

## **2 Profile of the Study Area**

### **2.1 National Waste Management Plan and Policy**

#### **2.1.1 The Ninth National Economic and Social Development Plan B.E. 2545-2549 (2002-2006)**

The National Economic and Social Development Board has implemented this plan since August 1999, opening up opportunities for broad participation of people from all layers of society in identifying a vision, direction, and framework, especially based on His Majesty the King's philosophy of "Sufficiency Economy", as the guiding principle of national development.

The Natural Resource and Environment Management Strategy takes into consideration the following four priorities:

- Upgrade the efficiency of natural resources and environmental management in support of conservation, and rehabilitation and development of the grassroots economy. To this end, existing mechanisms for natural resources and environmental management should be adjusted to emphasize local participation. Public awareness among Thai people regarding environmental quality, and implications for better quality of life, should be enhanced, together with more efficient enforcement of laws. Databases at the local level should be established to facilitate efficient monitoring and evaluation.
- For preservation and rehabilitation of natural resources, action should be taken to protect and demarcate preservation and conservation areas in order to maintain eco-system balance and promote land use consistent with capability and best use. A master plan for the rehabilitation of Thai coastal and marine environments should be formulated. Nationwide, natural resource strategies should stress preservation of bio-diversity, efficient utilization of water resources, and the restoration of soil fertility to support increased agricultural productivity, as well as support conservation, and improved economic utilization of energy.
- For rehabilitation and preservation of community surroundings, art and culture, as well as tourist attractions, to enhance the quality of life and the local economy, actions should be taken to preserve natural tourist attractions, local arts, and archeological sites in order to support sustainable development of tourism. Town planning should be used as a mechanism to coordinate environmental management in cities to achieve livable and viable cities.
- For efficient pollution abatement management conducive to the development of livable cities and communities, resources should be focused on development of waste disposal systems that are acceptable to communities. Pollution abatement requires strict law

enforcement, the adoption of appropriate technologies, and the upward adjustment of environmental standards to international levels.

### **2.1.2 National Environment Quality Control and Enhancement Policy B.E. 2540-2559 (1997-2016)**

The Office of Natural Resources and Environmental Policy and Planning in the Ministry of Natural Resources and Environment has provided the foresaid policy which has been approved by the Cabinet on November 26, 1996. The main targets of the policy can be summarized as four items as follows:

#### **Target Approach**

- To reduce or control the waste production by the people at a rate not exceeding 1.0 kilogram per person per day;
- To have waste utilization in Bangkok and communities throughout the country at a rate of not less than 15% of the waste quantity incurred;
- To get rid of uncollected waste in the municipal area, and for the area outside the municipality the uncollected waste must be not exceed 10% of the waste quantity incurred;
- To instruct every province to have a master plan and a sanitary waste and refuse disposal management plan for every municipality.

In order to achieve the above-mentioned targets, the Office of Natural Resources and Environmental Policy and Planning set several approaches in the policy that covered the scope of status, targeting, policy and execution approach for investment management, laws concerned and other supportive components, which could be described as follows:

#### **Policy and Execution Approach**

The Policy on Waste and Refuse Disposal and Protection is composed of the following:

- To provide sanitary waste and refuse management from storage to collection, transportation and disposal;
- To control the rate of waste produced by the people and to recycle it;
- To promote and support private sector involvement in co-investment, construction and/or management and operation of the waste and refuse management system;
- To encourage private organizations and non-government organizations to increasingly participate in solving waste and refuse problems.

For waste and refuse prevention and disposal, the policy has set the following four approaches:

### **Management Approach**

- To use the “Polluter Pays Principle (PPP)” against the people and government bodies who are waste and refuse producers or who conduct inappropriate waste and refuse management and cause damage to public health and the environment;
- To provide provincial waste and refuse management that is consistent with the integrated environmental quality management plan covering collection, transportation and disposal;
- To support private sector participation in waste and refuse collection, transportation and disposal services in the form of employment, joint ventures or concessions and/or management of the waste and refuse disposal system;
- To fix the organization and duties in the efficient control and supervision of waste and refuse management by the private and government sectors;
- To order the province to provide for appropriate land for long -term waste and refuse disposal and to fix the reserved land for waste disposal in the city plan;
- To establish a system where the producers are obligated to buy their waste products from the customers for disposal or recycling, and to identify the categories of the said products and their packaging to be refunded for the reduction of waste quantity;
- To continuously pursue, inspect and evaluate the status of waste and refuse management problems in communities and at the sources, and to develop a data system for waste and refuse management that is standardized and updated all the time including the establishment of a data coordination center for waste utilization.

### **Investment Approach**

- To invest in sanitary waste and refuse disposal plant construction and procure the appropriate machinery with joint investment between the government and private sectors or supporting wholly/partly the budget provided by the government to the local administrative body as the operator;
- To give investment promotion and incentives to the private sector and public organization involved in waste and refuse management including to bring the polluted waste for reuse without causing environmental problems;
- To establish a central waste and refuse disposal center to be jointly used among the communities in adjacent areas;

- To improve and recover unsanitary waste disposal plants located throughout the country based on the priority of important problems incurred;

#### **Legal Approach**

- To amend laws and regulations related to the fee rate of waste and refuse disposal management, and the fee rate of waste reduction and reuse;
- To issue a standard on waste disposal control as polluted sources to be controlled for polluted waste discharge in compliance with the said standard;
- To establish waste and refuse disposal plants as polluted sources to be controlled for polluted waste discharge in compliance with the said standard;
- To issue related regulations, standards, and laws as a mechanism to refund the product and package waste for its reuse and quantity reduction;
- To issue regulations involving the management of waste incurred from the construction of trains, buses and transport terminals including floating houses;
- To provide for a system of monitoring and inspecting the pollution status record from polluted sources by encouraging the private sector to play a larger role in inspection and encouraging the people to participate in the said system;

#### **Supportive Approach**

- To support the study, research and development of appropriate technology to solve problems and increase the productivity of waste and refuse management;
- To provide for training programs to increase the knowledge and experience in technical affairs and management skills of government and private offices that are involved in waste and refuse management;
- To support activities that will encourage the youth and general public to develop the right attitude and an interest in public cleanliness and proper waste and refuse management.

#### **2.1.3 Pollution Management Policy and Plan B.E. 2539-2549 (1996-2006)**

The Pollution Control Department in the Ministry of Natural Resources and Environment has provided for a framework and direction of pollution control including waste and refuse by analyzing the situation from the past until the present and to the future to determine the target for reducing and disposing of the polluted waste within the next ten years. The main content of the Policy and Plan can be summarized as follows;

### **Policy**

- To control the rate of waste production by the people;
- To support the budget, manpower and technical know-how in local areas in order to have sanitary waste and refuse management from storage to collection, transportation and disposal
- To encourage the private sector to co-invest in the construction and/or management and operation of waste and refuse management systems including waste utilization;
- To encourage private organizations and non-governmental organizations to play a larger role in solving waste and refuse problems;
- To support the enactment of rules, regulations and criteria on appropriate waste and refuse management for the concerned persons to comply with.

### **Target Approach**

- To have the waste production by the people at a rate not exceeding 1.0 kilogram per person per day by year 2001;
- To have the waste utilization in Bangkok and the communities throughout the country at a rate of not less than 10% and 15% of the waste quantity incurred by year 2001 and year 2006 respectively;
- To have the uncollected waste in municipal areas not exceeding 10% and 5% from the service of the municipality by year 2001 (NESDP No. 8) and year 2006 (NESDP No. 9) respectively, and for the Sub-district municipal area, not less than 20% and 10% by year 2001 and year 2006 respectively;
- To instruct every province to have a master plan and a land preparation plan for sanitary waste and refuse disposal by year 2001, and to have a sanitary waste and refuse disposal system covering not less than 50% of the total waste by year 2006.

#### **2.1.4 Draft National Waste Management Plan**

The Cabinet resolved on January 21, 2003 to agree with the Ministry of Natural Resources and Environment as the main planner. The planner would have public hearings with comments and recommendations as attached therein and submit them to the National Environment Board for approval.

The two objectives of the Draft of the National Waste Management Plan are as follows:

- (a) To have integrated sanitary waste management by the community and emphasize potential waste utilization as much as possible and the reduction of waste for disposal as little as possible by using a

management system that does not have an impact on the environment and people's quality of life;

- (b) To establish a waste management system that emphasizes participation from all sectors both government bodies (central, regional and local areas) and private bodies (non-government organizations and people). The arrangement has to be integral and positive outcome as most as practicable.

The four main targets of the plan are as follows:

- (a) To reduce waste production to a rate not exceeding 1 kg./person/day in Bangkok, Pattaya City and City Municipality; not exceeding 0.8 and 0.6 kg./person/day for Town Municipality and Sub-district Municipality; and not exceeding 0.4 kg./person/day for Tambol Administrative Organization by year 2006;
- (b) To reduce the uncollected waste to a rate not exceeding 5% of the total waste incurred in Bangkok, Pattaya City and Municipality; and not exceeding 10% of the total waste incurred in Tambol Administration Organization by year 2006;
- (c) To increase the waste utilization rate to not less than 30% of the total waste incurred by year 2006;
- (d) To support the establishment of central integrated waste management centers in not less than 50% of the total provinces by year 2006 and throughout the entire country by year 2011.

