	4,223,396
Misc Expense	12,380,483	0	12,380,483	12,380,483	0	12,380,483
Landfill Closure	2,557,385	0	2,557,385	0	2,557,385	2,557,385
Equipment for Operation	9,500,000	0	9,500,000	8,000,000	1,500,000	9,500,000
MOOE (wages, fuel, etc : first year)	1,872,040	4,500,000	6,372,040	0	6,372,040	6,372,040
Total	55,461,115	6,300,000	61,761,115	49,531,690	12,229,425	61,761,115

(BASIS: refer to Annex XXVI for the Budgetary Cost Estimate for Sagay City)

Projected Income, Funds Flow and Cash Flow Statements

Options 1 and 2's commercial profitability and viability are determined through a 15-year projected income statement, funds flow and cash flow. The projection would show us the financial performance of both within the maturity period of the loan. Its revenue shall be generated from a tipping fee for the two LGUs (pegged at **PhP488.00** per ton) and the constituents of Sagay City to be shouldered by the clients (populace), while option 2 would derive its income from the LGU-Sagay, Cadiz, and Escalante through a tipping fee of **PhP570.00** per ton.

The assumed LGU tipping fee was derived from the average breakeven point tipping fee of **PhP376.00** per ton. Said amount is 30% higher than the average breakeven point tipping fee representing the mark-up price per ton. Similarly, the assumed tipping fee for the privately operated SLF (option 2) was based on a 20% mark-up from option 1's tipping fee.

Based from the Projected Income Statement, option 1 shall generate an average net income of **PhP7,004,188** per annum while option 2, **PhP9,967,515** per annum which both indicate a decent profit for both options (see **Table 5.28** and **Table 5.29**).

Similarly, the **Projected Funds Flow Statement** generally shows encouraging results for both options as the project is expected to accumulate positive cash balances after paying-off project obligations and accountabilities. The project so far will not encounter any liquidity problem in its entire operation because of the availability of cash before the beginning of each year up to the end of project life (see **Table 5.30** and **Table 5.31**).

A **Projected Cash Flow Statement** showing the total benefits and costs for options 1 and 2 has been prepared to provide a picture of the project's financial performance in terms of the net benefits that would accrue to the proponent (see **Table 5.32** and **Table 5.33**).

Financial Feasibility Measures and Sensitivity

An ex-ante evaluation of options 1 and 2 has been conducted using the discounted measures of project worth viz: Benefit-Cost Ratio (BCR), Net Present Value (NPV), and Financial Internal Rate of Return (FIRR) using an opportunity cost of 10%.

The Benefit-Cost Ratios (BCR) are calculated at 1.11 and 1.29 for options 1 and 2, respectively which suggests that the project is financially viable since its value is greater than 1. Meaning, for every peso invested, a net benefit of 0.11 and 0.29 is generated by options 1 and 2, respectively. Further, the NPVs likewise show positive values of **PhP13,616,889** and **PhP37,533,621**, respectively since they are greater than zero. Likewise, the Financial Internal Rates of Return (FIRR) are computed at 17% and 28% for options 1 and 2, respectively, implying that both are financially viable since the values are greater than the opportunity cost of investment at 10% (see **Table 5.34**).

Furthermore, a standard sensitivity analysis with respect to possible fluctuations in anticipated project benefits and costs were also conducted to determine the project's performance under extreme conditions. This way, the risks and uncertainties due to environmental and economic abnormalities can be captured. One of the viability indicators of the project is its ability to absorb nominal shocks such as increase in prices of project inputs and decrease in project outputs.

Three (3) cases were considered for this analysis, namely: Case A: A reduction in revenue by 10% while capital investments and operating costs are unchanged; Case B: An increase in capital investments and operating costs by 10% while revenue is unchanged; Case C: A combination of cases A and B which is a reduction in revenue by 10% and a simultaneous increase in capital investments and operating costs by 10%.

Shown in **Table 5.34** is the summary of the sensitivity analysis which basically shows that the project is viable only in option 2 for all cases following the decision criteria of the measures of project worth. Unfortunately, cases A and C in option 1 failed the sensitivity test.

Table 5.34 Summary of Sensitivity Analysis

measures	Option 1				Option 2			
	Base	Case A	Case B	Case C	Base	Case A	Case B	Case C
IRR	17%	10%	10%	5%	28%	19%	19%	13%
NPV	13,616,889	-712,703	648,986	-13,680,607	37,533,621	20,812,356	24,565,718	7,844,452
BCR	1.11				1.29			

Table 5.28 Projected Income Statement (Option 1)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
GROSS REVENUE															
Tipping Fee*	13,870,000	14,563,500	15,291,675	16,056,259	16,859,072	17,702,025	18,587,127	19,516,483	20,492,307	21,516,922	22,592,768	23,722,407	24,908,527	26,153,954	27,461,651
Total Revenue	13,870,000	14,563,500	15,291,675	16,056,259	16,859,072	17,702,025	18,587,127	19,516,483	20,492,307	21,516,922	22,592,768	23,722,407	24,908,527	26,153,954	27,461,651
OPERATING EXPENSES															
Landfill Closure	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385
Operation Personnel	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000
Fuel and Lubricants	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040
Contingencies	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000
Operating Expenses Before Dep'n	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425
Add: Depreciation ³	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953
Total Operating Expenses	11,111,378	11,111,378	11,111,378	11,111,378	11,111,378	11,111,378	11,111,378	11,111,378	11,111,378	11,111,378	11,111,378	11,111,378	11,111,378	11,111,378	11,111,378
Net Income Before Interest	2,758,622	3,452,122	4,180,297	4,944,880	5,747,693	6,590,647	7,475,748	8,405,105	9,380,929	10,405,544	11,481,390	12,611,029	13,797,149	15,042,575	16,350,273
Less : Interest	5,546,112	5,546,112	5,546,112	4,852,848	4,159,584	3,466,320	2,773,056	2,079,792	1,386,528	693,264					
NET INCOME	(2,787,490)	(2,093,990)	(1,365,815)	92,033	1,588,110	3,124,327	4,702,692	6,325,313	7,994,401	9,712,280	11,481,390	12,611,029	13,797,149	15,042,575	16,350,273

Table 5.29 Projected Income Statement (Option 2)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
GROSS REVENUE															
Tipping Fee*	16,644,000	17,476,200	18,350,010	19,267,511	20,230,886	21,242,430	22,304,552	23,419,779	24,590,768	25,820,307	27,111,322	28,466,888	29,890,233	31,384,744	32,953,982
Total Revenue	16,644,000	17,476,200	18,350,010	19,267,511	20,230,886	21,242,430	22,304,552	23,419,779	24,590,768	25,820,307	27,111,322	28,466,888	29,890,233	31,384,744	32,953,982
OPERATING EXPENSES															
Landfill Closure	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385
Operation Personnel	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000
Fuel and Lubricants	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040
Contingencies	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000
Operating Expenses Before Dep'n	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425
Add: Depreciation ³	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953
Total Operating Expenses	11,111,378	11,111,378	11,111,378	11,111,378	11,111,378	11,111,378	11,111,378	11,111,378	11,111,378	11,111,378	11,111,378	11,111,378	11,111,378	11,111,378	11,111,378
Net Income Before Interest	5,532,622	6,364,822	7,238,632	8,156,132	9,119,508	10,131,052	11,193,174	12,308,401	13,479,390	14,708,929	15,999,944	17,355,510	18,778,854	20,273,366	21,842,603
Less : Interest	4,953,169	4,953,169	4,953,169	4,334,023	3,714,877	3,095,731	2,476,584	1,857,438	1,238,292	619,146					
Tax	499,320	524,286	550,500	578,025	606,927	637,273	669,137	702,593	737,723	774,609	813,340	854,007	896,707	941,542	988,619
NET INCOME	80,133	887,367	1,734,962	3,244,084	4,797,704	6,398,048	8,047,452	9,748,369	11,503,375	13,315,173	15,186,604	16,501,503	17,882,147	19,331,824	20,853,984

Table 5.30 Projected Funds Flow Statement (Option 1)

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A. Sources of Funds (Cash Inflow)																
Net Income from Operations	-	(2,787,490)	(2,093,990)	(1,365,815)	92,033	1,588,110	3,124,327	4,702,692	6,325,313	7,994,401	9,712,280	11,481,390	12,611,029	13,797,149	15,042,575	16,350,273
Add Back : Depreciation	-	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953
Add: BL / E	61,761,115															
Total	61,761,115	(605,537)	87,963	816,138	2,273,986	3,770,063	5,306,280	6,884,645	8,507,266	10,176,354	11,894,233	13,663,343	14,792,982	15,979,102	17,224,528	18,532,226
B. Uses of Funds (Cash Outflow)																
Principal Amortization		-	-	6,932,639	6,932,639	6,932,639	6,932,639	6,932,639	6,932,639	6,932,639	6,932,639	-	-	-	-	-
Facilities / Accessories	29,031,820															
Total	29,031,820	-	-	6,932,639	6,932,639	6,932,639	6,932,639	6,932,639	6,932,639	6,932,639	6,932,639	-	-	-	-	-
C. Net Cash Flow	32,729,295	(605,537)	87,963	(6,116,501)	(4,658,654)	(3,162,577)	(1,626,359)	(47,994)	1,574,626	3,243,714	4,961,594	13,663,343	14,792,982	15,979,102	17,224,528	18,532,226
Add: Beg. Cash Balance	-	32,729,295	32,123,758	32,211,721	26,095,220	21,436,567	18,273,990	16,647,631	16,599,637	18,174,263	21,417,978	26,379,571	40,042,914	54,835,896	70,814,998	88,039,526
Net Cash Balance, Ending	32,729,295	32,123,758	32,211,721	26,095,220	21,436,567	18,273,990	16,647,631	16,599,637	18,174,263	21,417,978	26,379,571	40,042,914	54,835,896	70,814,998	88,039,526	106,571,752

Table 5.31 Projected Funds Flow Statement (Option 2)

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A. Sources of Funds (Cash Inflow)																
Net Income from Operations	-	80,133	887,367	1,734,962	3,244,084	4,797,704	6,398,048	8,047,452	9,748,369	11,503,375	13,315,173	15,186,604	16,501,503	17,882,147	19,331,824	20,853,984
Add Back : Depreciation	-	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953
Add: BL / E	61,761,115															
Total	61,761,115	2,262,086	3,069,320	3,916,915	5,426,037	6,979,657	8,580,001	10,229,405	11,930,322	13,685,328	15,497,126	17,368,557	18,683,456	20,064,100	21,513,777	23,035,937
B. Uses of Funds (Cash Outflow)																
Principal Amortization		-	-	6,191,461	6,191,461	6,191,461	6,191,461	6,191,461	6,191,461	6,191,461	6,191,461	-	-	-	-	-
Facilities / Accessories	29,031,820															
Total	29,031,820	-	-	6,191,461	6,191,461	6,191,461	6,191,461	6,191,461	6,191,461	6,191,461	6,191,461	-	-	-	-	-
C. Net Cash Flow	32,729,295	2,262,086	3,069,320	(2,274,546)	(765,424)	788,196	2,388,540	4,037,944	5,738,861	7,493,867	9,305,665	17,368,557	18,683,456	20,064,100	21,513,777	23,035,937
Add: Beg. Cash Balance	-	32,729,295	34,991,381	38,060,700	35,786,155	35,020,730	35,808,927	38,197,467	42,235,411	47,974,272	55,468,139	64,773,804	82,142,361	100,825,817	120,889,918	142,403,694
Net Cash Balance, Ending	32,729,295	34,991,381	38,060,700	35,786,155	35,020,730	35,808,927	38,197,467	42,235,411	47,974,272	55,468,139	64,773,804	82,142,361	100,825,817	120,889,918	142,403,694	165,439,631

Table 5.32 Projected Cash Flow Statement (Option 1)

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
BENEFITS																
Tipping Fee	-	13,870,000	14,563,500	15,291,675	16,056,259	16,859,072	17,702,025	18,587,127	19,516,483	20,492,307	21,516,922	22,592,768	23,722,407	24,908,527	26,153,954	27,461,651
Residual Value								-	-	-	-	-	-	-	-	-
Total Benefits	-	13,870,000	14,563,500	15,291,675	16,056,259	16,859,072	17,702,025	18,587,127	19,516,483	20,492,307	21,516,922	22,592,768	23,722,407	24,908,527	26,153,954	27,461,651
COST																
Investment	61,761,115															
Operating Expenses	-	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425
Total Cost	61,761,115	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425
NET BENEFITS (BF)	(61,761,115)	4,940,575	5,634,075	6,362,250	7,126,833	7,929,646	8,772,600	9,657,701	10,587,058	11,562,882	12,587,497	13,663,343	14,792,982	15,979,102	17,224,528	18,532,226
FINANCING																
Loan	55,461,115															
Debt Service		5,546,112	5,546,112	12,478,751	11,785,487	11,092,223	10,398,959	9,705,695	9,012,431	8,319,167	7,625,903	-	-	-	-	-
Net Financing	55,461,115	(5,546,112)	(5,546,112)	(12,478,751)	(11,785,487)	(11,092,223)	(10,398,959)	(9,705,695)	(9,012,431)	(8,319,167)	(7,625,903)	-	-	-	-	-
NET BENEFITS (AF)	(6,300,000)	(605,537)	87,963	(6,116,501)	(4,658,654)	(3,162,577)	(1,626,359)	(47,994)	1,574,626	3,243,714	4,961,594	13,663,343	14,792,982	15,979,102	17,224,528	18,532,226

Table 5.33 Projected Cash Flow Statement (Option 1)

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
BENEFITS																
Tipping Fee	-	16,644,000	17,476,200	18,350,010	19,267,511	20,230,886	21,242,430	22,304,552	23,419,779	24,590,768	25,820,307	27,111,322	28,466,888	29,890,233	31,384,744	32,953,982
MRF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
organic fertilizer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Residual Value								-	-	-	-	-	-	-	-	-
Total Benefits	-	16,644,000	17,476,200	18,350,010	19,267,511	20,230,886	21,242,430	22,304,552	23,419,779	24,590,768	25,820,307	27,111,322	28,466,888	29,890,233	31,384,744	32,953,982
COST																
Investment	61,761,115															
Operating Expenses	-	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425
Total Cost	61,761,115	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425	8,929,425
NET BENEFITS (BF)	(61,761,115)	7,714,575	8,546,775	9,420,585	10,338,085	11,301,461	12,313,005	13,375,127	14,490,354	15,661,343	16,890,882	18,181,897	19,537,463	20,960,807	22,455,319	24,024,556
FINANCING																
Loan	49,531,690															
Debt Service		4,953,169	4,953,169	11,144,630	10,525,484	9,906,338	9,287,192	8,668,046	8,048,900	7,429,753	6,810,607	-	-	-	-	-
Net Financing	49,531,690	(4,953,169)	(4,953,169)	(11,144,630)	(10,525,484)	(9,906,338)	(9,287,192)	(8,668,046)	(8,048,900)	(7,429,753)	(6,810,607)	-	-	-	-	-
NET BENEFITS (AF)	(12,229,425)	2,761,406	3,593,606	(1,724,046)	(187,399)	1,395,123	3,025,813	4,707,081	6,441,455	8,231,590	10,080,274	18,181,897	19,537,463	20,960,807	22,455,319	24,024,556

Profit Analyses

The volume or the unit tipping fee at which the project will just break even may be established. Consequently, the proponent will have some ideas on how to decide when to increase or decrease the price or focus on the volume requirements of the enterprise given the various market forces and existing market environment. In this study, the volume commitment of **80 tons** per day shall come from the following: Sagay – 31 tons, Cadiz City – 41 tons, and Escalante City – 8 tons.

In the computation for the Break-Even Point Volume or the volume of garbage to be delivered to the landfill site and the Break-Even Point Tipping Fee for both options, the volume commitment is **80 tons** per day. The **Break-Even Volume (BEV)** and the **Break-Even Tipping Fee (BETF)** actually vary from year to year. For option 1, the BEV ranges from 39 to 119 tons per day while the BETF, ranges from **Php212.00** to **Php609.00** per ton. In like manner, for option 2, the BEV ranges from 36 to 84 tons per day while the BETF, ranges from **Php227.00** to **Php602.00** per ton. Nonetheless, to give the proponent an idea of the average for the 15-year project life for both parameters as a reference point, the BEV is around **70** and **55 tons** per day and the BETF is roughly **Php376.00** and **Php383.00** per ton for options 1 and 2, respectively. In this analysis, an initial tipping fee of **Php488.00** and **Php586.00** per ton for options 1 and 2, respectively shall be used over the 15-year period at current 2007 prices.

Theoretically, if the volume collected will be lower than the BEV per day for that particular year, the project will stand to lose, and if it will be higher, the project will gain. For analysis work, the BEV should be compared with the projected volume and the maximum attainable landfill capacity.