In order to achieve the above-mentioned objectives and targets, the Draft of the National Waste Management Plan set measures and actions. The measures and actions as determined in this Plan are the framework to be used for solving the overall integrated waste problems. It comprises phenomena from waste sources to final waste disposal. There are 11 steps divided into four measures: social, economic, legal and other supportive measures. These measures will only cover solving the waste management problems caused by the community, excluding the waste management problems caused by the industrial sectors.

Waste originating from communities will be classified into the following three types: (1) waste from communities such as organic waste, recyclable waste, and general waste; (2) hazardous waste; and (3) medical solid waste. The mentioned wastes originate from within the community such as from houses, offices, commercial areas, schools, hospitals, markets and tourist attractions, etc.

The measures and actions of the plan are divided into the following four categories:

**a. Social Measures and Actions**

Main measures:

- to encourage sellers of goods to participate in the reduction of packaging material;
- to encourage sellers of goods to participate in a refund system for packaging remains and defective products;
- to create a consumer attitude to use used or recycled products;
- to encourage people to separate waste at the source focusing on separating recyclable waste from general waste;
- to provide information and increase public knowledge concerning hazardous waste from the community.

Major Actions:

- The Thai Chamber of Commerce Council /Thai Industrial Council seeks cooperation from product sellers to minimize packaging material, and provide a suitable place for the system of waste separation and packaging refund;
- The Ministry of Commerce and the Ministry of Natural Resources and Environment launch a campaign to encourage people to use reused or recycled products, and the Ministry of Education provides for a study course in every educational institution in order to encourage students to use reused or recycled products.
- The Ministry of Natural Resources and Environment in cooperation with local administrative bodies launches a campaign for the people to separate waste before discharging and recycling.
- Local administrative bodies and the Ministry of Natural Resources and Environment provide media for the dissemination of information, campaigns and public relations to inform people about the separation of hazardous waste from general waste, and realize the importance of hazardous waste management.

**b. Economic Measures and Actions**

Main Measures:

- To increase tax for products and packaging to be hardly disposed;
- To increase the efficiency of waste collection and transportation in the community;
- To increase the efficiency of fee collection and cost management for waste collection and transportation

- To increase the capacity of local administrative bodies to carry out correct maintenance of waste treatment and disposal systems to achieve the highest benefit;
- To promote and support the establishment of hazardous waste management centers from the community in the regional parts of the country.

**Major Actions:**

- The Ministry of Finance in virtue of the Excise Tax Rate Act Year 1984 announces to increase tax for product and packaging to be hardly disposed;
- Local administrative bodies provide sufficient equipment for waste collection and transportation, consistent with the waste quantity incurred in the community, including the promotion of private sector participation in waste collection and transportation;
- Local administrative bodies improve the fee collection system in accordance with operating costs;
- The Office of Prime Minister (Office of Local Decentralization Commission) allocates budget to the local administrative bodies for the establishment of a central integrated waste management center, and encourages the private sector to operate the said system;
- Local administrative bodies encourage the private sector to invest and operate the integrated hazardous waste management center from the community at the regional level.

**c. Legal Measures and Actions**

**Main Measures:**

- To issue rules and regulations to control used materials/goods from abroad to be materials in production processes;
- To issue rules and regulations to create a mechanism for the refund of packaging remains and defective products;
- To issue rules and regulations for government bodies to procure products made from recyclable and degradable materials;
- To issue rules and regulations for people to separate waste, especially hazardous waste from the general waste;
- To determine standards and measures to control the operation of waste treatment and disposal plants.



**Major Actions:**

- The Ministry of Commerce in virtue of Goods Importation and Exportation Act Year B.E. 2522 (1979) issues the rules and regulations to control used materials/goods from abroad;
- The Ministry of Natural Resources and Environment in cooperation with the relevant bodies studies the impact from the issuance of rule and regulations to create a mechanism for the refund of packaging remains and defective products;
- The Office of Prime Minister (National Procurement Commission) determines the government body which is to use goods made from recyclable and degradable materials;
- The Ministry of Public Health in virtue of the Public Health Act Year 1992 issues the rules and regulations to separate community waste for the local administrative body to issue its own rules and regulations for the base of efficient waste management;
- The Ministry of Public Health insists that the Public Health Act B.E. 2535 (1992) be amended in regards to waste treatment and disposal in order to fix the technical criteria for waste treatment and disposal.

**d. Other Supportive Measures and Actions**

**Main Measures:**

- To promote and support research and development for goods
- To encourage product manufacturers and distributors to participate in the refund of packaging remains and degradable products;
- To increase the efficiency of waste collection and transportation in the community;
- To encourage local administrative bodies to provide hazardous waste collection and transportation services safely and correctly;
- To encourage every province to provide appropriate land for the construction of waste treatment and disposal systems.

**Major Actions:**

- The Office of Research Promotion Fund considered to support research and development for goods made from used materials especially;
- The Ministry of Commerce and other relevant organizations provided for the establishment of deposit and refund system for packaging remains and degradable products;

- The Ministry of Natural Resources and Environment provides training programs and seminars to the local administrative body in respect to proper waste collection and transportation;
- Local administrative bodies provide a hazardous waste collection system in the community separate from the general waste collection system;
- The Ministry of Natural Resources and Environment provides technical know-how to the local administrative body in order to evaluate and select appropriate land for the construction of waste treatment and disposal systems. However, the land as possessed by the government will be selected in the first priority.

## 2.2 Administration and Organization Concerned

According to the Constitution of Thailand B.E. 2540 (1997), Thailand is a state governing a democrat regime called a “Parliament System” and the King is under the law. The nation public administration of Thailand according to National Public Administration Act B.E. 2534 (1991) has 3 types as follows; (Figure 2-1).

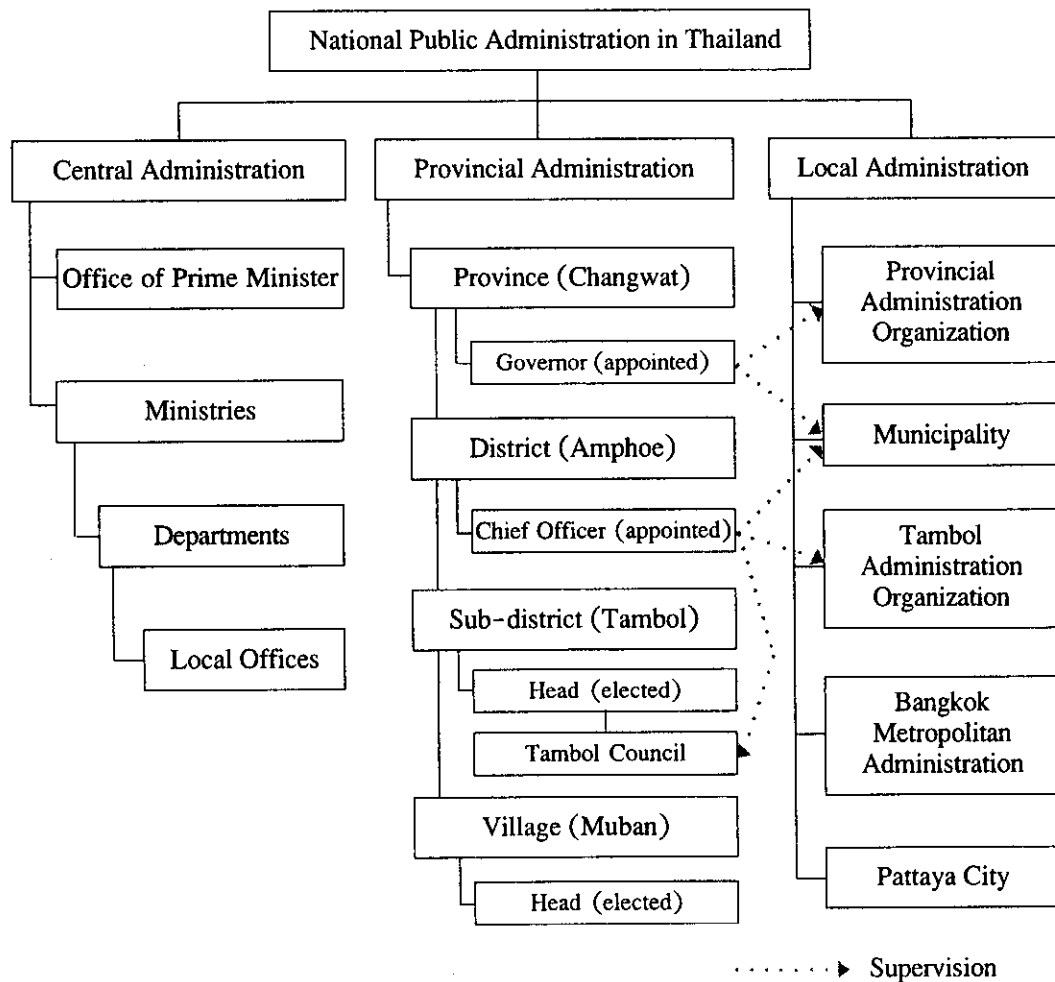


Figure 2-1: Structure of National Public Administration in Thailand

- Central Administration
- Provincial Administration
- Local Administration

These are further explained in the following sections.

### **2.2.1 Central Administration**

The central administration is under the concept of centralization by the government aiming at the application of national policies over the country and smooth implementation for policy accomplishment. At the time being, the central administration comprises 20 ministries and independent organizations having their offices in Bangkok.

### **2.2.2 Provincial Administration**

The provincial administration, under the basic concept of decentralization, is responsible for taking policies from the central administration to perform and to be representative of the central governments agencies. It has a hierarchical structure as in Figure 2-1.

According to National Public Administration Act B.E. 2534 (1991) and Local Administrative Act B.E. 2457, the provincial administration is divided into 4 categories as follows;

#### **1) Province (Changwat)**

A governor is appointed to each province by the central government. The governor is responsible for duties to accomplish the policies and orders from the government, ministries and departments in the suitable ways to the local people within the jurisdiction of the province and districts.

#### **2) District (Amphoe)**

Each province is divided into districts (Amphoe). The amphoe is a main government office at district level under provincial administration. The amphoe is headed by an Amphoe Chief Officer who is appointed by the central government and supervises the district officials.

The king amphoe is also a government office at district level under provincial administration headed by a king amphoe chief officer. The objectives to establish the king amphoe office is to render services thoroughly to the people in remote areas which is not ready to establish the amphoe office because of, for example, too small population or too small area. The provincial governor is authorized to set up king amphoe by proposing to the Interior Minister for cabinet's approval.

#### **3) Sub-district (Tambol)**

The tambol is a unit of provincial administration under the supervision of an amphoe or a king amphoe. As provided by the Local

Administrative Act B.E. 2457 (1914) a tambol composes of a cluster of more than 20 villages. It is established by the Interior Ministry's announcement. The elected leader of a sub-district is called Tambol Headman (Kamnan).

The administration body of tambol is the Tambol Council which headed by Tambol Headman as chairperson. The council is under the supervision of an Amphoe Chief Officer.

#### 4) Village (Muban)

The muban is the smallest structure of the provincial administration. The muban's head is elected by the villagers to be in charge of administrative duties in the village. According to the Local Administrative Act B.E. 2457 (1914), a muban is overseen by a muban headman with two assistants. A village have a Muban Committee as an advisory of a village. The committee is composed of head of village, his assistants and elected members from villagers.

Nowadays, Provincial Administration in Thailand is divided into 75 provinces, 795 districts, 81 sub-districts, 7,255 tambols and 7,865 villages.

### **2.2.3 Local Administration**

The local administration is based on the concept of decentralization according to the National Public Administration Act B.E. 2534 (1991) which stipulates that any area is ready for people participation in the local administration. There are 5 types of the local administration in Thailand today:

- Provincial Administration Organization (PAO)
- Municipality
- Tambol Administration Organization (TAO)
- Bangkok Metropolitan Administration (BMA)
- Pattaya City

The following explanation is prepared only for item 1-3 which directly concerned to the study.

#### **a. Provincial Administration Organization (PAO)**

The Provincial Administration Organization (PAO) is a local administration, commenced in Thailand since 1955. The PAO is established in all provinces in Thailand (except Bangkok). The PAO's responsible territory is same as province area. According to the Provincial Administration Organization Act, BE. 2540 (1997), the role and duties of PAO has been changed to emphatically act as development coordinator among local authorities in the province. According to the Provincial Administration Organization Act B.E. 2540 (1997), the PAO is composed of 2 main parts as below;

- The Provincial Council acts as a legislative body. Its members come from the election. Number of the Provincial Council member is totally depended on number of population in the province.
- The Provincial Executive Body, as an administrative body, is made up of one PAO chief executive and two to four PAO deputy chief executives.

The PAO's activities are governed by the Provincial Administration Organization Act. The organizational structure of a PAO is as follows;

- The office of the Permanent Secretary of the Provincial Administration Organization is responsible for general clerical works and personnel management
- Other divisions set up by the PAO are responsible for the specialized activities that do not involve PAO administrative work.

The main responsibilities of the PAO according to the section 45 of the Provincial Administration Organization Act B.E. 2540 (1997) are as follow;

- 1) to formulate the provincial development plan;
- 2) to enact provincial ordinances;
- 3) to support sub-district councils and local authorities in the province for local development;
- 4) to coordinate and cooperate with sub-district councils and other local authorities;
- 5) to allocate the PAO's budget to sub-district councils and other local authorities in the province;
- 6) to perform role and duties of PAO in accordance with Provincial Administration Act B.E. 2498 (1955) in sub-district councils only;
- 7) to conserved natural resources and environment;
- 8) to preserve and promote local art, local wisdom and culture;
- 9) to do any activity under the powers and duties of the local administrative body in PAO area and such activity is reasonable for local administrative body to jointly operate with or to give PAO do it as determined by the Ministerial Regulations;
- 10) to do other activity that specified by law as the powers and duties of PAO.

Section 17 of the Act for Determining the Plan and Procedure of Decentralization to Local Administrative Body B.E. 2542 (1999) says that subject to Section 16, PAO can arrange the public service system for the public interest in its own area, such as (11) dispose of waste and refuse; (12) manage the environment and pollution (24) do any activity under the powers and duties of the local administrative body in PAO area and such activity is reasonable for such local

administrative body to jointly operate with or to give PAO do it as determined by the Announcement of the Local Decentralization Commission.

Furthermore, under Section 20 of the same Act, it specifies that in case the local administrative body has the power and duty to do the same or similar public service, the said Announcement will determine which local administrative body has the power and duty to do such an activity and how much power and duty to do such activity.

At the time being, the central government is performing decentralization policy by transferring power, duties and revenue to local authorities in accordance with Act for Determining the Plan and Procedure of Decentralization to Local Administrative Body B.E. 2542 (1999). This main task is responsible by the Local Decentralization Commission. The said Commission has the following powers and duties (Section 12 and 13)

- to do local decentralization plan and action plan for approval by the Cabinet and for report to the Parliament;
- to determine the public service system under powers and duties between the states and the local administrative body and among the local administrative bodies;
- to adjust the proportion of tax and duty and revenue between the state and the local administrative body and among the local administrative bodies with regard to burden of the state and the local administrative bodies;
- to determine criteria and procedures for transferring activities from the control administrative body and the regional administrative body to the local administrative body;
- to coordinate the transfer of civil servants and state enterprise officers between the government state enterprise and local administrative body with the Commission, local administrative office or any other related body to be consistent with the determination of powers and duties for tax and duty allocation, supporting money and budget as transferred from the central administrative body to the local administrative body and transfer of activity under (2) (3) and (4);
- to recommend to the Cabinet to have decentralization of approval or permission as specified by the laws to the local administrative body with regard to convenience and rapid in giving services to the people and supervise to comply with the laws;
- to recommend the measures of finance, taxation, budgeting and maintaining discipline of finance for the local administrative body;
- to recommend issuance of the Act, Royal Decree, Ministerial Regulation, announcement and instruction as necessary to comply with the local decentralization plan to the Cabinet;

- to recommend to the Cabinet in budget allocation as increased to the local administrative body owing to transfer of activity from the central administrative body;
- to consider criteria of supporting money allocation to the local administrative body upon its necessity;
- to recommend and set up the audit system and public participation in the local administrative body;
- to make a proposal to the Prime Minister for his consideration and command in case it appears that the government body or state enterprise does not comply with the local decentralization plan;
- to propose report of local decentralization to the Cabinet at least once a year;
- to issue the announcement as determined in this Act;
- to do any other act as specified in this Act or other laws;
- to appoint the committee to do any act as assigned by the Commission.

The Office of Local Decentralization Commission in the Office of Prime Minister's Secretary Permanent will have the following powers and duties: (Section15)

- to be responsible for the Commission's general affairs;
- to collect data, study and analyze the local decentralization and data related to the Commission;
- to cooperate and coordinate with the central administrative body, the regional administrative body, the local administrative body and the states enterprise to comply with this act;
- to pursue and evaluate performance as assigned by the Commission
- to do any other duties as required by the laws or assigned by the Commission.

#### **b. Municipality**

A Municipality is a local administration, established in prosperous communities in Thailand since 1933. The Municipality Act B.E. 2496 (1953) divides municipalities into three types according to its size as described below.

##### **1) Sub-district Municipality (Tambol Municipality)**

The Sub-district Municipality is the smallest municipality in Thailand. The Interior Ministry defines its criteria as follows:

- Actual revenue, excluding state subsidy, amounts to more than Baht 12,000,000;

- Population more than 7,000; and
- Population density of over 1,500 per 1 sq.km.

**2) *Town Municipality (Muang Municipality)***

The Town Municipality is established where a city hall is located or an area which has more than 10,000 inhabitants and a population density of over 3,000 per 1 sq.km.

**3) *City Municipality (Nakhon Municipality)***

The City Municipality is established in large community areas, with more than 50,000 inhabitants and a population density of over 3,000 per 1 sq.km.

**4) *Structure of Municipalities***

Regardless of the type, the municipalities have a similar structure comprising the following two main bodies:

- The Municipality's Council, as a legislative body, is responsible for monitoring and examining the administrative body. Its members are elected.
- Municipal Councilors, as an administrative body, are elected from the members of the Municipality's Council.

The administration of a municipality by the Municipal Councilors is under the supervision of the district chief officer and the governor.