The computed BEV for both options from year 1 to 15 shows a declining volume as the costs (fixed and variable cost) decline over the years. In this particular project, a conservative estimate of an initial **80 tons** per day which is assumed to increase 5% every year is more than the average BEV of **70 tons** and **55 tons** for options 1 and 2, respectively. Hence, the project will gain as reflected by a difference of **10** and **25 tons** for options 1 and 2, respectively.

Furthermore, the Break-Even Tipping Fee (BETF) varies from **Php212.00** to **Php609.00** per ton for option 1 and **Php227.00** to **Php602.00** for option 2 over the project life. In order to have a specific comparison of these figures from a reference point, we get the average BETF at **Php376.00** and **Php383.00** per ton for options 1 and 2, respectively. Using these figures, theoretically, the project neither gains nor loses. At an assumed tipping fee of **Php488.00** and **Php586.00** per ton for options 1 and 2, respectively, the project is robust. The difference of **Php113.00** and **Php203.00** per ton would be able to defray the cost of other incidental expenses to be incurred relative to project operation not captured in this computation. Further, from year 1 onwards, a decreasing BETF is noted implying that the project becomes more profitable as it matures. This can be attributed to the declining interest expense, and a minimal increase in variable costs (see Table 5.35).

Therefore, an initial tipping fee of **Php488.00** and **Php586.00** per ton for options 1 and 2, respectively are a good price to start with as shown in the above discussions and substantiated by the computations (see Table 5.36 and Table 5.37).

Table 5.35 Summary of Breakeven Point Values

	Option 1		Option 2	
TIPPING FEE		488		586
AVERAGE BREAKEVEN TIPPING FEE (per ton)		376		383
AVERAGE BREAKEVEN VOLUME (per day)		70		55
AVERAGE BREAKEVEN TIPPING FEE (range)	212	609	227	602
AVERAGE BREAKEVEN VOLUME (range)	39	119	36	84

Furthermore, the Weighted Average Cost of Capital (WACC) was also computed in order to have an idea of how debt financing imposes a financial risk to both proponents who would then want to be compensated, at a minimum, by the tax shield on the periodic interest payment. Under an imperfect market, which characterizes the present local market environment in the Philippines, taxes are introduced as a market imperfection. The WACC is the benchmark discount rate at which projects are assessed to determine which of a set of financially feasible project is most desirable. The WAC is currently set by the National Economic Development Authority at 15%. At this scenario, the over-all cost of capital will decrease with the use of debt because the interest tax shield benefits the stockholders. **Table 5.38** shows the WACC. The figure shows that WACC (Weighted Real Rate) for equity and loan is 10% while the WACC (Weighted Nominal Rate) is 18.80% for both options.

Table 5.38 Weighted Average Cost of Capital

Description	option 1		option 2	
	Weighted Real Rate	Weighted Nominal Rate	Weighted Real Rate	Weighted Nominal Rate
Equity	5.99%	11.25%	6.42%	12.06%
Loan	4.01%	7.55%	3.58%	6.74%
Total	10.00%	18.80%	10.00%	18.80%

5.2.3 Options 3 & 4

Project Cost and Source of Financing

Options 3 and 4 have an indicative initial capital outlay of **PhP63,362,235** at 2007 prices as shown in **Table 5.39**. Around 85% of the initial capital outlay are allocated for the development costs which include site development / earth works, leachate control, gas control, support structures, among others. Only 13% is allocated for the MOOE.

The same arrangement for options 1 and 2 are employed in these options: 90-10% (LGU) and 80-20% (private) loan-equity arrangement, 10% interest rate, 10 years to pay and a 2-year grace period, for option 3 and 4 , respectively. Relative to this, option 3 has a total loan of **PhP57,062,235** whereas option 4 has a total loan of **PhP50,589,075** only.

Maintenance and operating expenses, which include salaries and wages, fuel, etc amounting to **PhP7,973,160** yearly shall be allocated starting on the first year of operation and thereafter. For both options, an additional manpower complement for the composting was incorporated.

Table 5.36 Breakeven Point (Option 1)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Fixed Cost															
Land Acquisition	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
Site Development/Earthworks (annualized)	394,794	394,794	394,794	394,794	394,794	394,794	394,794	394,794	394,794	394,794	394,794	394,794	394,794	394,794	394,794
Landfill Closure	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385
depreciation	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953
Interest	5,546,112	5,546,112	5,546,112	4,852,848	4,159,584	3,466,320	2,773,056	2,079,792	1,386,528	693,264	0	0	0	0	0
Total Fixed Cost	10,800,244	10,800,244	10,800,244	10,106,980	9,413,716	8,720,452	8,027,188	7,333,924	6,640,660	5,947,396	5,254,132	5,254,132	5,254,132	5,254,132	5,254,132
Variable Cost															
Misc Expense (annualized)	619,024	619,024	619,024	619,024	619,024	619,024	619,024	619,024	619,024	619,024	619,024	619,024	619,024	619,024	619,024
Contingencies	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000
Operation Personnel	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000
Fuel and Lubricants	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040
Total Variable Cost	6,991,064	6,991,064	6,991,064	6,991,064	6,991,064	6,991,064	6,991,064	6,991,064	6,991,064	6,991,064	6,991,064	6,991,064	6,991,064	6,991,064	6,991,064
GRAND TOTAL	17,791,308	17,791,308	17,791,308	17,098,044	16,404,780	15,711,516	15,018,252	14,324,988	13,631,724	12,938,461	12,245,197	12,245,197	12,245,197	12,245,197	12,245,197
Expected Sales / Collection (tons/day)	80	84	88	93	97	102	107	113	118	124	130	137	144	151	158
Expected Sales / Collection (tons/year)	29,200	30,660	32,193	33,803	35,493	37,267	39,131	41,087	43,142	45,299	47,564	49,942	52,439	55,061	57,814
Breakeven Tipping Fee (P/ton)	609	580	553	506	462	422	384	349	316	286	257	245	234	222	212
average tipping fee	376														
Break Even Point Sales Volume															
Variable Unit Cost (P/ton)	239	228	217	207	197	188	179	170	162	154	147	140	133	127	121
Fixed Cost	10,800,244	10,800,244	10,800,244	10,106,980	9,413,716	8,720,452	8,027,188	7,333,924	6,640,660	5,947,396	5,254,132	5,254,132	5,254,132	5,254,132	5,254,132
tipping fee	475	475	475	475	475	475	475	475	475	475	475	475	475	475	475
BEPSV Per year	45,845	43,729	41,888	37,687	33,859	30,342	27,088	24,058	21,219	18,547	16,018	15,683	15,377	15,097	14,839
BEPSV per month	3,820	3,644	3,491	3,141	2,822	2,528	2,257	2,005	1,768	1,546	1,335	1,307	1,281	1,258	1,237
BEPSV per day	126	120	115	103	93	83	74	66	58	51	44	43	42	41	41
average	73														

Table 5.37 Breakeven Point (Option 2)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Fixed Cost															
Land Acquisition	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
Site Development/Earthworks (annualized)	394,794	394,794	394,794	394,794	394,794	394,794	394,794	394,794	394,794	394,794	394,794	394,794	394,794	394,794	394,794
Landfill Closure depreciation	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385
Interest	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953
Tax	4,953,169	4,953,169	4,953,169	4,334,023	3,714,877	3,095,731	2,476,584	1,857,438	1,238,292	619,146	0	0	0	0	0
Total Fixed Cost	10,586,621	10,611,587	10,637,802	10,046,181	9,455,936	8,867,136	8,279,853	7,694,164	7,110,148	6,527,888	5,947,472	5,988,139	6,030,839	6,075,675	6,122,752
Variable Cost															
Misc Expense (annualized)	619,024	619,024	619,024	619,024	619,024	619,024	619,024	619,024	619,024	619,024	619,024	619,024	619,024	619,024	619,024
Contingencies	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000
Operation Personnel	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000	1,488,000
Fuel and Lubricants	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040
Total Variable Cost	6,991,064	6,991,064	6,991,064	6,991,064	6,991,064	6,991,064	6,991,064	6,991,064	6,991,064	6,991,064	6,991,064	6,991,064	6,991,064	6,991,064	6,991,064
GRAND TOTAL	17,577,686	17,602,652	17,628,866	17,037,245	16,447,000	15,858,200	15,270,918	14,685,228	14,101,212	13,518,952	12,938,536	12,979,203	13,021,904	13,066,739	13,113,816
Expected Sales / Collection (tons/day)	80	84	88	93	97	102	107	113	118	124	130	137	144	151	158
Expected Sales / Collection (tons/year)	29,200	30,660	32,193	33,803	35,493	37,267	39,131	41,087	43,142	45,299	47,564	49,942	52,439	55,061	57,814
Breakeven Tipping Fee (P/ton)	602	574	548	504	463	426	390	357	327	298	272	260	248	237	227
average tipping fee	382														
tipping fee	497														
Break Even Point Sales Volume															
Variable Unit Cost (P/ton)	239	228	217	207	197	188	179	170	162	154	147	140	133	127	121
Fixed Cost	10,586,621	10,611,587	10,637,802	10,046,181	9,455,936	8,867,136	8,279,853	7,694,164	7,110,148	6,527,888	5,947,472	5,988,139	6,030,839	6,075,675	6,122,752
tipping fee	570	570	570	570	570	570	570	570	570	570	570	570	570	570	570
BEPSV Per year	32,024	31,030	30,149	27,662	25,349	23,188	21,158	19,243	17,429	15,705	14,060	13,925	13,811	13,714	13,634
BEPSV per month	2,669	2,586	2,512	2,305	2,112	1,932	1,763	1,604	1,452	1,309	1,172	1,160	1,151	1,143	1,136
BEPSV per day	88	85	83	76	69	64	58	53	48	43	39	38	38	38	37
average	57														

Table 5.39 Initial Capital Outlay, Options 3 & 4

Items	Option 3			Option 4		
	Loan	Equity	Total	Loan	Equity	Total
Land Acquisition	0	1,800,000	1,800,000	0	1,800,000	1,800,000
Site Development/Earthworks	5,921,912	0	5,921,912	5,921,912	0	5,921,912
Leachate Controls	10,625,816	0	10,625,816	10,625,816	0	10,625,816
Gas Controls	952,810	0	952,810	952,810	0	952,810
Support Structures	4,177,273	0	4,177,273	4,177,273	0	4,177,273
Utilities	3,250,000	0	3,250,000	3,250,000	0	3,250,000
Access Roads/Parking Area	4,223,396	0	4,223,396	4,223,396	0	4,223,396
Misc Expense	12,380,483	0	12,380,483	12,380,483	0	12,380,483
Landfill Closure	2,557,385	0	2,557,385	2,557,385	0	2,557,385
Equipment for Operation	9,500,000	0	9,500,000	6,500,000	3,000,000	9,500,000
MOOE (wages, fuel, etc : first year)	3,473,160	4,500,000	7,973,160	0	7,973,160	7,973,160
Total	57,062,235	6,300,000	63,362,235	50,589,075	12,773,160	63,362,235

(BASIS: refer to Annex XXVI for the Budgetary Cost Estimate for Sagay City)

Projected Income, Funds Flow and Cash Flow Statements

The commercial profitability and viability of options 3 and 4 were determined through a 15-year projected income statement, funds flow and cash flow. The projection for both options would show us the financial performance of the project within the maturity period of the loan. The revenues shall be generated from tipping fees (pegged at **PhP543.00** and **PhP652.00** per ton, for options 3 and 4, respectively), and organic fertilizers (composting). The organic fertilizer production sale is pegged at 25 bags per day priced at P150.00 per bag.

Undoubtedly, the assumed LGU tipping fee was derived from the average breakeven point tipping fee of **PhP418.00** per ton. This is 30% higher than the average breakeven point tipping fee representing the mark-up price per ton. Likewise, the assumed tipping fee for the privately operated SLF (option 4) was based on a 20% mark-up from option 3's tipping fee.

As gleaned from the Projected Income Statement, option 3 is expected to generate an average net income of **PhP9,590,348** per annum which is **PhP3,961,698** short of option 4's average at **PhP13,552,046** per annum (see Table 5.40 and Table 5.41).

The **Projected Funds Flow Statement** for both virtually suggests a robust picture as the project is expected to build-up positive cash balances after defraying project obligations and accountabilities. More importantly, the project will not encounter any liquidity problem during its entire operation because of an assured cash balances every start of the year (see Table 5.42 and Table 5.43).

Moreover, a **Projected Cash Flow Statement** showing the total benefits and costs for options 3 and 4 has been prepared to present the project's financial performance relative to the net benefits that would accrue to the proponent or investor (see Table 5.44 and Table 5.45).

Financial Feasibility Measures and Sensitivity

A financial evaluation for options 3 and 4 using the discounted measures of project worth viz: Benefit-Cost Ratio (BCR), Net Present Value (NPV), and Financial Internal Rate of Return (FIRR) at an opportunity cost of 10% were employed.

The discounted measures of project worth such as Benefit-Cost Ratio (BCR) were computed at 1.21 and 1.43 for options 3 and 4, respectively, suggesting that the project is financially viable

Table 5.40 Projected Income Statement (Option 3)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
GROSS REVENUE															
Tipping Fee*	15,853,580	16,646,259	17,478,572	18,352,501	19,270,126	20,233,632	21,245,314	22,307,579	23,422,958	24,594,106	25,823,812	27,115,002	28,470,752	29,894,290	31,389,004
organic fertilizers	1,368,750	1,437,188	1,509,047	1,584,499	1,663,724	1,746,910	1,834,256	1,925,969	2,022,267	2,123,380	2,229,550	2,341,027	2,458,078	2,580,982	2,710,031
Total Revenue	17,222,330	18,083,447	18,987,619	19,937,000	20,933,850	21,980,542	23,079,570	24,233,548	25,445,225	26,717,487	28,053,361	29,456,029	30,928,831	32,475,272	34,099,036
OPERATING EXPENSES															
Landfill Closure	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385
Operation Personnel	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120
Fuel and Lubricants	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040
Contingencies	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000
Operating Expenses Before Dep'n	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545
Add: Depreciation ³	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953
Total Operating Expenses	12,712,498	12,712,498	12,712,498	12,712,498	12,712,498	12,712,498	12,712,498	12,712,498	12,712,498	12,712,498	12,712,498	12,712,498	12,712,498	12,712,498	12,712,498
Net Income Before Interest	4,509,832	5,370,948	6,275,121	7,224,502	8,221,352	9,268,044	10,367,071	11,521,050	12,732,727	14,004,988	15,340,863	16,743,531	18,216,332	19,762,774	21,386,537
Less : Interest	5,706,224	5,706,224	5,706,224	4,992,946	4,279,668	3,566,390	2,853,112	2,139,834	1,426,556	713,278					
NET INCOME	(1,196,392)	(335,275)	568,897	2,231,556	3,941,684	5,701,654	7,513,960	9,381,216	11,306,171	13,291,710	15,340,863	16,743,531	18,216,332	19,762,774	21,386,537

Table 5.41 Projected Income Statement (Option 4)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
GROSS REVENUE															
Tipping Fee*	19,024,296	19,975,511	20,974,287	22,023,001	23,124,151	24,280,359	25,494,376	26,769,095	28,107,550	29,512,928	30,988,574	32,538,003	34,164,903	35,873,148	37,666,805
organic fertilizer	1,368,750	1,437,188	1,509,047	1,584,499	1,663,724	1,746,910	1,834,256	1,925,969	2,022,267	2,123,380	2,229,550	2,341,027	2,458,078	2,580,982	2,710,031
Total Revenue	20,393,046	21,412,699	22,483,333	23,607,500	24,787,875	26,027,269	27,328,632	28,695,064	30,129,817	31,636,308	33,218,123	34,879,030	36,622,981	38,454,130	40,376,837
OPERATING EXPENSES															
Landfill Closure	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385
Operation Personnel	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120
Fuel and Lubricants	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040
Contingencies	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000
Operating Expenses Before Dep'n	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545
Add: Depreciation ³	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953
Total Operating Expenses	12,712,498	12,712,498	12,712,498	12,712,498	12,712,498	12,712,498	12,712,498	12,712,498	12,712,498	12,712,498	12,712,498	12,712,498	12,712,498	12,712,498	12,712,498
Net Income Before Interest	7,680,548	8,700,200	9,770,835	10,895,002	12,075,377	13,314,771	14,616,134	15,982,566	17,417,319	18,923,810	20,505,625	22,166,531	23,910,483	25,741,632	27,664,338
Less : Interest	5,058,908	5,058,908	5,058,908	4,426,544	3,794,181	3,161,817	2,529,454	1,897,090	1,264,727	632,363					
Tax	611,791	642,381	674,500	708,225	743,636	780,818	819,859	860,852	903,895	949,089	996,544	1,046,371	1,098,689	1,153,624	1,211,305
NET INCOME	2,009,849	2,998,912	4,037,428	5,760,233	7,537,560	9,372,135	11,266,821	13,224,623	15,248,697	17,342,357	19,509,081	21,120,160	22,811,793	24,588,008	26,453,033

Table 5.42 Projected Funds Flow Statement (Option 3)