**5) *Power and Duties of Municipalities***

The power and duties of all three forms of municipalities are clearly defined in the Municipal Administration Act, B.E. 2496 (1953). In the law, there are both compulsory duties that a municipality must render and optional duties that they can choose to perform. In the case of Sub-district Municipalities, the law stipulates that these municipalities must provide the following public services:

- Maintain public peace
- Maintain roads and waterways
- Keep roads, path-ways, and public places clean; and collect and dispose of refuse and garbage
- Prevent and suppress communicable diseases
- Provide fire engines and accessories
- Provide for local education and training

In the case of Town Municipalities, apart from the above-mentioned duties, these municipalities must provide the following additional services:



- Provide for clean water or water works
- Provide for abattoirs
- Provide medical services
- Provide and maintain drainage
- Provide and maintain public lavatories
- Provide and maintain electric works or other lighting

For City Municipalities, apart from all the above-mentioned duties for Sub-district Municipalities and Town Municipalities, these municipalities must provide the two additional services below:

- Provide child and mother welfare services
- Provide other services necessary to preserve public health

**c. Tambol Administration Organization (TAO)**

A TAO is a local administration at the countryside level and its structure is similar to that of a municipality, consisting of the following legislative and administrative bodies:

- TAO's council, as a legislative body, comprises two types of members. One is the head of the sub-district or villages under the TAO's administration. The other is elected village representatives.
- TAO's committees are elected by and from TAO's council members with the nomination from the district chief officer to act for the administrative body.

At present, local administration in Thailand comprises of 75 Provincial Administration Organizations (PAO), 1,129 Municipalities (20 City Municipalities, 84 Town Municipalities and 1,025 Sub-district Municipalities), 6,744 Tambol Administration Organizations (TAO), 214 Tambol Councils, and 2 Special Local Administrative Bodies (Bangkok Metropolis and Pattaya)

From the public administration as described above, Provincial Administration is responsible for its own activity within its region and is a representative of the central government and provides public services, for example: police, public health, etc. However, the Local Administration is responsible for its own jurisdiction and community that it can know and can take best self-administration.

Furthermore, the executive officers as appointed by the central government (Provincial Governor and Sheriff) play a vital role in regulating the local administrations above from a responsibility of its own regional administration.

Waste management in the community and public places will be undertaken by the local administrative body under the supervision of the Ministry of Interior. Besides, the Ministry of Public Health is also responsible for specially issuing the rules and regulations with recommendations on waste management.

## **2.2.4 Planning and Policy Maker Level**

### **2.2.4.1 National Environment Board**

The National Environment Board has the following duties:

- to determine the environmental quality standard;
- to recommend the plan, policy, measures, rules and regulations on the environment to the Prime Minister and the Cabinet;
- to regulate the management of the Environment Fund.

### **2.2.4.2 Pollution Control Commission**

The Pollution Control Commission has the following duties:

- to recommend a plan for protection against or a solution to the rapidly increasing pollution;
- to recommend amendments to laws and regulations related to controlling, protecting and reducing pollution, and the investment promotion measures of the private sector ;and to recommend a fee rate for waste disposal to the National Environment Board;
- to recommend a standard for pollution control from the source to the minister and to determine the features of hazardous waste;
- to coordinate government agencies, state enterprises and the private sector for protection against and the control and reduction of pollution.

### **2.2.4.3 Public Health Commission**

The Public health Commission has the following duties:

- to recommend policy, plans and measures on public health to the minister;
- to recommend amendments to laws and regulations to the minister and Local Administrative Body, and to consult with the local officer regarding the enforcement the law;
- to control and examine the law enforcement of the government agency who is responsible for public health and report to the minister, including coordination between the government agency and the Local Administrative Body for law enforcement.

### **2.2.4.4 Ministry of Interior**

The government agencies in charge of supporting and controlling the Local Administrative Body are the Ministry of Interior (by the minister himself), the Office of Permanent

Secretary to the Ministry of Interior, and the Department of Local Administration. In practical terms, they play a role in all local administrative bodies other than Bangkok Metropolis.

#### **2.2.4.5 Ministry of Public Health**

The agencies under the Ministry of Public Health that are in charge of waste disposal management are the following;

##### **a. Department of Public Health Services**

The Medical Registration Division is responsible for consideration and approval of applications for the establishment of hospitals and medical clinics, and for inspection and monitoring of their activities to ensure they comply with the Medical Clinic Act B.E. 2504 (1961).

##### **b. Department of Health**

The Environmental Health Division has the following powers and duties:

- to develop the mechanism and implementation of environmental technology and methods for the purpose of community public health;
- to provide a knowledge base and technology related to health;
- to promote and strengthen cooperation at every level for the sake of environmental management for public health;
- to cooperate with or support other relevant or assigned organizations.

The Environmental Health Division has policy and measures to control the source of pollution under the Public Health Act B.E. 2535 (1992), such as to control the pollution sources of communities, tourist attractions, industrial areas, and other commercial activities which cause danger to public health including other nuisance activities by recording; providing standard disposal management; and to promote law and regulation enforcement, promote local participation both in terms of performance and upgrading capability with integrating components and knowledge base concerned other concerns is opinion exchange are cooperation from people which can be implemented through public relation and other media.

#### **2.2.4.6 Ministry of Natural Resources and Environment**

There are four agencies under the Ministry of Natural Resources and Environment that are concerned with waste management. The for agencies are described as follows;

**a. Office of Natural Resources and Environmental Policy and Planning (ONEP)**

The agency has the following powers and duties:

- to provide national environment quality control and enhancement policy and plans in compliance with other national policy, including the monitoring and evaluating of it;
- to coordinate and implement the environmental management plan in compliance with the law on national environment quality control and enhancement;
- to carry out monitoring and inspections to prepare a report on the environmental quality situation;
- to implement natural resources management in compliance with the national environment quality control and enhancement plan and policy, national economic and social development plan, and environmental quality management plan;
- to arrange the analysis of the environmental impact arising from an activity or project of the state sector and private sector which affects environmental quality;
- to fix coordination of cooperation in international environment activity;
- to recommend policy and coordination of cooperation in international environment activity, and to raise fund for environment fund under the law on national environment quality control and enhancement;
- to arrange and coordinate on environmental issues in regional area;
- to any other act as required by the law.

**b. Pollution Control Department (PCD)**

The agency has the following powers and duties:

- to give opinions on national environment quality control and enhancement policy and planning in regards to pollution control;
- to make recommendations in the determination of environmental quality standards and polluted source control standards;
- to provide an environmental quality management plan and the measures in control, prevention, and solution of

the environmental problems caused by polluted circumstances;

- to monitor, inspect and make reports on the pollution situation;
- to develop an appropriate system, form and method for the systems to be applied to quality management of water, noise level, air, hazardous waste and unused remains;
- to undertake actions under the law on national environment quality control and enhancement in part of pollution control;
- to undertake actions involving complaints on pollution;
- to do any other act as required by the law.

**c. Department of Environmental Quality Promotion**

The agency has the following powers and duties:

- to promote, disseminate and make public relations on environmental aspects;
- to collect, provide, give service of data on information technology as the environmental information technology center;
- to give knowledge on environmental aspects to the state and private sectors;
- to do any other act as required by the law.

**d. Department of Underground Water Resources**

The major body in charge is the Underground Water Resources Preservation and Rehabilitation Bureau. Its powers and duties are as follows:

- to recommend measures on underground water resources preservation and rehabilitation management;
- to monitor the reserved level and quality of underground water;
- to protect and solve critical problems with underground water and impact on underground water and the environment;
- to study and research the preservation and rehabilitation of underground water resources;
- to inspect and analyze water quality for agricultural and industrial uses;

- to cooperate in or support the performance of other relevant or assigned organizations.

#### **2.2.4.7 Ministry of Industry**

The Department of Industrial Works (DIW) under the Ministry of Industry has full responsibility of industrial waste both hazardous and non-hazardous industrial wastes. The main responsible body of DIW in this field is the Industrial Environment Technology Bureau. Its powers and duties are as follows:

- to establish policy, plans, criteria, and standards on the industrial environment
- to support industrial operators in industrial environment technology and management, treatment and disposal of all kinds of wastes from factory including supplying water for industrial needs;
- to study, develop, and undertake on industrial waste center, industrial remains improvement and rehabilitation of contaminated area, industrial operation, utilization and treatment system, protection and solution of industrial environment problem arising from industrial operation;
- to analyze and test for toxic and hazardous materials;
- to consider and approve industrial management;
- to study and determine the usage of measures on environmental economics;
- to manage registration, study, inspect, control and supervise pollution treatment systems and the private sector's waste analysis laboratory;
- to contact and coordinate for industrial environment cooperation with environmental bodies both domestically and internationally in order to reduce the impact and other relevant trade barriers issues with reason of environment;
- to cooperate in and support the performance of other relevant and assigned organizations.

#### **2.2.5 Operation Level**

The operating organization and a responsible body for special areas are operation-level body to render services of waste management within each area. They are described as follows:

##### **2.2.5.1 Hospitals and Medical Clinics**

There are many hospitals and medical clinics located within each province, and owned by the States and private persons and

controlled by the Department of Communicable Disease Control or the Department of Medical Services.

Furthermore, the government is still in charge of controlling the business operation of private medical clinics by the Medical Registration Division of the Health Service Support Department.

Presently, all hospitals and medical clinics discharge both general waste and medical solid waste. Formerly, there was just a small amount of medical solid waste and some local administrative bodies could collect and mix it with the general waste on the ground. Some hospitals had waste storage facilities and burnt it within their own areas. Nowadays, the quantities of medical solid waste, the density of communities and the risk of scattered disease have been increasing a lot in Bangkok and other big communities. As a result, the Minister of Public Health has a policy to allocate a budget for constructing a small incinerator to all states hospitals. The incinerators have been built at all hospitals and used by them.