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A. Sources of Funds (Cash Inflow)																
Net Income from Operations	-	(1,196,392)	(335,275)	568,897	2,231,556	3,941,684	5,701,654	7,513,960	9,381,216	11,306,171	13,291,710	15,340,863	16,743,531	18,216,332	19,762,774	21,386,537
Add Back : Depreciation	-	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953
Add: BL / E	63,362,235															
Total	63,362,235	985,561	1,846,678	2,750,850	4,413,509	6,123,637	7,883,607	9,695,913	11,563,169	13,488,124	15,473,663	17,522,816	18,925,484	20,398,285	21,944,727	23,568,490
B. Uses of Funds (Cash Outflow)																
Principal Amortization		-	-	7,132,779	7,132,779	7,132,779	7,132,779	7,132,779	7,132,779	7,132,779	7,132,779	-	-	-	-	-
Facilities / Accessories	30,632,940															
Total	30,632,940	-	-	7,132,779	7,132,779	7,132,779	7,132,779	7,132,779	7,132,779	7,132,779	7,132,779	-	-	-	-	-
C. Net Cash Flow	32,729,295	985,561	1,846,678	(4,381,929)	(2,719,270)	(1,009,142)	750,828	2,563,133	4,430,390	6,355,345	8,340,884	17,522,816	18,925,484	20,398,285	21,944,727	23,568,490
Add: Beg. Cash Balance	-	32,729,295	33,714,856	35,561,534	31,179,605	28,460,335	27,451,192	28,202,020	30,765,154	35,195,543	41,550,888	49,891,772	67,414,588	86,340,072	106,738,357	128,683,084
Net Cash Balance, Ending	32,729,295	33,714,856	35,561,534	31,179,605	28,460,335	27,451,192	28,202,020	30,765,154	35,195,543	41,550,888	49,891,772	67,414,588	86,340,072	106,738,357	128,683,084	152,251,574

Table 5.43 Projected Funds Flow Statement (Option 4)

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A. Sources of Funds (Cash Inflow)																
Net Income from Operations	-	2,009,849	2,998,912	4,037,428	5,760,233	7,537,560	9,372,135	11,266,821	13,224,623	15,248,697	17,342,357	19,509,081	21,120,160	22,811,793	24,588,008	26,453,033
Add Back : Depreciation	-	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953
Add: BL / E	63,362,235															
Total	63,362,235	4,191,802	5,180,865	6,219,381	7,942,186	9,719,513	11,554,088	13,448,774	15,406,576	17,430,650	19,524,310	21,691,034	23,302,113	24,993,746	26,769,961	28,634,986
B. Uses of Funds (Cash Outflow)																
Principal Amortization		-	-	6,323,634	6,323,634	6,323,634	6,323,634	6,323,634	6,323,634	6,323,634	6,323,634	-	-	-	-	-
Facilities / Accessories	30,632,940															
Total	30,632,940	-	-	6,323,634	6,323,634	6,323,634	6,323,634	6,323,634	6,323,634	6,323,634	6,323,634	-	-	-	-	-
C. Net Cash Flow	32,729,295	4,191,802	5,180,865	(104,254)	1,618,551	3,395,879	5,230,454	7,125,140	9,082,942	11,107,016	13,200,676	21,691,034	23,302,113	24,993,746	26,769,961	28,634,986
Add: Beg. Cash Balance	-	32,729,295	36,921,097	42,101,962	41,997,708	43,616,259	47,012,138	52,242,592	59,367,732	68,450,674	79,557,690	92,758,365	114,449,400	137,751,513	162,745,259	189,515,220
Net Cash Balance, Ending	32,729,295	36,921,097	42,101,962	41,997,708	43,616,259	47,012,138	52,242,592	59,367,732	68,450,674	79,557,690	92,758,365	114,449,400	137,751,513	162,745,259	189,515,220	218,150,207

Table 5.44 Projected Cash Flow Statement (Option 3)

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
BENEFITS																
Tipping Fee	-	15,853,580	16,646,259	17,478,572	18,352,501	19,270,126	20,233,632	21,245,314	22,307,579	23,422,958	24,594,106	25,823,812	27,115,002	28,470,752	29,894,290	31,389,004
MRF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
organic fertilizer	-	1,368,750	1,437,188	1,509,047	1,584,499	1,663,724	1,746,910	1,834,256	1,925,969	2,022,267	2,123,380	2,229,550	2,341,027	2,458,078	2,580,982	2,710,031
Residual Value								-	-	-	-	-	-	-	-	-
Total Benefits	-	17,222,330	18,083,447	18,987,619	19,937,000	20,933,850	21,980,542	23,079,570	24,233,548	25,445,225	26,717,487	28,053,361	29,456,029	30,928,831	32,475,272	34,099,036
COST																
Investment	63,362,235															
Operating Expenses	-	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545
Total Cost	63,362,235	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545
NET BENEFITS (BF)	(63,362,235)	6,691,785	7,552,901	8,457,074	9,406,455	10,403,305	11,449,997	12,549,024	13,703,003	14,914,680	16,186,941	17,522,816	18,925,484	20,398,285	21,944,727	23,568,490
FINANCING																
Loan	57,062,235															
Debt Service		5,706,224	5,706,224	12,839,003	12,125,725	11,412,447	10,699,169	9,985,891	9,272,613	8,559,335	7,846,057	-	-	-	-	-
Net Financing	57,062,235	(5,706,224)	(5,706,224)	(12,839,003)	(12,125,725)	(11,412,447)	(10,699,169)	(9,985,891)	(9,272,613)	(8,559,335)	(7,846,057)	-	-	-	-	-
NET BENEFITS (AF)	(6,300,000)	985,561	1,846,678	(4,381,929)	(2,719,270)	(1,009,142)	750,828	2,563,133	4,430,390	6,355,345	8,340,884	17,522,816	18,925,484	20,398,285	21,944,727	23,568,490

Table 5.45 Projected Cash Flow Statement (Option 4)

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
BENEFITS																
Tipping Fee	-	19,024,296	19,975,511	20,974,287	22,023,001	23,124,151	24,280,359	25,494,376	26,769,095	28,107,550	29,512,928	30,988,574	32,538,003	34,164,903	35,873,148	37,666,805
MRF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
organic fertilizer	-	1,368,750	1,437,188	1,509,047	1,584,499	1,663,724	1,746,910	1,834,256	1,925,969	2,022,267	2,123,380	2,229,550	2,341,027	2,458,078	2,580,982	2,710,031
Residual Value								-	-	-	-	-	-	-	-	-
Total Benefits	-	20,393,046	21,412,699	22,483,333	23,607,500	24,787,875	26,027,269	27,328,632	28,695,064	30,129,817	31,636,308	33,218,123	34,879,030	36,622,981	38,454,130	40,376,837
COST																
Investment	63,362,235															
Operating Expenses	-	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545
Total Cost	63,362,235	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545	10,530,545
NET BENEFITS (BF)	(63,362,235)	9,862,501	10,882,153	11,952,788	13,076,955	14,257,330	15,496,724	16,798,087	18,164,519	19,599,272	21,105,763	22,687,578	24,348,484	26,092,436	27,923,585	29,846,291
FINANCING																
Loan	50,589,075															
Debt Service		5,058,908	5,058,908	11,382,542	10,750,178	10,117,815	9,485,452	8,853,088	8,220,725	7,588,361	6,955,998	-	-	-	-	-
Net Financing	50,589,075	(5,058,908)	(5,058,908)	(11,382,542)	(10,750,178)	(10,117,815)	(9,485,452)	(8,853,088)	(8,220,725)	(7,588,361)	(6,955,998)	-	-	-	-	-
NET BENEFITS (AF)	(12,773,160)	4,803,593	5,823,246	570,246	2,326,776	4,139,515	6,011,272	7,944,999	9,943,794	12,010,911	14,149,765	22,687,578	24,348,484	26,092,436	27,923,585	29,846,291

and 0.43 are generated by options 3 and 4, respectively. Similarly, the NPVs show positive values of **PhP29,564,405** and **PhP61,418,757**, respectively. Likewise, the Financial Internal Rates of Return (FIRR) at an opportunity cost of 10% were employed for both options and were estimated at **26%** and **41%**, respectively, implying that both are financially viable since the values are greater than the opportunity cost of investment at 10% (see Table 5.46).

Furthermore, a sensitivity analysis with respect to possible variations in anticipated project benefits and costs were also conducted to determine the project's performance under abnormal conditions. Expectedly, the risks and uncertainties due to environmental and market distortions could be incorporated. One of the viability indicators of the project is its ability to absorb nominal shocks such as increases in prices of project inputs and decreases in project outputs.

Theoretically, three (3) cases were considered in this study, to wit: Case A: A reduction in revenue by 10% while capital investments and operating costs are unchanged; Case B: An increase in capital investments and operating costs by 10% while revenue is unchanged; Case C: A combination of cases A and B which is a reduction in revenue by 10% and a simultaneous increase in capital investments and operating costs by 10%.

Table 5.46 shows the summary of the sensitivity tests which basically shows that the project is financially viable in all cases for both options except for Case C in option 3, following the decision criteria of the measures of project worth.

Table 5.46 Summary of Sensitivity Analysis

Items	Option 3				Option 4			
	Base	Case A	Case B	Case C	Base	Case A	Case B	Case C
IRR	26%	16%	16%	9%	41%	29%	27%	19%
NPV	29,564,405	12,262,124	15,218,565	-2,083,716	61,418,757	40,931,042	47,072,917	26,585,202
BCR	1.21				1.43			

Profit Analyses

In the calculation for the Break-Even Point Volume or the volume of garbage to be delivered to the landfill site and the Break-Even Point Tipping Fee for both options, the volume commitment is **80 tons** per day. This is the actual total amount of garbage from the cluster of Cadiz City, Escalante, and Sagay City. The **Break-Even Volume (BEV)** and the **Break-Even Tipping Fee (BETF)** generally vary from year to year. For option 3, the BEV ranges from 37 to 121 tons per day while the BETF, ranges from **PhP239.00** to **PhP670.00** per ton. Likewise, for option 4, the BEV ranges from 36 to 84 tons per day while the BETF, ranges from **PhP260.00** to **PhP668.00** per ton. Nonetheless, to give the proponent an idea of the average for the 15-year project life for both parameters as a reference point, the BEV is around **68** and **54 tons** per day and the BETF is around **PhP418.00** and **PhP430.00** per ton for options 3 and 4, respectively. In this particular analysis, an initial tipping fee of **PhP543.00** and **PhP652.00** per ton for options 3 and 4, respectively shall be used over the 15-year period at current 2007 prices. These are figures higher than the computed BETF.

The computed BEV for both options from year 1 to 15 shows a declining volume as the costs (fixed and variable cost) decline over the years. A conservative estimate of an initial **80 tons** per day which is assumed to increase 5% every year is more than the average BEV of **68 tons** and **54 tons** for options 3 and 4, respectively. Therefore, the project will gain because the initial committed volume of **80 tons** is higher than the average BEV for both options.

Furthermore, the Break-Even Tipping Fee (BETF) varies from **PhP239.00** to **PhP670.00** per ton for option 3 and **PhP260.00** to **PhP668.00** for option 4 over the project life. In order to have a specific comparison of these figures from a reference point, we get the average BETF at **PhP418.00** and **PhP430.00** per ton, respectively. Using these figures, theoretically, the project neither gains nor loses. At an assumed tipping fee of **PhP543.00** and **PhP652.00** per ton, respectively, the project is robust. The difference of **PhP125.00** and **PhP221.00** per ton would be able to defray the cost of other incidental expenses to be incurred relative to project operation not captured in this computation. Further, from year 1 onwards, a decreasing BETF is noted implying that the project becomes more profitable as it matures. This can be attributed to the declining interest expense, and a minimal increase in variable costs (see Table 5.47).

Therefore, an initial tipping fee of **PhP543.00** and **PhP652.00** per ton for options 3 and 4, respectively are a good price to start with as shown in the above discussions and substantiated by the computations (see Table 5.49 and Table 5.50).

Table 5.47 Summary of Breakeven Point Values

	Option 3		Option 4	
TIPPING FEE		543		652
AVERAGE BREAKEVEN TIPPING FEE (per ton)		418		430
AVERAGE BREAKEVEN VOLUME (per day)		68		54
AVERAGE BREAKEVEN TIPPING FEE (range)	239	657	260	668
AVERAGE BREAKEVEN VOLUME (range)	37	121	35	84

Furthermore, the Weighted Average Cost of Capital (WACC) was also computed in order to have an idea of how debt financing imposes a financial risk to both proponents who would then want to be compensated, at a minimum, by the tax shield on the periodic interest payment. Under an imperfect market, which characterizes the present local market environment in the Philippines, taxes are introduced as a market imperfection. The WACC is the benchmark discount rate at which projects are assessed to determine which of a set of financially feasible project is most desirable. The WAC is currently set by the National Economic Development Authority at 15%. At this scenario, the over-all cost of capital will decrease with the use of debt because the interest tax shield benefits the stockholders. Table 5.48 shows the WACC. The figure shows that WACC (Weighted Real Rate) for equity and loan is 10% while the WACC (Weighted Nominal Rate) is 18.80% for both options.

Table 5.48 Weighted Average Cost of Capital

Description	option 3		option 4	
	Weighted Real Rate	Weighted Nominal Rate	Weighted Real Rate	Weighted Nominal Rate
Equity	6.28%	11.81%	6.70%	12.60%
Loan	3.72%	6.99%	3.30%	6.20%
Total	10.00%	18.80%	10.00%	18.80%

Table 5.49 Breakeven Point (Option 3)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Fixed Cost															
Land Acquisition	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
Site Development/Earthworks (annualized)	394,794	394,794	394,794	394,794	394,794	394,794	394,794	394,794	394,794	394,794	394,794	394,794	394,794	394,794	394,794
Landfill Closure	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385
depreciation	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953
Interest	5,706,224	5,706,224	5,706,224	4,992,946	4,279,668	3,566,390	2,853,112	2,139,834	1,426,556	713,278	0	0	0	0	0
Total Fixed Cost	10,960,356	10,960,356	10,960,356	10,247,078	9,533,800	8,820,522	8,107,244	7,393,966	6,680,688	5,967,410	5,254,132	5,254,132	5,254,132	5,254,132	5,254,132
Variable Cost															
Misc Expense (annualized)	619,024	619,024	619,024	619,024	619,024	619,024	619,024	619,024	619,024	619,024	619,024	619,024	619,024	619,024	619,024
Contingencies	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000
Operation Personnel	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120
Fuel and Lubricants	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040
Total Variable Cost	8,592,184	8,592,184	8,592,184	8,592,184	8,592,184	8,592,184	8,592,184	8,592,184	8,592,184	8,592,184	8,592,184	8,592,184	8,592,184	8,592,184	8,592,184
GRAND TOTAL	19,552,540	19,552,540	19,552,540	18,839,262	18,125,984	17,412,706	16,699,428	15,986,150	15,272,872	14,559,595	13,846,317	13,846,317	13,846,317	13,846,317	13,846,317
Expected Sales / Collection (tons/day)	80	84	88	93	97	102	107	113	118	124	130	137	144	151	158
Expected Sales / Collection (tons/year)	29,200	30,660	32,193	33,803	35,493	37,267	39,131	41,087	43,142	45,299	47,564	49,942	52,439	55,061	57,814
Breakeven Tipping Fee (P/ton)	670	638	607	557	511	467	427	389	354	321	291	277	264	251	239
average tipping fee	418														
Break Even Point Sales Volume															
Variable Unit Cost (P/ton)	294	280	267	254	242	231	220	209	199	190	181	172	164	156	149
Fixed Cost	10,960,356	10,960,356	10,960,356	10,247,078	9,533,800	8,820,522	8,107,244	7,393,966	6,680,688	5,967,410	5,254,132	5,254,132	5,254,132	5,254,132	5,254,132
tipping fee	543	543	543	543	543	543	543	543	543	543	543	543	543	543	543
BEPSV Per year	44,074	41,724	39,706	35,488	31,690	28,237	25,072	22,150	19,434	16,893	14,503	14,166	13,860	13,581	13,325
BEPSV per month	3,673	3,477	3,309	2,957	2,641	2,353	2,089	1,846	1,619	1,408	1,209	1,181	1,155	1,132	1,110
BEPSV per day	121	114	109	97	87	77	69	61	53	46	40	39	38	37	37
average	68														

Table 5.50 Breakeven Point (Option 4)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Fixed Cost															
Land Acquisition	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
Site Development/Earthworks (annualized)	394,794	394,794	394,794	394,794	394,794	394,794	394,794	394,794	394,794	394,794	394,794	394,794	394,794	394,794	394,794
Landfill Closure	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385	2,557,385
depreciation	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953	2,181,953
Interest	5,058,908	5,058,908	5,058,908	4,426,544	3,794,181	3,161,817	2,529,454	1,897,090	1,264,727	632,363	0	0	0	0	0
Tax	611,791	642,381	674,500	708,225	743,636	780,818	819,859	860,852	903,895	949,089	996,544	1,046,371	1,098,689	1,153,624	1,211,305
Total Fixed Cost	10,924,831	10,955,421	10,987,540	10,388,902	9,791,949	9,196,768	8,603,445	8,012,075	7,422,754	6,835,585	6,250,676	6,300,503	6,352,822	6,407,756	6,465,438
Variable Cost															
Misc Expense (annualized)	619,024	619,024	619,024	619,024	619,024	619,024	619,024	619,024	619,024	619,024	619,024	619,024	619,024	619,024	619,024
Contingencies	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000
Operation Personnel	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120	3,089,120
Fuel and Lubricants	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040	4,634,040
Total Variable Cost	8,592,184	8,592,184	8,592,184	8,592,184	8,592,184	8,592,184	8,592,184	8,592,184	8,592,184	8,592,184	8,592,184	8,592,184	8,592,184	8,592,184	8,592,184
GRAND TOTAL	19,517,015	19,547,605	19,579,724	18,981,086	18,384,133	17,788,952	17,195,629	16,604,259	16,014,938	15,427,769	14,842,860	14,892,687	14,945,006	14,999,940	15,057,622
Expected Sales / Collection (tons/day)	80	84	88	93	97	102	107	113	118	124	130	137	144	151	158
Expected Sales / Collection (tons/year)	29,200	30,660	32,193	33,803	35,493	37,267	39,131	41,087	43,142	45,299	47,564	49,942	52,439	55,061	57,814
Breakeven Tipping Fee (P/ton)	668	638	608	562	518	477	439	404	371	341	312	298	285	272	260
average tipping fee	430														
tipping fee	559														
Break Even Point Sales Volume															
Variable Unit Cost (P/ton)	294	280	267	254	242	231	220	209	199	190	181	172	164	156	149
Fixed Cost	10,924,831	10,955,421	10,987,540	10,388,902	9,791,949	9,196,768	8,603,445	8,012,075	7,422,754	6,835,585	6,250,676	6,300,503	6,352,822	6,407,756	6,465,438
tipping fee	652	652	652	652	652	652	652	652	652	652	652	652	652	652	652
BEPSV Per year	30,579	29,507	28,567	26,147	23,916	21,847	19,918	18,111	16,409	14,801	13,275	13,140	13,027	12,933	12,856
BEPSV per month	2,548	2,459	2,381	2,179	1,993	1,821	1,660	1,509	1,367	1,233	1,106	1,095	1,086	1,078	1,071
BEPSV per day	84	81	78	72	66	60	55	50	45	41	36	36	36	35	35
average	54														

Estimation of Household Garbage Fee

This study tries to have an estimate of the collection fee or tipping fee once the project operates. At an initial tipping of fee of **PhP543.00** per ton, the estimated tipping fee per household is around **PhP0.62** per day or **PhP18.57** per month. These estimates increase over time because of the increase in population and urbanization. **Table 5.51** shows the details on the estimate of this household tipping fee.

Table 5.51 Estimation of Household Garbage Fee

Year	Population	projected (tons per day)	pax/ton	price/ton (P)	price/pax (P)	fee per household per day (P)	fee per household per month (P)
1	350,817	80	4,385	543	0.12	0.62	18.57
2	354,606	84	4,221	543	0.13	0.64	19.29
3	358,436	88	4,064	543	0.13	0.67	20.04
4	362,307	93	3,912	543	0.14	0.69	20.82
5	366,220	97	3,766	543	0.14	0.72	21.62
6	370,175	102	3,626	543	0.15	0.75	22.46
7	374,173	107	3,490	543	0.16	0.78	23.33
8	378,214	113	3,360	543	0.16	0.81	24.24
9	382,298	118	3,234	543	0.17	0.84	25.18
10	386,427	124	3,114	543	0.17	0.87	26.16
11	390,601	130	2,997	543	0.18	0.91	27.17
12	394,819	137	2,886	543	0.19	0.94	28.22
13	399,083	144	2,778	543	0.20	0.98	29.32
14	403,393	151	2,674	543	0.20	1.02	30.45
15	407,750	158	2,574	543	0.21	1.05	31.64

Collection of Tipping Fee

Households shall be charged with a monthly garbage fee of **PhP18.57** per month. This shall be collected by a LGU collector who is connected full time with the project. Another option is for the LGU –Sagay City to deputize or commission the barangay councils as collectors of the household garbage fee with a corresponding incentive within the jurisdiction of the city government. In addition, since it is a cluster approach, LGU-Sagay shall charge Cadiz and Escalante of the tipping fee per ton. To formalize this arrangement, a memorandum of understanding shall be executed by the three cities following prescribed rules and regulations relative to RA 9003.

On the other hand, LGUs Cadiz and Escalante would likewise charge their households of the garbage collection fee on a monthly basis.

Projected Income from Sale of Fertilizers

Shown in **Table 5.52** is the projected income and volume of sales of organic fertilizers generated from the SLF. It is assumed that a 5% increase yearly for the production volume of fertilizer shall take place. Initially, a minimal amount of 7 bags per day is projected for the first year of operation and to increase in the next succeeding years as volume commitment for garbage increases over time.

Table 5.52 Projected Income from Sales of Fertilizers

Volume (bags)	P / bag	Total Revenue
9,125	150	1,368,750
9,581	150	1,437,188
10,060	150	1,509,047
10,563	150	1,584,499
11,091	150	1,663,724
11,646	150	1,746,910
12,228	150	1,834,256
12,840	150	1,925,969
13,482	150	2,022,267
14,156	150	2,123,380
14,864	150	2,229,550
15,607	150	2,341,027
16,387	150	2,458,078
17,207	150	2,580,982
18,067	150	2,710,031

5.2.4 Recommendation

Based from the above discussions, it is recommended that the Local Government Unit of Sagay City (Option 3) should operate the Proposed Sanitary Landfill because of the robust picture presented in this study. Comparatively speaking, the tipping fee for this project is very affordable due to the high volume commitment of the three cities. If a private contractor manages and operates the project, normally, the LGU would be forced to pay more than the expected tipping fee if they themselves operate, thus, to the detriment of the local populace who will shoulder the high cost of disposing their wastes.

Chapter 6

Economic Analysis

CHAPTER 6 ECONOMIC ANALYSIS

6.1 INTRODUCTION

Economic analysis is closely related to a financial analysis. The only difference lies on the point of view of the proponent or investor. The former relates a project impact on the society as a whole while the latter talks of individual profit derived from the project operation. Moreso, a financial analysis is primarily concerned with the identification of project costs and the corresponding revenues generated after defraying costs of operation. Whereas, economic analysis adopts the concept of opportunity cost or the forgone income when resources are diverted from one project and redeployed on an alternative project. In lieu of the profits generated in a financial analysis, the concept of excess benefits over social costs or net social benefits is used in economic analysis. Hence, the purpose of the economic analysis is to ascertain the project's desirability in terms of its net contribution to the economic and social welfare of the country as a whole through techniques of benefit-cost analysis. The effects of the project on selected development goals measured and translated into quantitative feasibility indicators.

Economic analysis is closely related to the other phases of project development. The bulk of the data needed in the identification and valuation of economic costs and benefits are derived from the market, technical, and financial aspects of the project study. It is considered that financial analysis is a major input to economic analysis. The outcomes of financial analysis are usually adjusted to derive most of the estimates for economic analysis.

Conceptually, economic analysis is not a substitute for the final investment decision, the latter being a political choice. Through the definition and valuation of costs and benefits, it provides useful inputs in facilitating the decision making process concerning investment allocation.

The specific parameters that are used in this economic evaluation include:

- the weighted economic cost of capital (WAECC);
- economic internal rate of return (EIRR); and
- the economic net present value of the project (ENPV).

The WAECC is an economic feasibility parameter expressed in percentage and used as a benchmark in determining a set of economically feasible projects. It is currently set by the National Economic Development Authority (NEDA) at 15%. Likewise, the EIRR is a discounted measure of project worth which equates the present value of project costs with the present value of project benefits (i.e. ENPV is equal to zero). The decision criterion is: if EIRR is greater than the WAECC, then the project is considered economically feasible and desirable from the point-of-view of society as a whole. On the other hand, the ENPV is the present value of a stream of benefits less streams of project costs. The decision criterion is accept the project if the ENPV is greater than zero, since it is considered economically viable.

6.2 CALBAYOG CITY ECONOMIC ANALYSIS

6.2.1 Economic Benefits of Option 3

The implementation of option 3, LGU Operated Sanitary Landfill with Composting, would provide significant positive benefits to the people of Calbayog City. Some of these benefits include:

- improvement in health and sanitation of the beneficiaries in influence areas;
- reduction in ground water and surface water contamination;

- increased in LGU income through tipping fees and sale of organic fertilizers;
- improvement in the aesthetic quality of the covered service areas.

There are some above mentioned potential benefits that cannot be quantified or monetized because of inadequacies in environmental accounting (i.e. improvements in aesthetic quality). Only the following were assessed as part of this analysis:

A. Organic Fertilizer Sales Revenues

The initial benefit considered relates to revenues from the sale of organic fertilizer which shall generate from the residuals of the sanitary landfill. Initially, the project shall be generating 7 bags of fertilizer per day and expected to increase 5% annually.

B. Health Effects

Health risks associated with poor solid waste management arise from increased occurrence of habitat for vectors and bacteria; air pollution attributed from the uncontrolled burning of solid waste; and the contamination of ground and surface water. Since it was not possible to conduct a detailed assessment of the dose-response relationships between improvements in solid waste management practices and health effects in Calbayog City, this study relied solely on the secondary evaluation method known as a benefit transfer approach which would quantify project benefits of a SLF. This method involves the use of the results from one or more economic studies with estimated values for similar benefits, and modifying and transferring them to this assessment in order to approximate the economic benefits associated with option 3-related health improvements in Calbayog City.

In the assessment of potential benefits of improved health, the methodology used in the Project Feasibility Study on the Proposed Sanitary Landfill in Barangay Pugaan, Iligan City, submitted by the City Government of Iligan in April, 1998 (Schema Konsult, Inc., 1998) was adopted in this study. Consequent health effects associated with the proposed sanitary landfill in Calbayog City were quantified and valued on the basis of:

- reductions in productive time lost due to illness;
- reductions in income lost due to premature death; and
- savings in medical expenses.

Reductions in Productive Time Lost Due to Illness

In the Proposed Calbayog SLF study, reductions in morbidity associated with the reduced incidence of air and water-borne diseases was determined through the identification of the number of economically productive members of the population in the landfill's service area who would have been otherwise affected by air/water borne diseases. This was done by multiplying the number of served population with the labor force participation rate and the morbidity rate. The resulting estimate of the reduction in the number of people suffering from disease was then multiplied by the minimum daily wage rate and assumed that the duration of the illness is ten days. Finally, the resulting value was then multiplied by the assumed reduction in the incidence of morbidity associated with improved solid waste management which is valued at 5%.

The method outlined above was adopted in this analysis, and an estimate of the resulting health benefits associated with a reduction in the incidence of morbidity was based on the following parameters:

- Labor force participation rate of 69.5% (DOLE, 2006)
- Morbidity rate of 4.17% of the population per year (DOH, 2004)
- Average daily wage of PhP208.75/day (National Wage and Productivity Commission)
- Reduction in the incidence of morbidity of 5%
- Population of the serviced area (147,187)

As gleaned from above discussion, this study assumed a reduction in the incidence of morbidity of 5% in order to reflect that not all diseases included in the morbidity statistics are water or air-borne and, therefore, their incidence may not be affected by improvements in the solid waste management system. In this analysis, reductions in the productive time lost due to illness are assumed to begin to accrue in the first year following completion of the sanitary landfill project.

Reductions in Economic Losses Due to Premature Death

In this study, reductions in the incidence of mortality were determined in a manner similar to that for morbidity. An estimate of the number of economically productive members of the population in the landfill service area was derived by multiplying the served population by the labor force participation rate and the mortality rate. This value was then multiplied by the average daily wage rate and assumed that the number of productive years lost due to premature death was 12.5. Finally, the resulting value was multiplied by the assumed reduction in the incidence of mortality associated with improved solid waste management by 5%.

The approach outlined above was adopted in this analysis, and an estimate of the resulting health benefits associated with a reduction in the incidence of mortality was based on the following parameters:

- Labor force participation rate of 69.5% (DOLE, 2006);
- Mortality rate of 4.70% (National Statistical Coordination Board, 2001)
- Average daily wage for Region 6 of PhP208.75; and
- Reduction in the incidence of mortality of 5%.

Savings in Medical Expenses

In this study, savings in medical expenses were calculated as the product of the reduction in the number of people temporarily suffering from air and water-borne diseases and the annual medical expenditure of PhP5,000.00, which is the standard annual expenditure per person per year. The approach outlined was adopted in this study.

6.2.2 Economic Evaluation Results

The undiscounted stream of economic benefits and costs, at 2007 prices, expected as a consequence of the implementation of option 3 (LGU Operated SLF with Composting) are summarized in **Table 6.1**. Likewise the estimation for the Economic Net Present Value (ENPV) and the Economic Internal Rate of Return (EIRR) are also presented in the same table. Results showed that the EIRR is 28% which is higher than the WAECC rate of 15%. Also, the ENPV is PhP31,745,633 thus, the figure suggests that it is economically viable.

Standard sensitivity analyses with respect to the possible fluctuations in expected project benefits and costs were also conducted. The sensitivities considered the following cases:

- Case A: 10% decrease in benefits;
Case B: 10% increase in total project investments and operating costs; and
Case C: Combination of Cases A and B

The results of the sensitivity analysis, in terms of the present value of net project benefits, and the EIRR, are summarized in **Table 6.2**.

In all cases, the project passed the decision criteria on the measures of project economic worth.

Table 6.2 Summary of Sensitivity Analysis

Year	sensitivity analysis		
	10% Decrease in Revenue (A)	10% Increase in Cost (B)	Combination of A and B
	-3,000,000	-5,990,186	-5,990,186
1	-382,178	-69,284	-890,219
2	-54,530	294,769	-562,571
3	-3,074,415	-2,687,021	-3,582,456
4	-2,379,367	-1,952,110	-2,887,408
5	-1,667,631	-1,198,656	-2,175,672
6	-938,407	-425,771	-1,446,448
7	-190,858	367,476	-698,899
8	575,896	1,182,062	67,856
9	1,362,777	2,019,010	854,736
10	2,170,751	2,879,395	1,662,710
11	6,363,564	7,127,075	5,855,523
12	6,880,542	7,701,496	6,372,501
13	7,421,807	8,302,901	6,913,766
14	7,988,527	8,932,591	7,480,487
15	8,581,932	9,591,929	8,073,891
16	9,203,307	10,282,346	8,695,267
17	9,854,004	11,005,342	9,345,963
18	10,535,439	11,762,492	10,027,398
19	11,249,098	12,555,447	10,741,058
20	11,996,541	13,385,939	11,488,500
21	12,779,401	14,255,784	12,271,361
22	13,599,396	15,166,889	13,091,356
23	14,458,325	16,121,255	13,950,285
24	15,358,076	17,120,978	14,850,036
25	16,300,631	18,168,261	15,792,590
EIRR	20%	20%	15%
ENPV	20,969,378	24,143,941	13,367,687

6.3 SAGAY CITY ECONOMIC ANALYSIS

6.3.1 Economic Benefits of Option 3

The implementation of option 3, LGU Operated Sanitary Landfill with Composting, would provide significant positive benefits to the people of Sagay City and the two clustered cities of Cadiz and Escalante. Some of these benefits include:

- improvement in health and sanitation of the beneficiaries in influence areas;
- reduction in ground water and surface water contamination;
- increased in LGU income through tipping fees and sale of organic fertilizers;
- improvement in the aesthetic quality of the covered service areas.

There are some above mentioned potential benefits that cannot be quantified or monetized because of inadequacies in environmental accounting (i.e. improvements in aesthetic quality). Only the following were assessed as part of this analysis:

A. Organic Fertilizer Sales Revenues

The initial benefit considered relates to revenues from the sale of organic fertilizer, which shall generate from the residuals of the sanitary landfill. Initially, the project shall be generating 25 bags of fertilizer per day and expected to increase 5% annually.

B. Health Effects

Health risks associated with poor solid waste management arise from increased occurrence of habitat for vectors and bacteria; air pollution attributed from the uncontrolled burning of solid waste; and the contamination of ground and surface water. Since it was not possible to conduct a detailed assessment of the dose-response relationships between improvements in solid waste management practices and health effects in Sagay City and other covered areas, this study relied solely on the secondary evaluation method known as a benefit transfer approach which would quantify project benefits of a SLF. This method involves the use of the results from one or more economic studies with estimated values for similar benefits, and modifying and transferring them to this assessment in order to approximate the economic benefits associated with option 3-related health improvements in Sagay City and covered areas.