#### **2.2.5.2 Industrial Estate**

Presently, the industrial estate is under the control of the Industrial Estate Authority of Thailand (IEAT). In each industrial estate the waste management is the responsibility of the Public Utilities Unit, one of four units of IEAT. The other three units are (1) General Service Unit; (2) Finance and Accountancy Unit; and (3) Business Operation Control Unit. However, the waste disposal of IEAT was not good and lacked efficiency because its staff did not have adequate knowledge and expertise in disposing of the waste.

#### **2.2.5.3 Important Tourist Attractions**

Tourist attractions will be one of the main generation sources of waste and will cause big problems in sanitation, environmental maintenance and the promotion of tourism if there is no preparation to confront such problems efficiently and systematically. Almost all tourist attractions are within the boundary of the local administrative bodies, but some are outside the said boundary such as, national parks, which are under the control of the Department of National Park, Wildlife and Plant, historical or cultural places, which are under the control of the Department of Fine Arts, etc. Presently, tourist attractions located in the jurisdiction of a local administration can either contact it to collect the waste or manage the waste by itself. In the case of a tourist attraction not within the jurisdiction of a local administration, it can dig a hole and dump the waste into it or burn it if it is inconvenient for a local administrative body to collect the waste.

However, there are an increasing number of tourists who visit or travel to the said places and the quantity of waste is also rapidly increasing. As a result, the said disposal is not hygienic and is more apt to have an effect on public health and the environment.

#### **2.2.5.4 Local Administration**

The key body that is mainly responsible for community waste management is local administration. There are the following five types of local administrations in Thailand:

- Provincial Administration Organization
- Municipality
- Tambol Administration Organization
- Bangkok Metropolitan Administration
- Pattaya City

In this report, the first three types which are related to the project will be described as follows:

##### **a. Provincial Administration Organization (PAO)**

Under the Section 45 of Provincial Administrative Organization Act B.E. 2540 (1997), it specifies that PAO has powers and duties to do activities within its own boundary such as, (6) the province's powers and duties under the Provincial Administration Act B.E 2498 (1955) particularly within the area of Tambol Council (including providing and maintaining the sewers; cleaning the streets, waterways, walkways and public places; and disposing of the waste and refuse within the PAO boundary) and such activity is reasonable for other local administrative body to jointly operate with PAO or to give PAO to do it as required by the Ministerial Regulation (including providing and maintaining the sewers; cleaning the streets, waterways, walkways, and public places; and disposing of waste and refuse.

##### **b. Municipality**

According to the Municipality Act B.E. 2496 (1953), municipalities are divided into the following three (3) categories:

- **Sub- district Municipality.** Under Section 50 (3) of this Act, it specifies that subject to the laws, the Sub- district Municipality has duties to maintain the cleanliness of the roads, walkways or public places including disposal of the waste and refuse within its own boundary.
- **Town Municipality.** Under Section 53 (1) of the same Act, it says that subject to the laws, the Town Municipality has duties to do activities as specified in Section 50 such as, maintain the cleanliness of roads,



walkways and public places including the disposal of the waste and refuse within its own boundary;

- **City Municipality.** Under Section 56 (1) of the said Act, it specifies that subject to the laws, the City Municipality has duties to do activities as mentioned in section 53 such as, maintain the cleanliness of roads, walkways and public places including the disposal of the waste and refuse within its own boundary.

**c. Tambol Administration Organization (TAO)**

Under the Tambol Council and Tambol Administrative Organization Act B.E. 2537 (1994), TAO is divided into the following two (2) categories:

- **Tambol Council:** Under Section 23(3) of the same Act, it specifies that subject to the laws, the Tambol Council has duties to maintain the cleanliness of roads, waterways, walkways and public places including the disposal of the waste and refuse within its own boundary;
- **Tambol Administration Organization:** Under Section 67 (2) of this Act, it says that subject to the laws, TAO has duties to maintain the cleanliness of roads, waterways, walkways and public places including the disposal of the waste and refuse within its own boundary.

In conclusion, the organization or bodies as mentioned above are deemed as important organizations in the network of domestic waste management system. Each organization constitutes a part of this system. Some organizations are responsible for waste operation and some for waste policy, planning, control, supervision and support. After joint among the said organizations, the waste management will become efficient and unified. The operating organization will increasingly need the assistance and support from the central administrative body in case they have no capacity to do it.

All organizations in the network shall have the same understanding among them. In case of inconsistency, the National Environment Board is presided by the Prime Minister shall coordinate the understanding and agreement of the role of each organization.

## **2.3 Law on Waste Management**

### **2.3.1 Laws Involving Control, Prevention and Solution of Waste Pollution**

Formerly, there were many laws which had some provisions related to waste management because of a lack of integrated laws directly involved with control, prevention and solution of waste pollution. Since 1991, almost all of such laws have been modified or amended to directly manage all aspects of waste pollution as shown in Table 2-1.

Table 2-1: Laws Involving Control, Prevention or Solving of  
Waste Pollution

Item	Name of Law	Waste	
		On land	In water
1	Canal Maintenance Act of Ratanakosin Era 121		x
2	Internal Water Navigation Act B.E. 2456 (1913)		x
3	Civil and Commercial Code	x	
4	Royal Irrigation Act B.E. 2456 (1913)		x
5	Fishery Act B.E. 2490 (1947)		x
6	Penal Code	x	x
7	Mineral Act B.E. 2510 (1967)	x	x
8	Petroleum Act B.E. 2514 (1971)	x	x
9	National Executive Council Announcement No. 68 B.E. 2515 (1972); Control of Ship Anchorage alongside the Canal		x
10	Land Allocation Act B.E. 2543 (2000)	x	
11	Building Control Act B.E. 2522 (1979)	x	
12	Water Supply Canal Maintenance Act B.E. 2526 (1983)		x
13	Public Health Act B.E. 2535 (1992)	x	x
14	Public Cleanliness and Orderliness Act B.E. 2535 (1992)	x	x
15	Factory Act B.E. 2535 (1992)	x	x
16	National Environment Quality Control and Enhancement Act B.E. 2535 (1992)	x	x
17	Highway Act B.E. 2535 (1992)	x	

Remark: "x" means the law related to waster management inland or waterway.

**1) Canal Maintenance Act of Ratanakosin Era 121**

This Act was provided for canal maintenance and usage. Any person who discharges waste into or causes damage to the canal will be punished.

**2) Internal Water Navigation Act B.E. 2456 (1913)**

This Act was provided for control of internal water navigation. Building construction over public waters will be prohibited unless permission is obtained from the Department of Water Transport and Maritime, and the owner of such building will pay high fees for the said permission. Any person who throws or causes damage to the waterway will be punished.

**3) Civil and Commercial Code**

This Code was provided for the control of the relationships between private and private, from birth to death. This code prohibits any person to dig a pit for waste within 2 meters from a boundary line of the land.

**4) Royal Irrigation Act B.E. 2456 (1913)**

This Act was provided for the control and prevention of royal irrigation that was made by The Royal Irrigation Department. This Act prohibited any person to discharge waste, carcasses, charcoal or dirt in an irrigation waterway.

**5) Fishery Act B.E. 2490 (1947)**

This Act was provided for fishing control and water animal conservation. This discharge of a toxic object into fishing resources or the use of electricity or explosives for fishing is prohibited and will be punished. From the end of year 1991, prawn farmers will register their farms with the fishery official and prawn farmers with farms of more than 50 rais will be provided wastewater treatment not less than 10 % of the total farm area and its biochemical oxygen demand not more than 10 mg./l.

**6) Penal Code**

This Code was provided for the preservation of public order or social order and has a punishment for anyone who dumps a carcass on the public-way.

**7) Mineral Act B.E. 2510 (1967)**

This Act was provided for the control of mineral exploration and mining. All persons are prohibited from mining within 50 meters of public waterways and a concessionaire who releases the waste incurred from mining in a place outside the mining area will be punished both in fine and imprisonment.

**8) Petroleum Act B.E. 2514 (1971)**

This Act was provided to control the impact of petroleum exploration and drilling on the environment. It prohibits a concessionaire from polluting with oil, mud or any other substance.

**9) National Executive Council Announcement No. 68 B.E. 2515 (1972); Control of Ship Anchorage alongside the Canal**

This law was provided for the control of ship anchorage alongside the canal and for the prevention of dumping waste or dirt from ships into canal. It determines the anchoring line and sets the method for how to anchor a ship.

**10) Land Allocation Act B.E. 2543 (2000)**

This Act was provided for land allocation and repealed the National Executive Council Announcement NO. 286 B.E. 2515 (1972) but all Ministerial Regulations and ordinances as issued under the said law which are not conflict with this Act shall still be in effect until issuance of new regulations and ordinances. Now there is an ordinance of land allocation to enforce the land allocation operator to provide for the area without the waste by showing details of waste management and disposal and propose to the Land Allocation Commission for consideration as appropriate.

**11) Building Control Act B.E. 2522 (1979)**

This Act was provided for control of the building construction, adaptation, removal, mobilization and usage and repealed the Building Control Act B.E. 2479 (1936). But all Ministerial Regulations, local regulations and orders as issued under the former Act will still be in effect except they are contrary to this Act. Now there is the Ministerial Regulation No. 33 B.E. 2535 (1992) to determine the high building or special huge building to have collection of waste by the way of carriage or dumping into the waste hole.