In the assessment of potential benefits of improved health, the methodology used in the Project Feasibility Study on the Proposed Sanitary Landfill in Barangay Pugaan, Iligan City, submitted by the City Government of Iligan in April, 1998 (Schema Konsult, Inc., 1998) was adopted in this study. Consequent health effects associated with the proposed sanitary landfill in Sagay City were quantified and valued on the basis of:

- reductions in productive time lost due to illness;
- reductions in income lost due to premature death; and
- savings in medical expenses.

Reductions in Productive Time Lost Due to Illness

In the Proposed Sagay SLF study, reductions in morbidity associated with the reduced incidence of air and water-borne diseases was determined through the identification of the number of economically productive members of the population in the landfill's service area who would have been otherwise affected by air/water borne diseases. This was done

by multiplying the number of served population with the labor force participation rate and the morbidity rate. The resulting estimate of the reduction in the number of people suffering from disease was then multiplied by the minimum daily wage rate and assumed that the duration of the illness is ten days. Finally, the resulting value was then multiplied by the assumed reduction in the incidence of morbidity associated with improved solid waste management which is valued at 5%.

The method outlined above was adopted in this analysis, and an estimate of the resulting health benefits associated with a reduction in the incidence of morbidity was based on the following parameters:

- Labor force participation rate of 65.3% (DOLE, 2006)
- Morbidity rate of 3.42% of the population per year (DOH, 2004)
- average daily wage of Php202.00/day (National Wage and Productivity Commission)
- Reduction in the incidence of morbidity of 5%
- Population of the serviced area (350,817)

As gleaned from above discussion, this study assumed a reduction in the incidence of morbidity of 5% in order to reflect that not all diseases included in the morbidity statistics are water or air-borne and, therefore, their incidence may not be affected by improvements in the solid waste management system. In this analysis, reductions in the productive time lost due to illness are assumed to begin to accrue in the first year following completion of the sanitary landfill project.

Reductions in Economic Losses Due to Premature Death

In this study, reductions in the incidence of mortality were determined in a manner similar to that for morbidity. An estimate of the number of economically productive members of the population in the landfill service area was derived by multiplying the served population by the labor force participation rate and the mortality rate. This value was then multiplied by the average daily wage rate and assumed that the number of productive years lost due to premature death was 12.5. Finally, the resulting value was multiplied by the assumed reduction in the incidence of mortality associated with improved solid waste management by 5%.

The approach outlined above was adopted in this analysis, and an estimate of the resulting health benefits associated with a reduction in the incidence of mortality was based on the following parameters:

- Labor force participation rate of 65.3% (DOLE, 2006);
- Mortality rate of 5.70% (National Statistical Coordination Board, 2001)
- Average daily wage for Region 6 of Php202.00; and
- Reduction in the incidence of mortality of 5%.

Savings in Medical Expenses

In this study, savings in medical expenses were calculated as the product of the reduction in the number of people temporarily suffering from air and water-borne diseases and the annual medical expenditure of Php5,000.00, which is the standard annual expenditure per person per year. The approach outlined was adopted in this study.

6.3.2 Economic Evaluation Results

The undiscounted stream of economic benefits and costs, at 2007 prices, expected as a consequence of the implementation of option 3 (LGU Operated SLF with Composting) are summarized in **Table 6.3**. Likewise the estimation for the Economic Net Present Value (ENPV) and the Economic Internal Rate of Return (EIRR) are also presented in the same table. Results showed that the EIRR is Error! Not a valid link.74%, which is very much higher than the WAECC rate of 15%. Also, the ENPV is **PhP65,006,542**, thus, the figure suggests that it is economically viable.

Standard sensitivity analyses with respect to the possible fluctuations in expected project benefits and costs were also conducted. The sensitivities considered the following cases:

- Case A: 10% decrease in benefits;
- Case B: 10% increase in total project investments and operating costs; and
- Case C: Combination of Cases A and B

The results of the sensitivity analysis, in terms of the present value of net project benefits, and the EIRR, are summarized in **Table 6.4**.

In all cases, the project passed the decision criteria on the measures of project economic worth.

Table 6.4 Summary of Sensitivity Analysis

Year	sensitivity analysis		
	10% Decrease in Revenue (A)	10% Increase in Cost (B)	Combination of A and B
	-6,300,000	-12,636,224	-12,636,224
1	3,221,984	4,331,013	2,168,929
2	4,039,742	5,239,634	2,986,688
3	-2,236,067	-940,957	-3,289,121
4	-624,664	770,238	-1,677,719
5	1,029,933	2,529,425	-23,122
6	2,729,864	4,338,985	1,676,810
7	4,477,379	6,201,415	3,424,325
8	6,274,838	8,119,338	5,221,783
9	8,124,718	10,095,507	7,071,663
10	10,029,621	12,132,813	8,976,566
11	19,125,058	21,367,071	18,072,004
12	20,435,061	22,822,630	19,382,007
13	21,808,699	24,348,893	20,755,644
14	23,249,132	25,949,374	22,196,077
15	24,759,680	27,627,761	23,706,625
EIRR	43%	35%	23%
ENPV	44,160,048	50,660,702	29,814,208

Chapter 7

Review of Environmental Impact Assessment (EIA) Process

CHAPTER 7 REVIEW OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA) PROCESS

7.1 REVIEW OF JICA GUIDELINES FOR ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

On April 1, 2004, JICA which is responsible for technical cooperation and preliminary study of grant aid projects of Japan's bilateral grants issued a guideline for environmental and social considerations.

JICA classified projects into three (3) categories based on the scale of the projects, site condition and environmental impact assessment schemes of host countries which are:

- a) Category A - Projects which have significant adverse impacts on the environment and society. It also includes projects with complicated impacts or unprecedented impacts which are difficult to assess or have a wide range of impacts or irreversible. Projects are also classified as Category A if a detailed environmental impact assessment is required by the recipient government or wider area is affected other than the project site.
- b) Category B - Under this category are projects whose adverse impacts are less than those classified in Category A. Normally these include projects that are site specific, few irreversible impacts, and mitigation measures can be designed readily.
- c) Category C - Projects with minimal adverse impacts on the environment and society.

JICA's procedures for environmental and social considerations in all categories are as follows:

- a) Proposed projects are submitted to the Ministry of Foreign Affairs (MOFA) and reviewed by JICA by confirming the project and site description, environmental impact assessment process of recipient governments, and other information. JICA classifies the projects into categories during the first screening. From the standpoint of environmental and social considerations, JICA makes recommendations to MOFA;
- b) JICA posts information of projects under Category A, such as country, area, and project description, on its website for a certain period of time. External information and opinions about the projects are solicited before making recommendation to MOFA;
- c) If information for a category classification is not sufficient, JICA makes inquiries to recipient governments, embassies of Japan, JICA overseas offices and other institutions. If the data gathered is still not enough, JICA sends teams to collect information on environmental and social features by consulting authorized persons of recipient governments, by conducting field visits and by some other means. Results of studies are released promptly; and
- d) After the conclusion of international agreements by MOFA, JICA releases the names, countries, sites, outlines, and sectors of projects together with their categorization, and justifications on its website. For project categories A and B, JICA also discloses recommendations to MOFA on its website.

7.2 REVIEW OF PHILIPPINE ENVIRONMENTAL IMPACT STATEMENT (EIS) SYSTEM

In 1979, the Philippines EIS System was established by virtue of Presidential Decree (PD) 1586. Since its implementation it has undergone amendments to be more effective tool in planning, and managing environmental issues and concerns. The basic policy governing the EIS System is “to attain and maintain a rational and orderly balance between socio-economic growth and environmental protection.”

The EIS System categorizes projects into two namely: the Environmentally Critical Project (ECP) and projects located in Environmentally Critical Areas (ECA). For these categories, an Environmental Compliance Certificate (ECC) should be secured from the Department of Environment and Natural Resources (DENR).

The ECPs are those that have high potential for negative impacts, as provided for in Presidential Proclamation (PP) 2146 series of 1981 and Presidential Proclamation (PP) 803 series of 1996). These projects include:

- a) Heavy Industries
 - i) non-ferrous metal
 - ii) iron and steel mills
 - iii) smelting plants
 - iv) petroleum and petro-chemical, including oil and gas
- b) Resource Extractive Industries
 - i) major mining and quarrying
 - ii) forestry e.g logging, forest occupancy, extraction of mangrove products, introduction of fauna (exotic animals) in public/private forests
 - iii) major wood processing
 - iv) grazing
 - v) fishery projects e.g dikes for/and fishpond development projects
- c) Infrastructure Projects
 - i) major dams
 - ii) major power plants
 - iii) major roads and bridges
 - iv) major reclamation projects
- d) Golf Course Projects

The ECAs are those projects located at ecologically sensitive areas, as provided for in PP2146 and PP 803 and other areas which the President may proclaim. These include:

- Areas declared by law as national parks, watershed reserves, wildlife preserves and sanctuaries;
- Areas set aside as tourist spots;
- Areas which are habitat of endangered and threatened species;
- Areas occupied by cultural communities;
- Areas frequently visited by natural calamities;
- Areas with critical slopes;
- Areas classified as prime agricultural lands;
- Recharged areas and aquifers;
- Areas of unique historic archaeological or scientific interest;

- Water bodies tapped for domestic uses, within protected areas, natural buffers; and
- Coral reefs.

7.3 GENERAL APPROACH AND METHODOLOGY

A technically sound, interdisciplinary approach of the EIA study shall be used to achieve the objectives of the project. This approach does not only evaluate the different components of the environment, but also conforms to the guidelines of the DENR. The guidelines provided in DAO 2003-30 will be followed in all aspects of the EIA study.

The EIA study shall focus on key environmental problems and issues through the scoping sessions and stakeholders consultations.

The EIA study is viewed not only as a requisite under the existing laws but also as an assessment of the sustainability of the project as a whole. The results of the study can be applied in enhancing the overall management and operations of the project

The key activities in the EIA study include:

1) Scoping

Scoping defines the range of actions, alternatives, and impacts to be examined in the study. It also defines the thematic, temporal, and spatial boundaries to be considered. If properly planned and implemented, scoping can significantly improve the relevance, technical efficiency, and cost-effectiveness of an environmental study. Thus, this will be done at the outset of the EIA study. The scoping process consists of the First Level Scoping at EMB and the formal Second Level Scoping with the stakeholders at the project site.

2) Environmental Baseline Conditions (Eco-Profiling)

Eco-profiling is the evaluation of environmental quality of the area to establish baseline data for the impact study, identify the environmental strategies, and determine the monitoring needs of the proposed project.

It achieves three things: (1) establishes an environmental baseline of an area against which to evaluate the impact of the project; (2) provides the basis to identify environmental management strategies; and (3) identifies monitoring needs to track the effectiveness of the strategies.

Environmental baseline characterization will utilize secondary data and information based on the results of the site inspection, socio-economic profile of the area and other relevant studies. Primary data gathering to describe the existing conditions of the various environmental media (i.e. land, air, water, and people sectors) will be undertaken. The activities would include air, water and biological/terrestrial sampling activities as well as the conduct of perception surveys and key informants interviews.

3) Impact Identification, Assessment, Evaluation and Mitigation

Based on the collected information, the impacts of the project will be identified, assessed and evaluated. Assessment will cover the various physical, chemical, biological and socio-economic impacts of the project on the environment. Beneficial as well as adverse impacts of the project will be looked into. Impacts will also be rated according to severity and duration.

4) Formulation of Environmental Management and Monitoring Plans

The objective of the EMP is to enhance the positive impacts and mitigate negative impacts. It is an action plan that will ensure the implementation of environmental enhancement and impact mitigation measures related to the project.

The EMP will include the doable programs, budget estimates, schedules, and staffing requirements, and other necessary support services to implement the mitigating measures. Moreover, this will include the parameters to be monitored, sampling stations, cost, and identification of responsible group.

5) Compilation of the Component Reports

The content and layout of the EIA will follow the annotated outline prescribed in DAO 2003-30. The results of the environmental profiling (baseline environmental description), impact identification, assessment and prediction, and environmental management planning for all the study components will be compiled and included in the said document.

6) Submission of EIS to the EMB for approval and secure the Environmental Compliance Certificate (ECC).

With the foregoing, it is evaluated that the JICA Guidelines for Environmental and Social Considerations and the Philippine EIS System are almost the same in nature in terms of categorization of projects and procedures. The objectives of the two are the same, which is to address environmental and social issues and concerns of the different projects.

In consideration of the JICA Guidelines and Philippine EIA System, the proposed sanitary landfill projects of Calbayog City and Sagay City shall fall under the following:

JICA Guidelines's Category B - Under this category are projects whose adverse impacts are less than those classified in Category A. Normally these include projects that are site specific, few irreversible impacts, and mitigation measures can be designed readily.

Philippine EIS System's Category B. – Projects that are not environmentally critical in nature, but which may cause negative environmental impacts because they are located in environmentally critical areas (ECAs).

Therefore, the proposed SLF projects must comply with the EIA requirements under the Philippine EIS system as stipulated in DENR-AO 2003-30. However, the proposed SLF in Calbayog City will fall under Category 1, while that in Sagay City under Category 2, in which only IEE Checklist is needed by both cities for ECC application as per DENR memorandum circular cited below.

7.4 DEPARTMENT MEMORANDUM CIRCULAR NO. 06 SERIES OF 2006

The DENR Secretary has issued the Department Memorandum Circular No. 06 Series of 2006 on the adoption of IEE Checklist and IEE Report on the ECC processing of Categorized Final Disposal Facilities (sanitary landfill), as stated as follows:

“Consistent with the Department thrust to further streamline the requirements and procedures of the Environmental Impact Statement System as provided in the DENR Administrative Order No. 30 Series of 2003 and Administrative Order No. 42 Series of 2002 and in view of the operationalization of the Resolution No. 6, Guidelines on the Categorized Final Disposal Facilities (Sanitary Landfill), the following requirements shall apply and is hereby adopted to further simplify the Environmental Compliance Certificate (ECC) application of the following projects:

Category	Capacity, metric tones per day (MTPD)	Required Document	Approving Official
Category 1	15	IEE Checklist	Regional Director
Category 2	>15 but 75	IEE Checklist	Regional Director
Category 3	>75 but 200	IEE Report	Regional Director
Category 4	>200 but 1000	IEE Report	Regional Director

In accordance with the technical requirements stipulated under the Procedural Manual for DENR Administrative Order No. 3, projects requiring IEE Report are not required to undergo the scoping process. However, a technical scoping meeting with the appropriate regional office may be undertaken by the proponent to establish the range of actions and impacts, which could be attributed to the development of the project.

Likewise, and Environmental Impact Study (EIS) shall be required for sanitary landfill projects with a capacity of 1,000 metric tons daily capacity and above, consistent with the Procedural Manual for DENR Administrative Order No. 30 (DAO 03-30).

The National Solid Waste Management Commission (NSWMC) Resolution No. 6, the Guidelines on the Categorized Final Disposal Facility (Sanitary Landfill), which was approved by the National Solid Waste Management Commission (NSWMC) on December 15, 2005, rationalizes the engineering requirements to meet the net residual waste generation per day of the local government units.

The EMB Regional Office shall make available copies of the IEE Checklist and the IEE Report to the proponents and upon submission of the accomplished checklist, review, evaluate and make decision within sixty (60) working days.”

Chapter 8

Legal Procedures on Land Purchase, Expropriation, and Compensation

CHAPTER 8 LEGAL PROCEDURES ON LAND PURCHASE, EXPROPRIATION, AND COMPENSATION

8.1 REFERENCES

1. **REPUBLIC ACT No. 8974** November 7, 2000, otherwise known as "AN ACT TO FACILITATE THE ACQUISITION OF RIGHT-OF-WAY, SITE OR LOCATION FOR NATIONAL GOVERNMENT INFRASTRUCTURE PROJECTS AND FOR OTHER PURPOSES" (see **Annex R** of the Data Book).
2. **INFRASTRUCTURE RIGHT-OF-WAY (IROW) PROCEDURAL MANUAL**, 01 April 2003 (see **Annex S** of the Data Book).

8.2 OBJECTIVE

To facilitate the acquisition of Right-of-Way, site or location of new sanitary landfill site.

8.3 ROW / SITE STATUS

1. Calbayog City

Per information from the Chief of the Calbayog City Solid Waste Management Office, the city government of Calbayog and the private landowners of the proposed sanitary landfill site have agreed for the city government to acquire the 4.90 hectares proposed landfill site. Proper documentation is in process for the immediate transfer of the proposed site to the city government of Calbayog.

2. Sagay

According to the Executive Director of Sagay Solid Waste Management Council (SWMC), the proposed sanitary landfill site at Barangay Luna which has an area of eight (8) hectares is under negotiation with its private owner. The City has allotted funds for the acquisition of said lot this year (2007).

3. Davao

The four sites identified were:

- a) Brgy New Carmen Owned by the City government
- b) Brgy Concepcion Land cost maybe a major impediment
- c) Brgy New Valencia Privately owned, land cost is Php50/m².
- d) Brgy Dalagdag Public Land, no problem on land acquisition

8.4 PROCEDURE

Documentations to facilitate acquisition of the proposed sanitary landfill site shall be in accordance with R.A. 8974 and to follow some documentation procedures of the DPWH-IROW Procedural Manual.