**12) Water Supply Canal Maintenance Act B.E. 2526 (1983)**

This Act was provided for water supply canal maintenance and prohibited the dumping of carcasses, waste, or dirt into a water supply canal.

**13) Public Health Act B.E. 2535 (1992)**

This Act was provided for public health control and repealed the Public Health Act B.E. 2484 (1941) and the Act for Control of Excrement Usage to be Fertilizer B.E. 2480 (1937). But all Ministerial Regulations and local regulations or orders as issued under the former Acts will still be in effect except if they are contrary to the Act.

The main objectives of this Act are:

- To establish Public Health Commission and fix its powers and duties, such as, to determine policy, plans and measures on public health, supervise and enforce to comply with this Act;
- To fix the authority's powers not allow any person to cause nuisance in private or public places, solve nuisance's problem, including maintain roads, land ways, waterways, canals and any other place without nuisance's problem;
- To fix any activity dangerous to health to be controlled;

- To fix establishment of markets, stands, food or ice cube businesses and vender to be obtained licenses from the local authority with conditions to maintain cleanliness and collect and dispose the waste.

#### **14) Public Cleanliness and Orderliness Act B.E. 2535 (1992)**

This Act was provided for control of public cleanliness and orderliness and repealed the Public Cleanliness and Orderliness Act B.E. 2503 (1960). But all Ministerial Regulations, local regulations and orders as issued under the former Act will still be in effect except if they are contrary to this Act. This Act has been enforceable in the Municipality, Bangkok Metropolis and Pattaya City. Any other local administrative organization will be applied this Act upon issuance of Notification of Interior Ministry and published in the Royal Gazette. All persons are prohibited from dumping waste or refuse in public places.

#### **15) Factory Act Year B.E. 2535 (1992)**

This Act was provided for the control of factories and their operation. This Act repealed the Factory Act B.E. 2512 (1969) but all Ministerial Regulations, local regulations and orders as issued under the former Act will still be in effect except if they are contrary to this Act. This Act compelled factory owners to dispose of their waste, otherwise they will be punished both in fine and imprisonment.

#### **16) National Environment Quality Control and Enhancement Act B.E. 2535 (1992)**

This Act was provided to control and solve environmental problems. This Act repealed the National Environment Quality Control and Enhancement Act B.E. 2535 (1992) but all Ministerial Regulations, local regulations and orders as issued under the former Act will still be in effect except if they are contrary to this Act.

The details of this Act are as follows:

- To promote public and private organization participation in environmental quality control and enhancement;
- To set up an environmental management system in compliance with the principle of environmental quality management;
- To determine the powers and duties of the government body, state enterprise and local administrative body to cooperate and have joint duties in environmental quality control and enhancement, and to determine practical way that any organization is not directly responsible for.

- To determine the control measures with providing waste air treatment system, wastewater treatment system, waste disposal system and equipment and tools to solve pollution's problems
- To clearly determine the duty and responsibility of the involved person who causes the pollution
- To determine the promotion measures on the Environment Fund and assistances for incentives in performing the duties of the environmental quality enhancement. This Act also specifies the waste collection, transportation and management in any aspects such as separation, recycling etc. for treatment and disposal of solid waste and any other polluted waste in compliance with the law involved, the Public Health Act B.E. 2535 (1992) in part of solid waste.

#### **17) Highway Act B.E. 2535 (1992)**

This Act was provided for control of highway construction and maintenance and repealed the National Executive Council Announcement No. 295 B.E. 2515 (1972) but all Ministerial Regulations as issued under the former law will still be in effect except if they are contrary to this Act. This Act prohibited the discharging of waste, refuse and anything else on highways or do any act that will result in the discharging of waste and refuse in the way of traffic.

#### **2.3.2 The laws concerning method of investment and operation of waste management system**

##### **1) Investment and operation of waste management system by bureau agency**

The organization which has the powers and responsibility to manage solid waste is the bureau agency by itself investment and management or the other organization's investment and management for example; the municipalities or provincial administrative organization which manage to solid waste.

##### **a. Investment, operation of waste management system may be out of its own district.**

###### ***In case of Municipality:***

The Municipalities Act B.E 2496 (1953), Section 57 determines that "municipalities may manage solid waste out of own district provided that;

- it is necessary and relevant to its own normal management
- consent is obtained from the Council of Municipalities, the Council of Province, the Council of Tambol
- approval is obtained from the Minister of Interior."

***In case of Tambol Administration Organization:***

The Council of Tambol and Tambol Administration Organization Act B.E 2537 (1994) Section 73 specifies that “Tambol Administration Organization may manage solid waste out of its own district if it obtains consent from the Council of Tambol or the relevant local administrative organization and it is necessary and relevant to its own normal management.”

***In case of Provincial Administration Organization:***

The Provincial Administration Organization Act B.E. 2540 (1997) Section 46 specifies that “Provincial Administration Organization may manage solid waste out of its own district if it obtains consent from the relevant local administrative organization, according to the ministerial regulation.”

- b. The Investment and operation of waste management system may be done in coordination with the Bureau Agency and/or the State Enterprise**

***In case of Municipality:***

The Municipalities Act B.E 2496 (1953), Section 58 determines that “If any management is under the responsibility of two (or more than that) organizations, it should establish an organization called a “Syndicate”. Its status is Political Body, component with the representative of the relevant municipalities, besides the “Syndicate” is established and cancel with the Royal Decree. And section 59 “Syndicate will be supported of the finance from the government and may borrow by issuance the state bond or loan.”

***In case of Tambol Administration Organization:***

According to the Council of Tambol and Tambol Administration Organization Act B.E. 2537 (1994) Section 73, “Tambol Administration Organization may coordinate with the Tambol Council, Provincial Administration Organization or the relevant of local administrative organization in this management.”

The Industrial Authority of Thailand, according to The Industrial Authority of Thailand Act B.E. 2522 (1979) section 6 (5) “The Industrial Authority of Thailand may coordinate with the other Bureau Agency or the State Enterprise of solid waste management.”

- 2) The Investment by the Bureau Agency but private sector is in charge of operation**

According to Public Health B.E 2535 (1992) Section 18, 19, the Bureau Agency or the solid waste management organization may

consent to the private sector for taking responsibility of waste management system. By that form;

**a. To lease or managed of right or taking operation of solid waste management to private**

It means the Bureau Agency or the solid waste management organization assign the private sector to that taking and can charge the premium or fee on the agreed rate of annual or/and monthly.

In accordance with the Provincial Administration Organization Act B.E. 2540 (1997) "The Provincial Administration Organization may assign the private sector to that taking by getting to consent from the Council of Provincial and the Chief Executive of Provincial, according to the regulation of the Ministry of Interior.

**b. To hire the private sector for waste management operation or the Contract-Out**

The meaning is the Bureau Agency or the solid waste management organization hires the private sector to operate waste management system by paying the agreed rate wage to the private sector.

**c. To establish joint venture company for waste management with private sector**

The Bureau Agency is able to establish a joint venture company for waste management with private sector according to the regulation clarified as follows:

***In case of Municipality:***

According to the Municipalities Act B.E 2496 (1953), Section 7 (tri), "the Municipalities may coordinate with the other person for establishment the company or being the shareholder in any the company when;

- The company's objective is for public utility business
- The Municipalities should hold the share over 50 % of the registered capital which including to holding of the other municipalities or the PAO or TAO and
- Getting approval from the Minister of Interior.

***In case of The Industrial Authority of Thailand:***

According to The Industrial Authority of Thailand Act B.E. 2522 (1979), Section 6 (5), The Industrial Authority of Thailand has the objective to the shareholder in the other company or any the juristic person which is about the coordination with solid waste management.



**3) Investment and operation of waste management system by private sector only**

The organization which has a responsibility about the solid waste management may assign the private sector to invest and manage solid waste system in the form of franchise (like of 2.3.2 (2 a)).

**4) Both the Bureau Agency and Private sector jointly invest and operate waste management system**

The organization which has a responsibility about the solid waste management may coordinate with the private sector to invest and manage the solid waste system in the form of Joint Venture Company (like as 2.3.2 (2 c)).

**Observation**

- If the private sector participates in waste management system, it should have a right of the charging fare and suitable premium or fee from service user.
- If the private sector invests and /or manages the waste management system or coordinates with the bureau agency or the state enterprise, it should get the legal benefit from the Board of Investment (BOI) or the relevant.

The conclusion of the State Bodies which invest and /or manage the waste management system is tabulated in Table 2-2.

**Table 2-2: Conclusion of State Bodies which Invest and/or Manage the Solid Waste Management**

State Bodies	In Area	Out of Area	Join with other State Body/State Enterprise	Join with Private or hold the share
1. TAO	x	x	x	-
2. PAO	x	x	-	-
3. Municipality	x	x	Co-operative	Company
4. IEAT	Industrial Estate	-	-	Company
5. DIW	Factory	-	-	Company
6. Dept. of Health	Hospital	-	-	Company
7. New Established State Organization	According to Law	-	-	Company

Remark: "x" means able to do

### **2.3.3 The law concerning of waste management fees**

#### **2.3.3.1 Fees**

Under Section 5 of the Public Health Act B.E.2535 (1992), it specifies that the Minister of Public Health is entitled to issue the Ministerial Regulation to determine the fees or exempt the fees for solid waste collection and disposal.