Chapter 9

Loan Portfolio

CHAPTER 9 LOAN PORTFOLIO

9.1 LOAN PROCEDURES UNDER THE DBP, LANDBANK AND OTHER FINANCING INSTITUTIONS

This chapter presents the various windows for financing, which are being extended by local and international funding institutions in support to Ecological Solid Waste Management Act (RA 9003) in the Philippines. The common objective of these funding institutions is to help the Local Government Units (LGU) in securing financing of their ISWM programs and projects, which they would like to implement in adherence to the implementation of RA 9003 which primarily advocated conservation and preservation of our environment thereby maintaining good health and sanitation to every Filipino.

Enumerated are the various windows for financing.

ENVIRONMENTAL PROJECT CREDIT / LOAN PORTFOLIO

Program	:	DBP - KfW
Objectives	:	To provide financing and technical assistance to local government units (LGUs) and private enterprises to carry out investments in solid waste management.
Eligible Borrowers	:	1. Local Government Units (LGUs) 2. Private Enterprises (with at least 70% Filipino ownership)
Eligible Projects	:	1. Conversion of open dumpsites into controlled dumpsites <ul style="list-style-type: none">- Rolling stock such as trucks: compactor, bulldozer, dip truck, pick-up truck and payloador.- Construction works to a limited extent: trenches for the collection and drainage of surface water; covering and landscaping of filled up areas, fencing, receiving and controlling station with scale, gas drainage, etc. 2. Conversion of dumpsites into sanitary landfills <ul style="list-style-type: none">- Rolling stock such as trucks: compactor, bulldozer, dip truck, pick-up truck and payloador.- Construction works to a limited extent: trenches for the collection and drainage of surface water; covering and landscaping of filled up areas, fencing, receiving and controlling station with scale, gas drainage, etc. 3. Construction of sanitary landfills including acquisition of equipment for waste disposal and treatment <ul style="list-style-type: none">- Rolling stock such as trucks: compactor, bulldozer, dip truck, pick-up truck, payloador, and control unit for leachate drainage.- Construction works: clearance and preparation of ground; drains for the collection and discharge of surface water; sealing to the underground; leachate collection and treatment facilities; gas drainage to the torch; general infrastructure, operating buildings, electrical scale, equipment, tools, material for final covering, etc. 4. Waste collection and transport including collection vehicles and other equipment. <ul style="list-style-type: none">- Containers and garbage bins for collection; central and decentralized deployment, containers for separate collection.- Waste collection vehicles of various sizes, adjustment of bins

		and containers to the garbage trucks.
		- Reloading stations for reloading waste from smaller garbage trucks into larger trucks
		- Garbage trucks with higher payload and corresponding trailers.
		5. Facilities for waste treatment and recycling
		- Mechanical-biological facilities for treatment of residual waste prior to dumping.
		- Facilities for sorting recyclables.
		- Composting plants.
		- Biogas plants for the treatment of organic wastes.
		6. Consulting services for project preparation and implementation.
Eligible Expenditures	:	Project relates expenditures not exceeding:
		- 90% of the total project cost for LGUs
		- 80% of the total project cost for private enterprises
Non-eligible Expenditures	:	1. Purchase of land
		2. Cost of taxes and duties
		3. General administrative expenses
Loan Features	:	Interest Rate : Prime, fixed rate based on prevailing market rate at the time of the loan.
		Repayment : Maximum of 12 years with maximum of 3 years grace period.
		Term : 0.25% per annum on undisbursed loan amount.
		Commitment Fee
		Loanable Amount per Project : For LGUs: Maximum 90% of the total project cost
		For Private Enterprises: Maximum of 80% of the total project cost.
		Equity Participation : For LGUs: Minimum of 10% of total project cost
		For Private Enterprises: Minimum of 20% of total project cost.
		Collateral Requirements : The loans shall be fully secured by assets acquired out of the loans proceeds and other collaterals acceptable to the Bank such as but not limited to:
		- Real Estate Mortgage (except landfill site)
		- Chattel Mortgage
		- Loan Guarantee
		- Assignment of Insurance Cover
		- Assignment of revenues from the project
		- Assignment of a portion of Internal Revenue Allotment (IRA) in favor of DBP with holdout agreement (for LGUs)
		Prepayment : 3% of the amount to be prepaid with 60 days advance notice.
		Penalty
Program	:	Support Strategic Local Development & Investment Project (Land Bank)
Objectives	:	To improve living conditions, public health standards, and the urban environment by providing upgraded and improved urban and rural infrastructure and services in line with the Medium-Term Philippine Development Plan's strategic focus of eradicating poverty, good governance, and efficiency delivery of basic services.

To facilitate LGUs' access to viable financing options to fund the construction, upgrading and rehabilitation of basic urban and rural

	infrastructure facilities in accordance with their local development plan and public investment program.
Eligible Borrowers :	<ol style="list-style-type: none"> 1. Provinces 2. Cities 3. Municipalities 4. Infrastructure Utilities Operators (WDs, RECs, Telecoms) 5. Private Sector Groups in partnership with LGUs
Project Components to be Funded :	<ol style="list-style-type: none"> 1. LGU infrastructure facilities and utilities such as: <ul style="list-style-type: none"> - Water supply and distribution - Power production and distribution - Solid waste management facilities including construction of sanitary landfill - Wastewater treatment - Housing - New site development for commercial purposes - Roads and bridges - Drainage and flood control - Schools and health clinics - Improvement of municipal enterprise and infrastructure facilities such as public markets, slaughterhouses, bus terminals, and other related income generating projects. 2. Goods and services for enhancement of revenue or income
Terms of Loan :	Maximum of 15 years inclusive of 2-year grace period on principal payment.
Interest Rate :	Special financing rates fixed for the term of the loan
Loan Amount :	The loan amount shall be based on the investment requirement of the sub-project but for LGUs, amount of loan shall not exceed net borrowing capacity
Project Cost Sharing :	LBP – 90% Borrower's Equity – 10%
Processing Requirements :	<u>For LGUs</u> <ul style="list-style-type: none"> - Letter of Intent - Sangguniang Resolution authorizing the Local Chief Executive to negotiate and sign all documents pertaining to the loan with LBP - Description of the proposed project - COA Audited financial statements for the past three (3) years - BLGG Certification on Net Borrowing Capacity for current year - Approved Budget for the current year - Schedule of IRA for the past 3 years including the current year and - Standard documentary requirements such as evidences of ownership of offered collateral
	<u>For Utilities Operator/Private Sector in partnership with LGUs</u> <ul style="list-style-type: none"> - Letter of Intent - Board Resolution - Description of the Proposed Project - Audited financial statements for the past three (3) years - Collateral Documents

- Collateral : Real Estate Mortgage
Chattel Mortgage
Hold-out on Deposit
Assignment of LGU's IRA (for LGU only)
- Program : **ENVIRONMENTAL DEVELOPMENT PROGRAM (DBP)**
- Goals and Objectives : The Environmental Development Program (EDP) is based on the principle of sustainable development, that is, environmental protection and socio-economic development are complementary and enhance one another. The goal of the program is to make a significant contribution in environmental protection and enhancement and in the sustainable development and utilization of natural resources in line with the government's policy thrusts.

EDC caters to the environmental financing needs both the government and private sector in:

- Improving the quality of the environment in ways that also assist industries to achieve production efficiency and competitiveness as well as regulatory compliance;
- Enabling local government units to manage environment and natural resources in ways that increases their income and their capability to respond to the needs of their constituents; and
- Developing and managing natural resources sustainability in ways that provides communities with basic needs including potable water, sanitation services, waste management and reliable and affordable electricity, and opportunities for alternative livelihood and enterprise development.

Program Components :

- a. Credit Programs : To finance investment requirements.

1. Eligible Borrowers :
- a. Private corporations/enterprises
 - b. Renewable Energy Service Companies/Corporations (RESCOs)
 - c. Qualified Third Parties (QTPs) for energy projects
 - d. Private Utility Operators
 - e. Local Government Units (LGUs)
 - f. Non-governmental organizations (NGOs)
 - g. Electric Cooperatives (ECs)
 - h. Cooperatives other than electric cooperatives (Coops)
 - i. Water Districts (WDs)
 - j. Participating Financial Institutions (PFIs)
2. Eligible Projects :
- a. Power Generation/Distribution
 - Small-scale energy generation and mini-grid rural electrification projects thru renewable energy resources.
 - Stand-alone renewable energy rural electrification project, including the

marketing, sale, purchase, and
installation of Renewable Energy
Technology Systems

- Any project which improves the reliability and efficiency of rural water supply and increase access to electricity services by underserved customers.

b. Clean Alternative Transport

Fuel

- Projects that will reduce air pollutant emissions from motor vehicles.
 - Acquisition of Original Equipment Manufacture (OEM) vehicles run by LPG/CNG
 - Vehicle conversion/retrofitting
- Fuel Supply Infrastructure Facilities
 - Transmission
 - Distribution e.g. refueling stations, blending stations/depots, specialized tankers
- LPG/CNG Vehicle Support Service Facilities
 - Conversion/retrofitting shops
 - Service Centers
- Equipment and/or technology supply e.g. cylinder tanks, conversion kits, etc.
- Investments in the production of alternative fuel for vehicles and industry (e.g. coco methyl ester, bioethanol)
- Investments in supply infrastructure facilities including distribution facilities for alternative fuels e.g. blending stations/depots, specialized tankers.

c. Water Supply Sanitation

Services

- Bulk Water Supply
- Level 3 water supply system (New, rehabilitation and expansion)
- Sanitation Services
- Urban drainage

d. Solid and Hazardous Wastes

Management

- Closure and rehabilitation of dumpsite
- Conversion of dumpsite into sanitary landfill
- Construction of sanitary landfill
- Solid waste collection, transport, treatment and disposal including acquisition of equipment
- Materials Recovery Facility (MRF) /

- composting facility
- Industrial waste recycling/treatment or disposal
- Hazardous waste treatment, storage and disposal
- e. Water and Air Pollution Prevention and Control
 - Projects that improve the quality of the environment thru pollution prevention and reduction including environmental monitoring instruments and equipment
 - Occupational health and safety improvements
 - Reduction of raw material inputs for production
 - Waste minimization/clean technology in industrial processes/pollution prevention
 - Wastewater and sewerage treatment facility
 - Establishment of EMS & ISO 14001 certification
 - Relocation of pollutive industry from residential area
 - Contracts for capital goods & services within the environment sector
 - Investments in energy saving equipment
 - Support for environmental investments as well as industries undergoing restructuring
- f. Eco Tourism
 - Eco-tourism facilities and support infrastructure particularly those located along coastlines and protected forest zones.
- g. Carbon Sequestration
 - Afforestation and reforestation in private lands
- 3. Eligible Loan Purposes : a. Capital investments
b. Working capital
c. Interest during construction period
d. Consultant's services
- 4. Loan Features : a. Repayment Term
 - Up to fifteen (15) years with up to five (5) years grace period based on project cash flows
- b. Interest Rate
 - Prevailing market rate, fixed or variable
- c. Other Fees
 - Commitment Fee
 - Front-end fee

- d. Equity Requirement
 - Private Corporations – minimum of 20% based on total project cost
 - LGUs, Electric Cooperatives, NGOs, Water Districts (WDs) – Minimum of 10% based on total project cost
- 5. Collateral Requirements :
 - a. Real estate mortgage
 - b. Chattel mortgage
 - c. Assignment of receivables with recourse
 - d. Assignment of Power Purchase Agreement
 - e. Assignment of Carbon Emission Reduction Purchase Agreement (ERPA), if any
 - f. Assignment of revenues
 - g. Assignment of Notice of Payment Schedule (NPS)
 - h. Loan Guarantee, if any
 - i. Collateral sharing with NEA
 - j. Assignment of insurance cover
 - k. Joint and Several Signatures
 - l. Internal Revenue Allotment (IRA) for LGUs.
 - m. Assignment of Billed Receivables
 - n. Assignment of Joint Deposits of LUWA and WD of the WD Reserve requirement
 - o. Other acceptable asset/s
- 6. Checklist of Requirements :
 - a. General Requirements
 - Bio-data of Applicants / Major Stockholders / Officers
 - Certificate of Registration of Business/Articles of Incorporation/By-Laws certified by the Board Secretary
 - Board Resolution or Sangguniang Bayan Resolution authorizing the borrowing and designating authorized signatories for the loan borrowing and designating authorized signatories for the loan
 - Certified list of stockholders and offices
 - Customers Information Report (DBP Form)
 - Income Tax Return (last 3 years)
 - Feasibility study/business plan on the proposed project

Note: There are additional requirements based on the nature of projects.

 - b. Requirements on the Collateral to be offered
 - On Lot/Building
 - 2 copies of lot plan, certified by a Geodetic Engineer
 - location/vicinity map
 - 2 photo copies of TCT/ OCT

- authenticated by the Registry of Deeds
 - latest real estate Tax Declaration and tax receipt
 - Bill of materials, building plans and specifications (if with construction)
 - Building Permit to be submitted before construction
 - Machinery and Equipment
 - Affidavit of ownership and non-encumbrance of machineries and equipment with complete machine specification
 - Supplier's quotation of machinery and equipment with complete technical specifications for machinery to be acquired.
 - Contract to sell for machinery to be acquired
 - Copy of Certificate of Registration with LTO for transportation equipment
 - Importation documents (for verification of imported equipment)
- b. Clean Development Mechanism (CDM) : To assist CDM eligible projects in securing carbon credits which can be utilized as additional fund to accelerate loan amortization payment and/or security for the loan

Carbon credits from CDM-registered projects as security for the loan or for acceleration of loan amortization payments.

 1. Eligible Projects : Projects the reduce Greenhouse gases emission such as Carbon dioxide (CO₂), Methane (CH₄), Nitrous oxide (N₂O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs) and Sulfur hexafluoride (SF₆).
 - a. Emission Reduction
 - Renewable Energy – hydro, solar, wind, geothermal, biomass, biogas, tidal/wave power series
 - Fuel Switching
 - From diesel/bunker fuel to bio-diesel, ethanol, natural gas or renewable energy
 - From electricity to steam or compressed air
 - Demand-side energy efficiency improvements
 - Use of energy efficiency equipment such as motors, lamps, ballasts, refrigerators, fans, air conditioners, appliances, etc.
 - Supply –side energy efficiency improvements

- Generation – efficiency improvements at power stations and district heating plants and co-generation
- Transmission and Distribution – system loss reduction
- Agriculture (reduction of CH₄ and N₂O emissions)
 - Reducing emissions from agricultural soils by the use of ammonium sulfate or the use of phosphogypsum in combination with urea instead of urea alone; use of composted rice straw instead of fresh rice straw; reducing methane emissions from livestock.
- Industrial processes
 - Methane recovery and avoidance from landfills/dumpsites, coal mines, agro-industries, wastewater treatment facilities
 - Cement production (CO₂)
 - Electric equipment manufacturing (SF₆)
 - PFC emissions from aluminum production
 - PFC and SF₆ emissions from semiconductor manufacturing
 - Nitrous oxide (N₂O) emissions from adipic acid and nitric acid manufacturing
- b. Carbon Sequestration Projects
 - Afforestation – planting of trees on agricultural land
 - Reforestation – planting of trees on denuded forest land. Reforestation activities will be limited to those lands that remained unforested as of December 31, 1981.
- 2. Initial Requirements : a. Letter of Intent – to pursue Clean Development Mechanism from the client
- b. Project Idea Note – DBP can assist in the preparation of this requirement
- c. Technical Assistance : To assist borrowers in project preparation and for capacity improvement of bank staff in program management

9.2 OTHER DONOR'S ASSISTANCE ON SOLID WASTE

9.2.1 RP-FRANCE FINANCIAL PROTOCOL

- Project Title: : **HOSPITAL WASTE INCINERATOR PROJECT FOR METRO MANILA**
- Project Description : The Project has two main components:
- a) Installation of a centralized incineration plant with a total incinerating capacity of treating 23 tons of hospital waste per day. The incinerator includes provision for a flue gas treatment which is an effective air pollution control system intended to clean and minimize emissions consistent with the policy under the integral framework plan of the Integrated National Solid Waste Management System Framework.
 - b) Development of a system of collecting and transporting hospital waste that will minimize if not eliminate the risks to the environment and to workers directly concerned and ensure that the communities along the route are similarly protected. This includes training for hospital personnel regarding proper segregation and disposal.
- Implementing Agency : Metropolitan Manila Development Authority (MMDA)
- Project Duration : 1994 – 2002
- Objectives : The Project aims to provide safe and proper collection, storage and disposal of hazardous hospital wastes
- Lessons Learned in the Project :
- 1. The Project is a basic need during that time.
 - 2. The Project is not implemented due to the following:
 - Social acceptability is a problem.
 - No available area to put up the facility because of NIMBY attitude.
 - Implementation of RA 8749 (Clean Air Act) - ban of incineration.