##### **a. Waste Collection Fee**

After the Minister of Public Health has issued the Ministerial Regulation to determine the solid waste collection fees, the local administrative bodies can issue their own local administrative regulations to fix the rate of the fees for solid waste collection in their own boundaries in accordance with the rule, procedure, condition and not exceeding the rate as specified in the said Ministerial Regulation (Sections 20 (4) and 63). Presently, the Ministerial Regulation No 2 B.E.2536 (1993) has been issued to determine the said fees.

##### **b. Waste Disposal Fee**

After the Minister of Public Health has issued the Ministerial Regulation to determine the solid waste disposal fees, the local administrative bodies can issue their own local administrative regulations to fix the rate of the fees for solid waste disposal in accordance with the rule, procedure, condition and not exceeding the rate as specified in the said Ministerial Regulation (Section 63). Presently, the Ministerial Regulation has not yet been issued to determine the said fees.

However, the local administrative body can issue its own local administrative regulation to determine the rule, procedure and condition of solid waste collection and/or disposal for the private sector to comply with, including setting the rate of solid waste collection and/or disposal fees for the private sector to collect from the users (Sections 20 (5) and 63). Presently, only Bangkok Metropolis has issued its own regulation to control the business of solid waste collection or disposal since 1998.

Besides, under Section 88 of the National Environment Quality Control and Enhancement B.E.2535 (1992) it provides that the National Environment Board with the suggestion of the Pollution Control Committee is empowered to determine the rate of solid waste disposal fees in each polluted control area or area as located for the central solid waste disposal owned by the government and constructed with the government budget or local administrative body revenue or money from environment fund. The said Announcement will be published in the Government Gazette and the said rate may be differed upon

appropriateness. In this Act it does not specifies the local administrative body to have power to issue its own regulation to fix this rate.

Owing that the solid waste disposal fees have not yet been issued by the law, the Study Team prefers to issue it by the Public Health Act B.E.2535 than by the National Environment Quality Control and Enhancement B.E.2535 (1992) because the Public Health Act focuses on solid waste disposal but the latter scopes with general waste disposal and focuses on wastewater disposal (not solid waste disposal). Besides, the solid waste disposal is involved with its collection it then should be in charge with the same government agency. Therefore, the issuance of solid waste collection fees and solid waste disposal fees should be done by the same law and the same government agency. Consequently, it causes rapid, convenience, completeness and integrated system in the solid waste management.

#### **2.3.3.2 Method of Fee Collection**

Under the Section 64 of the Public Health B.E. 2535 (1992) and the Section 43 of the National Environment Quality Control and Enhancement B.E.2535 (1992), they say that the local official can collect the collection fees and disposal fees within his own boundary. The income from the said fees collection will be owned by its local administration without sending to the government as government budget.

The collection of collection fees and disposal fees should be done at the same time with the same receipt, but specify that how much of collection fees and how much of disposal fees for the users to understand why they must pay the said amount. Public relations for people understanding, especially explanation of disposal fee in order to reduce the problem at the time of the said collection should be performed.

Previously, the local administration collected the collection fees just few amounts because of many causes, such as, efficiency of collection by the local official, co-operation of people, etc. Even though the users who did not pay the said fees would be punished fine, but some users failed to pay the said fees. Consequently, it caused financial problem in solid waste management. The local administration could not manage the solid waste within its own boundary more and more when comparing with the quantity of solid waste as increased day by day. Even though the local administration can issue the local regulation to sanction the user who does not pay the said fees by no collection, but in practical the said user will drop his solid waste in other tanks or central tanks. The Study Team opines that it is not the good solution and if the said local

regulation is issued, it may be challenged and caused bad image to the local administration.

The Study Team is of opinion that the reason why the people fail to pay the collection fees is that the sanction measure is not good and could not penalize them immediately which differ from failing to pay electricity, waterworks, or telephone fees. Therefore, in order to have more efficiency and productivity in the said fees collection, the Study Team has opinion that the method of fees collection should be adjusted as follows:

**a) To assign the government agency or state enterprise to collect it**

The assignment of fees collection to the government agency or state enterprise which render services of public utilities in the local area and can penalize the users who do not pay the fees promptly, such as, cut electricity, water or telephone, etc. to be the collector on its behalf must done by issuance of the law. In this matter, the law to empower the land official to collect the withholding tax at source from the seller arising out of sale of property on behalf of the Revenue Department has never been issued. If the said seller fails to pay the said tax at the same time as payment of transfer fees and stamp duty at the land office, the land official will not register the sale of immovable property of the seller. (Please see Section 52 of the Revenue Code) Or the custom official collects the value added tax (formerly business tax) from the importer while arrangement of custom clearance at the custom port on behalf of the Revenue Department. If the importer fails to pay them, the custom official does not allow the importer bring the goods out of the custom port. (Please see Sections 83/8-83/10 of the Revenue Code) Therefore, the Study Team opines that amendment to the Public Health Act B.E.2535 (1992) should be done and should determine that the local administration is able to issue the local regulation to assign or authorize any government agency or state enterprise to collect the collection and disposal fees on behalf of the local administration and the said government agency or state enterprise must take the enforcement and punishment measures against the users who do not pay the said fees and announce the said measures to the people in the said local area. In practical, there will be agreement between the local administration and the government agency or state enterprise. For instance, city municipality may have agreement with the Provincial Waterworks Authority to collect the said fees on behalf of the city municipality by issuance of its municipal regulation. In municipal boundary, it must be determined that if the users in the city municipality do not pay the said fees as collected with

water fees they will be fine and the waterworks will also be cut, etc.

The advantage of this method is that the users are penalized immediately and this punishment is efficient. The disadvantage of this method is that it causes burden to the government agency or state enterprise and must get approval from the government agency or state enterprise. Furthermore, the local administration must pay some commissions to the government agency or state enterprise.

**b) To collect the fees by itself**

Any local administration which renders services of waterworks and/or electricity within its own boundary can issue the local regulation to collect the collection and disposal fees at the same time with the electricity and/or waterworks fees.

If the users fail to pay the said fees, the local administration will be entitled to cut electricity or waterworks as same as no payment of electricity or waterworks fees.

The advantage of this method is that the violator must be penalized promptly and efficiently. The disadvantage of this method is that it causes burden to the said division in charge with the electricity and/or waterworks.

**e) To collect the fees with tax**

The local administration is entitled to collect the said fees within its own boundary. If the user fails to pay such fees, he will be punished fine and his failure to payment will be recorded in the division in charge with house and land tax law or land development tax law (property taxes)

Therefore, if any person who pays the said tax will pay the said fees as well, otherwise the tax official will not accept his payment. It is alike the person who receives the traffic ticket from the police, if he fails to pay fine his fine will be recorded in registration file. He must pay the said fine before car registration. However, there will be amendment to the house and land tax law and the land development tax law for this purpose.

The advantage of this method is that the users get more punishment. The disadvantage of this method is that the punishment measure is not good and is used for the person who fails to pay house and land tax or land development tax only. It causes some users not subject to this method and not effect the amount of the said fees because the said violators pay the fees at low rate.

**d) To issue or renew license upon payment of the fees**

The local administration can issue the local regulation to determine that the business operator who fails to pay the said fees must be punished fine and his business license or permission must not be issued or renewed by the local administration until the said fees are fully and completely paid by him.

The advantage of this method is that the violator will be afraid the effect to his business owing that he could not do business until obtaining license or permit from the local administration. The disadvantage of this method is that it causes burden to the division in charge with the issuance of license or permit and is used for the business operator only.

However, the town municipality should pressure the Ministry of Public Health to issue the Ministerial Regulation to fix the appropriate and acceptable fees of solid waste disposal to enforce with all users throughout Thailand.

**2.3.3.3 Punishment**

Even though the Section 73 Paragraph 2 of the Public Health Act B.E.2535 (1992) says that any person who violates the local regulation not to pay the said fees, he will be punished fine not exceeding Baht 5,000 but the Study Team is of opinion that the said Act should be amended to have 4 times surcharge of the said fees like the person who does not pay wastewater treatment fees under the Section 90 of the National Environment Quality Control and Enhancement B.E.2535 (1992). Besides, he will pay premium of 1.5% per month for the outstanding fees as well like the person who does not pay tax to the government. Apart from this, it should be determined that the said surcharge and premium as collected are exempted from sending to the government as government budget.

**2.3.3.4 Litigation**

The civil and criminal actions are the legal measures to control and solve the solid waste problem. It is shown that the authority in charge with does not enforce them as mechanism proportionately and systematically. Apart from the legal measure to suppress with punishment, it should be used the legal measure to prevent any action as called "Safety Procedure" as well. The Study Team is of opinion that the prohibition of business operation as specified in Sections 39 and 50 of the Penal Code will be enforced for prevention of repeated offence. Any person who possesses the building for business operator causes the solid waste problem which is deemed committed criminal offences, he will be taken legal action for punishment and for safety procedure. The Court will

order him not to do any business for the fixed period. If he fails to do so he will be punished more and more imprisonment and/or fine under the Section 196 of the Penal Code.

## **2.4 General Conditions of the Study Area**

### **2.4.1 Natural Conditions**

#### **2.4.1.1 Location and Size**

##### **a. Cholburi Province**

Cholburi province is situated on the eastern Gulf of Thailand, about 80 km east of Bangkok. It covers an area of 4,363 sq. km., or 2,726,875 rai.