9.2.2 SWEDISH INTERNATIONAL DEVELOPMENT AGENCY (SIDA)

- Project Title: : **IMPROVEMENTS IN THE RECOVERY OF DRY RECYCLABLES IN METRO MANILA**
- Implementing Agency : Metropolitan Manila Development Authority (MMDA)
- Project Duration : December 12, 2000 – October 7, 2002
- Objectives :
- Main Objective : The Project aims to establish a system on the recovery of dry recyclables in the selected project sites in Metro Manila.
 - Objective : To achieve an increased recovery rate of dry recyclables through the creation of a new system for recovery of dry waste and to reduce the amount of solid waste being disposed at the sanitary landfill.
- Location : Brgy. Guadalupe Nuevo, Makati City (first pilot site) and Brgys. Addition Hills and Highway Hills, Mandaluyong City
- Target Beneficiaries : LGUs, Barangays, MMDA, Schools, Churches, Junkshops
- Project Activities :
- 1. Establishment of recovery system
 - 2. Capability building
 - 3. Installation of storage facility

4. Implementation of a pilot recovery system
- Status of the Project :
1. Brgy. Guadalupe Nuevo, Makati City
 - a. MRF is operational.
 - b. Project turned-over to barangay – March 2002.
 - c. Project can financially support the salary of 6 recyclers.
 - d. Collection stabilizing at 3-3.5 tons/week.
 - e. Household Collection – 78%;
Commercial collection – 22%
 - f. System efficiency, generation vs collection with 3,200 households – 20%.
 2. Brgy. Addition Hills, Mandaluyong City
 - a. Facility owned by DSWD.
 - b. Collection covered – 90% of household.
 - c. Operation not yet turned-over to the barangay.
 - d. Site Staff – 5 Recyclers; 1 Sorter; 1 Project Coordinator.
 3. Brgy. Highway Hills, Mandaluyong City
 - a. Facility is privately owned.
 - b. Collection covered – 70% of the households.
 - c. Operation not yet turned over to the barangay.
Site Staff – 3 Recyclers; 1 Sorter; 1 Project Coordinator.
- Lessons Learned in the Project :
1. The challenge in the Project is to look for a collector that will stay in his job and in his route.
 2. If the collectors have a regular route, cheating is very rampant.
 3. The current system is that the collectors are provided with a capital by the MRF.
 4. The collection areas of the established group like Linis Ganda compete with the MRF group in the barangay.
 5. The conception of the people especially in low income areas to the foreign consultants is that the services they offer are for free.

9.2.3 UNITED NATIONS DEVELOPMENT PROGRAM

- Project Title: : **COMMUNITY-BASED ECOLOGICAL SOLID WASTE MANAGEMENT SYSTEM**
- Project Description: : The Project has three (3) basic components:
1. Setting up the system, where communities would be assisted in developing an ecological waste management system considering factor like storage, collection of dry recyclables, putting up a Material Recovery Facility as well as constituting the Barangay SWM Committee;
 2. Capability building for MMDA, LGUs, and communities; and
 3. Development of enabling tools e.g. a manual to serve as guide for implementation of RA 9003 and aid in policy development from which a model shall evolve to guide replication in other LGUs.
- Implementing Agency : Metropolitan Manila Development Authority
- Project Duration : January 2002 – December 2004
- Objectives :
- Main Objective : The Project is aimed at expanding community-based recycling with the end in-view of replicating the activity to other LGUs in the

Immediate Development Objectives:	:	country, contributing to the achievement of the target of increasing the level from the current 6% to at least 10% by the year 2010. 1. To increase the capabilities of the LGUs on community-based ecological waste management. 2. To set-up catalytic community-based waste recycling system in the selected sites in the LGU identified/selected for the project. 3. To develop institutionalization instruments like policies, tools and models and appropriate implementation mechanisms.
Location	:	The project will be implemented in 10 communities/barangays in 10 municipalities/cities in Metro Manila and 3 secondary cities outside Metro Manila namely: Lipa City, Tagbilaran City, and Cagayan de Oro City
Project Activities	:	1. Collaborative effort among MMDA, JICA, DENR Local-EPM. 2. Sharing of experiences among the LGUs, MMDA and the Local EPM. 3. Settling up of a catalytic Integrated Community-based Solid Waste Management System in the LGUs. Capability building and institutionalization of environmental planning and management in SWM.
Lessons Learned in the Project	:	1. The Project is 75% done when it is transferred to DENR. 2. Proper documentation should be institutionalized. 3. It is extremely difficult to secure available land area to put up a MRF. 4. Though the system is in-place, it is difficult to meet the diversion goal of 25% because the focus of the Project is for dry recyclable. It is recommended to put up a composting facility to increase the diversion rate. 5. The use of fund is maximized. 6. For small projects, fund should not be included in administrative matters because there might be difficulties in withdrawing cash. 7. The Project can only move if the Barangay Chairman would decide to implement the Project.

9.2.4 GOVERNMENT OF FINLAND

Project Title:	:	FEASIBILITY STUDY ON THE CONTROLLED CLOSURE OF THE SAN MATEO SANITARY LANDFILL
Implementing Agency	:	Metropolitan Manila Development Authority
Project Duration	:	May 26, 2000 – November 7, 2000
Components of the Proposed Closure Plan	:	1. Provision of final landfill cover; 2. Upgrading and building of a new runoff collection system; 3. Upgrading of existing leachate collection system; 4. Building of a new leachate WTP to complement existing one; 5. Gas recovery to energy conversion; Post closure land-use plan; Capacity Building.
Lessons Learned in the Project	:	1. The Project is not implemented. 2. Only Leachate Treatment Plant was put up by MMDA but it is not operational.

9.2.5 DANIDA

Project Title: : **ECOLOGICAL SOLID WASTE MANAGEMENT PROJECT FOR COMMUNITIES ALONG PASIG RIVER**

Implementing Agency : Metropolitan Manila Development Authority

Project Duration : April 24, 2002 – December 7, 2006

Project Location : 1. Brgy. Pineda, Pasig City
2. Brgy. Barangka Drive, Mandaluyong City
3. Brgy. 898, Manila
4. Brgy. Doña Imelda, Quezon City
5. Municipality of Taguig (Community-based Waste Management (CBWM) Training)
6. City of Pasay (CBWM Training)
7. Malacañang Barangays along Pasig River tributaries (CBWM Training)

Lessons Learned in the Project : The Project is implemented.

9.2.6 USEPA

Project Title: : **LANDFILL GAS STUDY IN THE PHILIPPINES (SAN MATEO SANITARY LANDFILL FACILITY AND CARMONA SANITARY LANDFILL FACILITY)**

Implementing Agency : Metropolitan Manila Development Authority

Lessons Learned in the Project : The Study was done only.

9.2.7 ADAF – NEW ZEALAND

Project Title: : **EXTRACTION AND UTILIZATION OF LANDFILL GAS IN THE PHILIPPINES**

Implementing Agency : PNOC-EC

Project Duration : August 2001 – May 2002

Lessons Learned in the Project : 1. The Project is not commercially viable.
2. The Project is not feasible even for a demonstration.

Project Title: : **FEASIBILITY STUDY ON SAN MATEO LANDFILL GAS EXTRACTION PROJECT**

Implementing Agency : PNOC-EC

Project Duration : September 2005

Lessons Learned in the Project : The Project is not feasible.

9.2.9 WORLD BANK

Project Title: : **SOLID WASTE ECOLOGICAL ENHANCEMENT PROJECT (SWEEP)**

Implementing Agency : DENR

- Project Duration : 1998 - 2000
- Project Components : Project preparatory technical assistance to formulate a US\$ 55 million loan package for solid waste management improvements for seven selected LGUs in intermediate cities. The proposed package included:
- (i) Demonstration sub projects including capital investments in system facilities and equipment, dumpsite closure and rehabilitation and institutional capacity building technical assistance.
 - (ii) Institutional strengthening at the national level through national policy enhancement, development of technical guidelines, training and capacity enhancement in contract procurement and management; and
 - (iii) Formulation of a social and ecological support program for the social rehabilitation of waste pickers, micro-financing for waste pickers and city specific activities to promote recycling and public awareness.
- Lessons Learned in the Project : The project has subsequently been dropped.

- Project Title: : **SOLID WASTE DISPOSAL FACILITY LOAN**
- Implementing Agency : DPWH
- Project Duration : 1990 – 1991
- Project Components : World Bank funding for the development of the Carmona and San Mateo disposal activities.
- Lessons Learned in the Project : Reportedly, although both facilities were initially designed, constructed and operated to appropriate standards, in later years these standards diminished, resulting in the forced suspension of operations at both facilities due to public opposition.

- Project Title: : **TOXIC AND HAZARDOUS WASTE MANAGEMENT STUDY**
- Implementing Agency : DENR
- Project Duration : 1997 - 1998
- Project Components : A comprehensive assessment of toxic and hazardous waste management in the Metro Manila and CALABARZON regions resulting in recommendations for waste minimization and recycling.

9.2.9 USAID

- Project Title: : **ECOLOGICAL GOVERNANCE PROJECT (ECOGOV)**
- Implementing Agency : DENR
- Project Duration : 2001 – 2004
- Project Components : Three-Year LGU demand-driven program to improve environmental governance. Resources are focused in Mindanao (50 percent), the Visayas (35 percent) and Northern Luzon (15 percent). Solid waste management assistance is being provided to 43 LGU including:
- i. Stakeholder orientation;
 - ii. LGU Board establishment;
 - iii. Waste management planning and formulation of priority actions;
 - iv. Waste characterization;
 - v. LGU Plan development;

- vi. Public awareness, including formulation of a RA 9003 primer;
- vii. Inventory and characterization of industrial wastes; and
- viii. Assistance with dumpsite closure and rehabilitation, and sanitary landfill development for Cotabato City and possibly other LGUs.

Project Title: : **WASTE MANAGEMENT PROCUREMENT TECHNICAL SUPPORT**

Implementing Agency : MMDA

Project Duration : 1999

Project Components : Provision of technical consultants to assist the Government in the formulation and implementation of a major waste treatment and disposal Build-Operate-Transfer procurement process for Metro Manila.

Lessons Learned in the Project : Although the procurement process resulted in the selection of a preferred bidders, the initiative stalled due to issuance of a restraining order. Government has declined to proceed with the initiatives.

9.2.10 JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

Project Title: : **THE STUDY ON SOLID WASTE MANAGEMENT FOR METRO MANILA IN THE REPUBLIC OF THE PHILIPPINES (JICA MASTERPLAN)**

Implementing Agency : MMDA

Project Duration : 1997 – 1999

Project Components : Major technical assistance project resulting in the development of a Metro Manila Solid Waste Master Plan. The project focused on the evaluation of alternatives and selection of a preferred waste transfer, treatment and disposal system comprising transfer station, onshore and offshore sanitary landfills and an offshore incinerator complex.

Lessons Learned in the Project : The masterplan recommendations were not implemented, reportedly due to principally to public opposition at the disposal sites and enactment of the Clean Air Act.

9.2.11 ADB

Project Title: : **METRO MANILA SOLID WASTE MANAGEMENT PROJECT (MMSWMP)**

Implementing Agency : DENR

Project Duration : 2002 - 2003

Project Components : Integrated planning, design, training, and implementation assistance to strengthen Metro Manila solid and medical waste management. Includes five key components:

- (i) RA 9003 capacity building including LGU Plan development assistance, waste characterization assessments, funding of pilot CBSWM projects, formulation of model CBSWM guidelines;
- (ii) Medical waste sector review, training, IEC, technology assessment, formulation of a sector wide improvement strategy;

- (iii) RA 9003 national agency support including institutional capacity building, media outreach and websites initiatives;
- (iv) Waste disposal assistance including sector review, formulating short-term improvements, assisting in long-term planning; and
- (v) Providing coordination and advice.

Project Title: : **PHILIPPINE REGIONAL MUNICIPAL DEVELOPMENT PROJECT (PRMDP)**

Implementing Agency : DILG

Project Duration : 1998-2003

Project Components : Joint ADB and Australia municipal infrastructure development project for six provincial cities. Includes the provision sanitary landfill facilities for Puerto Princesa and Tagbilaran, equipment for Puerto Princesa and General Santos, institutional development programs and development of systems and manuals.

Lessons Learned in the Project : The project is facing difficulties in the implementation of these solid waste management components.

Project Title: : **PASIG RIVER ENVIRONMENTAL MANAGEMENT AND REHABILITATION**

Implementing Agency : PRRC – DENR

Project Duration : 1994 – 2003

Project Components : Major environmental improvement programs for the Pasig River system funded by DANIDA and later by ADB, and both included technical assistance to improve solid waste management within riverside communities and provide support to CBSWM.

Lessons Learned in the Project : The project is facing difficulties in the implementation of these solid waste management components.

9.2.12 JBIC

Project Title: : **ECOLOGICAL SOLID WASTE MANAGEMENT PLANS (ESWMP)**

Implementing Agency : DENR

Project Duration : 2002-2003

Project Components : Formulation of LGU Plans for Muñoz City, Legaspi City and Butuan City

9.2.13 CANADIAN INTERNATIONAL DEVELOPMENT AGENCY (CIDA)

Project Title: : **LOCAL GOVERNMENT SUPPORT PROGRAM (LGSP)**

Implementing Agency : DILG – NEDA

Project Duration : 1999 – 2005

Project Components : Technical Assistance for over 200 LGUs in seven regions of the Visayas, Mindanao and ARMM to build capacity and implement development projects. During 2000 to 2002, solid waste management interventions included orientations and workshops, rapid waste appraisals, LGU plan assistance, LGU Board formation, capacity needs analyses, waste characterization support, and IEC activities.

9.2.14 USA TRADE AND DEVELOPMENT AGENCY

Project Title: : **BIOMEDICAL WASTE TREATMENT AND DISPOSAL
OPTIONS IN THE PHILIPPINES**
Project Duration : 2002
Project Components : To provide the EMB with information regarding technologies that
would treat health care wastes properly and comply with the
Clean Air Act

9.2.15 WORLD HEALTH ORGANIZATION

Project Title: : **MEDICAL WASTE MANAGEMENT TECHNICAL
ASSISTANCE**
Implementing Agency : DOH
Project Duration : 1995 – 2003
Project Components : Medical waste advisory technical assistance to DOH, DENR and
other agencies. This assistance has included medical waste
treatment and disposal technologies.

9.2.16 USAEP

Project Title: : **ESTABLISHMENT OF SWAPP AND TRAINING
ACTIVITIES**
Project Duration : 1997 – 2003
Project Components : USAEP has actively supported the sector since the mid 1990s
including:
(i) assistance to establish the Solid Waste Association of the
Philippines (SWAPP) in 1998;
(ii) integrated solid waste management training (2000);
(iii) financial assistance to develop a resource center, training
modules and a database (2000)
(iv) supporting the SWAPP annual conference (2001-2002);
and
(v) in conjunction with civil society, developing a technical
design manual for solid waste management-friendly
buildings (2003).

9.2.17 AUSTRIAN GOVERNMENT

Project Title: : **MEDICAL WASTE EQUIPMENT LOAN**
Implementing Agency : DOH
Project Duration : 1996 – 1997
Project Components : Austrian government aid package to supply 26 incinerators and 36
microwave disinfection units to DOH for the treatment of medical
wastes in government medical facilities.
Lessons Learned in the : Reportedly, the incinerators have only limited air pollution control
Project equipment, and will become obsolete in mid 2003 due to the Clean
Air Act.

Chapter 10

Comments on the JICA Draft Project Framework

CHAPTER 10 COMMENTS ON THE JICA DRAFT PROJECT FRAMEWORK

The Study Team has reviewed the Draft Project Framework (see **Attachment B**) for the “Introduction of Suitable Solid Waste Management System in 3 Cities” and found that the activities for both Phases 1 and 2 are sufficient and well-adapted in the needs of the study areas.

Recommendations and suggestions for the conduct of some activities are presented below:

Phase 1

A. On the Conduct of Feasibility Study

The feasibility study to be undertaken should also include incoming waste survey to determine the actual waste acceptance at the existing disposal facility which is important in the design of SLF, the collection and transport survey to determine the capacity per trip and frequency of collection or schedule, service coverage, market study for Sagay City which would like to cluster with its neighboring towns.

B. On the Conduct of Environmental Impact Assessment

The proposed SLF in Calbayog City will fall under Category 1, while that in Sagay City under Category 2, in which only IEE Checklist is needed by both cities for ECC application as per DENR Memorandum Circular No. 06 Series of 2006 on the adoption of IEE Checklist and IEE Report on the ECC processing of Categorized Final Disposal Facilities (sanitary landfill). Pursuant to this memorandum circular, the proposed SLF in Davao, being under Category 4, must undergo the IEE as contained and mandated through Presidential Decree 586. An IEE Report must be prepared by Davao City for submission to the DENR-EMB Regional Office and will be the basis for the issuance of an ECC for its SLF project.

C. On the Safe Closure and Rehabilitation of Existing Dumpsites in Sagay, Calbayog and Davao Cities

For Davao City, JICA may consider to add a study on the possibility of establishing a gas-to-energy facility in its disposal site at New Carmen, which may be classified as a possible Clean Development Mechanism (CDM) project.

Phase 2

A. On the Conduct of Training on Landfill Operation and Management for LGU Personnel

In particular for Sagay City, which has signified its intention to operate its own sanitary landfill, a training program for landfill operations maybe given to the City’s SWM personnel for such purpose. Davao City would also need the same kind of training considering that it has enough number of personnel for the operation of an SLF.

ATTACHMENTS

Attachment



List of Consultants

LIST OF CONSULTANTS WITH EXPERIENCE IN THE PLANNING, DESIGN AND OPERATION OF SANITARY LANDFILL / MRF

NAME OF FIRM	ADDRESS	CONTACT NOS.	FAX NOS.	EMAIL ADD./WEBSITE	CONTACT PERSON
A.L. Salazar Construction Inc.	Unit 1001 Annapolis Wilshire Plaza, #11 Annapolis St., Greenhills, San Juan	723-1378 / 721-1726	724-2389		Abelardo L. Salazar Chairman/President
Woodfields Consultants, Inc.	153 Kamias Rd., Ext., Kamias, Quezon City	436-7360/65 / 925-3621	436-7372	bussinessdev@wci.com.ph / www.wci.com.ph	Dr. Reynaldo R. Medina Director
Philippine Ecology Systems Corp.	136 Malakas Street, Diliman, Quezon City	925-3301 to 08 local 112	426-4267	phileco@speed.info.com.ph	Chito L. Nombres Vice President
Jaram Hauling Services	Litex Rd., Commonwealth, Quezon City	297-1760	297-2137	jaram_avelia_lipata@yahoo.com	Avelia T. Lipata Manager
TEST Consultants, Inc.	Room 304 A. DMSC Building, West cor. Quezon Ave., Quezon City	373-3234	373-0820	tesl@i-next.net	Rawlinson Dimayuga President
Vector Engineering, Inc.	90 General Luna St., Fort Bonifacio, Metro Manila	887-2564 local 145	887-2564		Fran Subagal General Manager
Lacto Asia Pacific Corporation	4000 Champaca Ext. St., UPS-IV, Brgy. Marcelo Green via West Service Road, Paranaque City	776-1511	824-7975	lapc@edsamail.com.ph	Lily Sianghio-Darroles Sales Manager
IPM Construction & Development Corporation	804 Ortigas Bldg., Ortigas Avenue, Pasig City	633-4372 / 75		contruction@ipmgroup.com.ph	Eisa Mercado President and CEO

NAME OF FIRM	ADDRESS	CONTACT NOS.	FAX NOS.	EMAIL ADD./WEBSITE	CONTACT PERSON
CEST Incorporated	Unit 1404 Prestige Tower Don Francisco Ortigas Jr Road, Ortigas Center, Pasig City	631-7520/21	631-3080	busdevl@cest-inc.com	Antonio U. Navarro President
SMEC International PTY, Ltd.	1606 the Orient Square Emerald Avenue, Ortigas Center, Pasig City	631-6497 631-8726	635-6676	smecphils@smec.com.ph	Connie Sayon
Sinclair Knight Merz (Phils.) Inc. (SKM)	35/F The Orient Square Bldg., Emerald Ave., Ortigas Center, Pasig City	638-3838	638-6605	www.skmconsulting.com	Yolanda Fernandez
Engineering and Development Corp. of the Philippines	7/F CLMC Bldg., 259-269 EDSA Greenhills, Mandaluyong City	723-9475 / 76	725-6277	consult@edcop.ph	Jose U. Jovellanos
SEA Consultants, Inc.	2/F Raja Sulayman Building, 108 Benavidez St., Legaspi Village, Makati City	815-8790 / 815-8798	815-6587	seacon@seaconsultants.com	Atty. Leopoldo E. San Buenaventura
ORIENT Integrated Development Consultants, Inc.		374-0757 / 374-0761	413-2326	oidci@orient.com.ph	Remy G. Esteban

Attachment **B**

Draft Project Framework

Draft Project Framework for the "Introduction of Suitable Solid Waste Management System in 3 Cities"

Goal:

Neighboring LGUs of the model cities adopt the solid waste management system introduced by the project.

Project Purpose:

Solid waste management system is improved in the model cities.

Outputs:

(Phase I)

1. Sanitary landfill plan is designed for Sagay and Calbayog Cities.
2. Safe closure and rehabilitation of existing dump sites in Sagay, Calbayog and Davao Cities are planned.

(Phase II)

3. Sanitary landfills are constructed in Sagay and Calbayog Cities.
4. Dump sites are safely closed.
5. Sanitary landfill is properly operated and maintained.

Activities:

(Phase I)

- 1-1. Conducted Feasibility Study on solid waste management in the model cities.
- 1-2. Formulate solid waste management plan in the model cities.
- 1-3. Conduct training for LGU personnel.
- 1-4. Conduct geological survey and measurement of proposed landfill sites in Calbayog and Sagay Cities
- 1-5. Draw basic design of sanitary landfills for the 2 cities
- 1-6. Conduct Environmental Impact Assessments.
- 1-7. Draw detailed design of sanitary landfill
- 1-8. Prepare bid documents for construction of sanitary landfill.
- 2-1. Conduct geological surveys and measurements in the existing dumpsites of the 3 model cities.
- 2-2. Formulate safe closure and rehabilitation plan of the existing dump sites.
- 2-3. Conduct environmental assessment of the existing sites.
- 2-4. Draw detailed design of safe closure of the existing sites.
- 2-5. Prepare bid documents for safe closure of the existing sites.

(Phase II)

- 3-1. Procure consultants for constructing new sanitary landfill sites.
- 3-2. Supervise construction of landfills.
- 4-1. Procure consultants for safe closure and rehabilitation of existing dump sites.
- 4-2. Supervise closure of the existing dump sites.
- 5-1. Operate and manage the new landfill sites.
- 5-2. Conduct training on landfill operation and management for LGU personnel
- 5-3. Produce manual for landfill operation and management.
- 5-4. Monitor landfill operation and management.

Attachment

Terms of Reference

SCOPE OF WORK

Preliminary Study for Solid Waste Management in 3 Cities: Sagay, Calbayog and Davao Cities

1. Background

The National Solid Waste Management Commission (NSWMC) is tasked to assist Local Government Units (LGUs) to develop an appropriate, viable and sustainable solid waste management system that may be adopted by cities and municipalities, in accordance with the provisions of the Ecological Solid Waste Management Act of 2000 (RA9003). With this mandate, the NSWMC in 2003 proposed to JICA the identification of cities / municipalities that would serve as models for waste management systems.

In JFY 2004, JICA conducted a Basic Study on the Selection of High Priority Cities / Municipalities for the Establishment of a Suitable Solid Waste Management System. NSWMC selected 31 cities / municipalities for the study which focused on four aspects, namely: Economic / Financial; Socio-Economic; Existing Solid Waste Management (SWM) system and local conditions; and Initiatives to promote the introduction of SWM facilities. The LGUs were evaluated for all the indices developed in accordance with the objectives of the study. The NSWMC in 2005 requested the Japanese Government for the provision of technical assistance to 3 LGUs proposed to be model cities / municipality. These are Sagay City, Negros Occidental; Calbayog City, Samar; and the Municipality of Rodriguez, Rizal. However, in June 2006, Rodriguez withdrew its request for technical assistance from JICA. NSWMC replaced this LGU with Davao City. Upon field visit in Davao City, JICA staff were informed that the LGU has applied for a loan with Land Bank for the construction of a sanitary landfill. Thus, Davao City requests that assistance be possibly focused in their equipment requirements, and capacity building in the operation and maintenance of the landfill and enhanced management capability in its solid waste management program.

For JFY 2006, JICA approved the request of NSWMC for Technical Cooperation for the Introduction of Suitable Solid Waste Management System in 3 Cities in the Philippines. JICA assistance would be in the form of a technical cooperation to provide capacity development for LGUs to manage and operate sanitary landfills. It is understood that the LGUs will be responsible in securing development loans for the infrastructure component from government banks, like the Land Bank and Development Bank of the Philippines. The Technical Cooperation of JICA for this project is proposed for a period of four (4) years for the establishment of a suitable solid waste management system for these model LGUs.

2. Objectives of the Study:

- 2.1 To conduct data gathering in Sagay, Calbayog and Davao Cities on their existing Solid Waste Management (SWM) system, socio-economic conditions and level of capacity in handling waste disposal.
- 2.2 To prepare rough cost estimates and financial analysis on the proposed sanitary landfills and material recovery facilities in the Sagay and Calbayog Cities.
- 2.3 To review capabilities of the 3 LGUs in the implementation of a solid waste management plan in compliance to RA 9003.

Since a Basic Study has been done earlier, this study will update available information based on the requirements set forth in Section 4 of this document. A Preparatory Study Team from Japan will use the output in coming up with the Final Project Framework.

3. Duration of the Study

The study will be conducted from November 15, 2006 to January 31, 2007.

4. Scope of the Study

Under the direction of JICA Philippines, the study will involve the following tasks:

4.1 Review of National Policies and Implementing Agencies:

- A. RA 9003 or The Ecological Solid Waste Management Act, and its requirements in relation to this study.
- B. Mandate and Current Activities of the National Solid Waste Management Commission
- C. Agencies responsible for medical, hazardous and toxic wastes. Cite agencies' mandate under existing laws.

4.2 Review of "Basic Study on the Selection of High Priority Cities/Municipalities for the Establishment of a Suitable Solid Waste Management System", JICA Study, 2004.

4.3 Data Gathering on the Existing and Planned Solid Waste Management System.

Prepare a questionnaire for LGUs to gather the following information. This instrument would form part of the Inception Report.

- 4.3.1 Compliance of LGUs to RA 9003 (e.g. waste segregation, recycling and composting)
- 4.3.2 Condition of existing dump or controlled dump site, land area, use of soil for cover during site visit.
- 4.3.3 Volume of garbage and frequency of disposal in the dumpsite
- 4.3.4 Recycling Market: Are recycling markets, formal or informal; transaction prices, amount and material flows.
- 4.3.5 Current methods of storing and discharging wastes
- 4.3.6 Areas and population served by collection service
- 4.3.7 Collection points: How to establish collection points, types of dustbins, transshipment methods at waste collection points, condition of collection by waste collectors. Show this in a map.
- 4.3.8 Method for vehicle operation management
- 4.3.9 Intermediate treatment methods (e.g. composting facility)
- 4.3.10 How the LGU s are coping with waste pickers: residential conditions and relationship with local community.
- 4.3.11 Number and condition of collection and disposal equipment

4.3.12 Outsourcing services to the private sector: Description of services and cost.

4.4 Conduct Capacity Assessment of LGUs on SWM System

1. Laws and Ordinances concerning SWM
2. Availability of Solid Waste Management Plans
3. Enforcement of Ordinances

4.5 Determine Awareness Level of LGUs on Proper SWM System.

Conduct interviews with the 3 LGUs and EMB Regional Offices to determine:

1. Waste awareness: Levels of public understanding of waste services, the practice of reduce, reuse and recycling methods.
2. Information, Education and Communication (IEC) campaign implemented
3. NGOs involved in waste management and their type of activities.

4.6 Review of the Functions of the Solid Waste Management Office in the 3 LGUs:

1. Organizational Structure of the LGU and Waste Management Office (Proposed Structure in their Solid Waste Management Plan, if any)
2. Decision making mechanism: Procurement of equipment, outsourcing contracts, personnel, location of sanitary landfill and other facilities.
3. Job description of personnel in charge of waste management in the 3 LGUs
4. Capacity-building requirements of LGU in planning, operation, and management of sanitary landfill in accordance with RA 9003.
5. Level of capacity of LGU in SWM Operation.
6. Number of permanent and contractual positions and their job descriptions.

4.7 Studies on the Proposed Sanitary Landfills for Calbayog and Sagay Cities

1. Calculate estimated project cost in the construction of sanitary landfills and material recovery facilities, using any of the following guidelines:
 - (i.) NSWMC Guidelines for 4 Categories of Waste Disposal
 - (ii.) Technical Guidebook on Solid Waste Disposal Design
 - (iii.) Other Guidelines used for similar projects (e.g. World Bank funded projects)
2. Study garbage collection fee, resale of scrap materials for recycling and tipping fee in the sanitary landfill.
3. Estimate the amounts of loan and LGU contribution for each year.
4. Compute Annual Debt Servicing Needs
5. Based on records from the Bureau of Local Government Finance, update data on LGUs net borrowing capacity
6. Estimate the project's operating cost requirements: operation of landfill, soil cover, manpower requirements, maintenance of equipment, among others.
7. Estimate the amount of revenues to be generated from the project
8. Compute Financial Viability Using Discounted Cash Flow Statement
9. Compute Financial Viability using Funds Flow Statement
10. Conduct sensitivity or risk analysis
11. Take into account Sagay City's plan to implement the project on an LGU cluster type basis.

4.8 EIA Requirements

Discuss Environmental Impact Assessment (EIA) process, timeline and its applicability to the subprojects. (See www.emb.gov.ph) Review JICA Guidelines for Environmental and Social Considerations to determine if all its requirements are covered under the Philippine EIA System. (See www.jica.go.jp)

4.9 Legal Procedures on Land Purchase, Expropriation and Compensation

4.10 Loan Procedures under the DBP and Land Bank

4.11 Other Donor's Assistance on Solid Waste Projects

1. Summary of Project Profiles
2. Lessons learned in past projects

4.12 Based on the findings of this study; provide comments and recommendations on the attached draft Project Framework.

4.13 List of local consultants with specialization or expertise in the planning, design and operation of a sanitary landfill.

5. Expected Qualifications of the Consultant

The study will be commissioned to a Consulting Firm that can provide the following personnel:

- (A). Solid Waste Management Specialist / Team Leader - preferably with adequate education in Environmental Planning, or Environmental Economics; with substantial experience as Team Leader in past projects; at least 10 years of relevant experience in planning and implementing solid waste projects and managing socio-economic surveys on local government infrastructure or environmental related projects; able to write reports and communicate in English and Pilipino; and willing to travel to areas targeted by the study.

Tasks:

- (a). Review "Basic Study on the Selection of High Priority Cities / Municipalities for the Establishment of a Suitable Solid Waste Management Study", JICA Study 2004
- (b). Prepare Institutional Analysis
- (c). Discuss the existing Solid Waste Management System
- (d). Discuss Capacity Assessment of the 3 LGUs
- (e). Conduct interviews to determine awareness level of the 3 LGUs on proper solid waste management program.
- (f). Discuss Status of Relevant organizations, and Local Resources available.
- (g). Other Donor's Assistance on Solid Waste Projects
- (h). Provide comments and recommendations on the Attached project Framework

- (B). Financial Analyst – preferably with advanced degree in Business Administration, Economics or related; with at least 10 years experience in financial planning and analyses of local government infrastructure projects.

Tasks:

- (a). Prepare Financial Analyses of the 2 subprojects, to determine its credit worthiness.
- (b). Discuss Loan Procedures under DBP and Land Bank

- (c). Sanitary Landfill Specialist - preferably with adequate education in Environmental Engineering or Environmental Science; at least 5 years of relevant experience in planning, design, and construction of sanitary landfill.

Tasks:

- (a). Prepare cost estimates in the construction of a sanitary landfill in Sagay and Calbayog Cities, using the NSWMC Guidelines, or the Technical Guidebook on Solid Waste Disposal, whichever is appropriate.
- (b). Discuss EIA process, timeline and its applicability to the subprojects.
- (c). Review JICA Guidelines for Environmental and Social Considerations to determine if all its requirements are covered under the Philippine EIA System.

6. Expected Manning Schedule:

Personnel	Nov. 15	Nov. 30	Dec. 1	Jan. 1-31
1. SWM Spec.				
2. S. Landfill Spec.				
3. Financial Analyst				

7. Schedule of Activities (Expected)

Personnel	Nov. 22	Dec 1 - 15	Dec. 30	Jan. 15 – 21 – 31
1. Inception Report				
2. Data Gathering				
3. Surveys				
4. Draft Reports				
5. JICA Comments				
6. Final Reports				

8. Reporting Requirements

The Consultant will be required to submit the following reports:

Required Report	No. of Copies	Target Date
Inception Report – containing, among others, the detailed study plan and methodology and the proposed format of the Study Report.	3	One week after Notice to Proceed
Draft Study Report – describing in detail the findings on each study item outlined in Item 5.	3	Two weeks before submission of Final Report
Final Study Report – incorporating the comments of JICA on the Draft Final Report	10	End of Contract January 31, 2007
CD – ROM	1	
Photo – documentation – photographs mounted on A4 paper and annexed to the Final Study Report	1	
Collected reference materials / documents	1	