Sriracha Town Municipality is located in Sriracha District, Cholburi province, about 116 km far from Bangkok. The total area of the municipality is 4.058 sq. km., or 0.66% of the total area of Sriracha District. The area of Sriracha Town Municipality comprises a land area of 2.153 sq. km. and a water area of 1.905 sq.km.

##### **b. Chachoengsao Province**

Chachoengsao province is about 75 km to the east of Bangkok and has a total area 5,351 sq. km., or 3,344,375 rai.

Chachoengsao Town Municipality is located in Muang Chachoengsao district, the capital district of Chachoengsao province. The total area of the municipality is 12.76 sq. km., or 3.37% of the total area of the capital district.

##### **c. Nakhonnayok Province**

Nakhonnayok is in the central part of Thailand, about 105 km northeast of Bangkok. Its total area is about 2,122 sq. km., or 1,326,250 rai.

Koh Wai Sub-district Municipality is situated in Pak Phli district. It is 7 km far from Nakhonnayok province. The total area of the municipality is 2 sq. km. (1,250 rai), or 0.33% of the total area of Pak Phli district.

##### **d. Prachinburi Province**

Prachinburi province is in the eastern part of Thailand, about 140 km far from Bangkok. The provincial total area is 4,762.36 sq. km., or 2,976,475 rai.

Prachantakham Sub-district Municipality is in Prachantakham district, about 20 km far from Prachinburi province. The total municipal area is 4.68 sq. km. (2,925 rai), or 0.52% of the total area of Prachantakham district.

### **e. Ratchaburi Province**

Ratchaburi province is located on the western side of the central part of Thailand. Its boundary is close to Myanmar. Ratchaburi is about 100 km far from Bangkok and has a total area 5,196.46 sq. km., or 3,247,788 rai.

Ratchaburi Town Municipality is in Muang Ratchaburi district, the capital district of Ratchaburi province. Its total area is 8.7 sq. km. (5,437 rai), or 2.02% of the total area of Muang district.

#### **2.4.1.2 Topography and Climate**

##### **a. Cholburi Province**

The topography of Cholburi province comprises of mountains, low-lying flatland and a coastal zone including several large and small islands. Sriracha district, where Sriracha Town Municipality is located, is in a coastal zone. It is a narrow flatland along the seacoast with some small mountains. As Cholburi province and Sriracha Town Municipality are located in a coastal zone, the climate does not much change. The annual temperature is somewhere between 19-40 °C while the average temperature is 29 °C. The annual total rainfall is about 960-1,577 mm.

##### **b. Chachoengsao Province**

Chachoengsao province is generally on a low-lying flatland with highland in some areas. Some parts of the highland is 20 m above the mean sea level while some parts of the low-lying flatland is under the average sea level. The Bangpakong River flows through the province. Chachoengsao Town Municipality is located on the plain along both sides of the river which is suitable for fruit plantation.

The climate of Chachoengsao is categorized as Tropical Savannah. The annual temperature is between 19-36 °C while the annual rainfall is 1,244 mm.

##### **c. Nakhonnayok Province**

The general topography of Nakhonnayok province is low-lying flatland in the northern and eastern part while Banna district, Muang Nakhonnayok district and Pak Phli district are in a mountainous area. The climate of Nakhonnayok is categorized as Tropical Savannah. Weather in the province can be divided into three seasons, namely rainy, winter and summer. The average temperature is 27-28 °C while the total rainfall is about 1,327 mm/year.



#### **d. Prachinburi Province**

The topography of Prachinburi comprises highland and mountainous area. About 70% of the bottom part of the province is on a low-lying flatland which is suitable for plantation. The Prachin river flows through several districts of the province including Prachantakham district.

As for the climate, the general temperature is not very hot because the southwest wind blows through Prachinburi province. The annual temperature is somewhere between 15-39 °C while the average temperature is 28 °C. The annual rainfall is 1,342 mm (the standard is 1,700 mm/year).

#### **e. Ratchaburi Province**

The Mae Klong River is the main river flowing through Ratchaburi. The province is generally mountainous. Muang Ratchaburi district, where Ratchaburi Town Municipality is located, is on the delta of the Mae Klong River, which is suitable for agriculture.

Ratchaburi is also influenced by the southwest wind from the India Ocean but not fully because Tanaosri mountain blocks the southwest wind. The average rainfall is 1,000-1,250 mm/year while the annual temperature is about 18-36 °C. The average temperature is 27 °C.

### **2.4.2 Social Conditions**

#### **2.4.2.1 Administration**

##### **a. Cholburi Province**

Sriracha Town Municipality, previously Sriracha Sub-district Municipality, was established in 1945 (B.E. 2488) and was promoted from Sub-district Municipality to Town Municipality in Year 1995 (B.E. 2538)

Sriracha Town Municipality is categorized as a 1<sup>st</sup> Grade Municipality. The administration structure consists of;

- Municipal Council, as a legislative body, is responsible for monitoring and examining the administrative body. Its 18 members are elected for a 4-year term.
- Municipal Councilors, as an administrative body, consists of one Mayor and three councilors.
- Apart from the two main bodies, there are municipal staff members who perform the general works of the municipality under the municipal clerk.

### **b. Chachoengsao Province**

Chachoengsao Town Municipality became a Sanitary District in 1931. In 1935, four years later, Chachoengsao Sanitary District was upgraded to “Chachoengsao Town Municipality” with a total area of 5.52 sq. km. In 1973, the municipal area was largely expanded to its present size, 12.76 sq. km.

Chachoengsao Town Municipality is categorized as a middle class municipality. Its administrative structure is similar to other municipalities as follows;

- Municipal Council, as a legislative body, consists of 12 members with a chairman and a vice chairman.
- Municipal Councilors, as an administrative body, consists of one Mayor and three councilors.

### **c. Nakhonnayok Province**

Koh Wai Sub-district Municipality was also established as Koh Wai Sanitary District in the past. It was promoted to a municipality in 1999. The administrative structure of Koh Wai Sub-district Municipality is the same as other municipalities as follows;

- Municipal Council, as a legislative body, consists of 12 members elected for a 4-year term.
- Municipal Councilors, as an administrative body, consists of one Mayor and two councilors.

### **d. Prachinburi Province**

Prachantakham Sub-district Municipality was established as a Sanitary District in 1956. It was promoted to “Prachantakham Sub-district Municipality” in 1999.

The administrative structure of Prachantakham Sub-district Municipality, as with the other municipalities, follows the Municipality Act Year 1953 as follows;

- Municipal Council, as a legislative body, consists of 12 members elected for a 4-year term.
- Municipal Councilors, as an administrative body, consists of one Mayor and two councilors.

### **e. Ratchaburi Province**

Ratchaburi Town Municipality was established as Ratchaburi Town Sanitary District in 1915. In 1935, 20 years later, it was promoted to Ratchaburi Town Municipality.

The administrative structure of the municipality consists of two main bodies as follows;

- Municipal Council, as a legislative body, consists of 18 members elected for a 4-year term.
- Municipal Councilors, as an administrative body, consists of one Mayor and two councilors.

#### **2.4.2.2 Population**

##### **a. Cholburi Province**

The population statistics from 2000 indicated that the total population in Cholburi province is 1,078,518 (542,913 males, 535,605 females). The average population density is 247 persons/sq. km.

As for Sriracha Town Municipality, the population statistics show that at the end of 2001, the total population of the municipality was 26,299 (13,043 males, 13,256 females). The total number of households was 3,917 with an average of 6.7 members per household. The average population density is 12,215 person/sq. km.

##### **b. Chachoengsao Province**

According to the population statistics of Chachoengsao Town Municipality at the end of 2002, the total population is 42,872 persons (20,372 males, 22,500 females). The total number of households is 8,900, while the average population density is 3,360 persons/sq. km.

##### **c. Nakhonnayok Province**

The population statistics from 2002 indicated that the total population of the province is 251,721 with 124,768 males and 126,953 females. The total number of households is 66,670, while the average population density is 169 person/sq. km.

For Koh Wai Sub-district Municipality, the total population according to the population statistics at the end of 2002 is 2,167 (1,018 males and 1,149 females). The average population density is 1,055 person/sq. km.

##### **d. Prachinburi Province**

From the latest population statistics in June 2002, the total population of Prachinburi province is 450,070 (225,585 males, 224,485 females). The total number of households in Prachinburi province is 124,924, with an average of 3.6 persons/household. The average population density is 94.17 persons/sq. km.

For Prachantakham Sub-district Municipality, the population statistics from the end of March 2003 show the total population is 5,105, or about 1.13% of the total population of Prachinburi province. The total number of households is 1,782 with an average population density of 1,090 persons/sq. km.

#### **e. Ratchaburi Province**

At the end of 2001, the total population of Ratchaburi province was 826,986 (406,716 males, 420,270 females). The average population density is 159 person/sq. km.

For Ratchaburi Town Municipality, at the end of June 2002, the total population was 44,404 (21,320 males and 23,084 females) with a total of 15,240 households. The average population density is 5,104 person/sq. km.

### **2.4.2.3 Public Health**

#### **a. Cholburi Province**

There are plenty of public health facilities in all districts of Cholburi province. From a total 26 public health facilities, 19 are state hospitals with a total of 2,789 beds and 7 are public health clinics. Apart from these, there are 6 private hospitals in the province with a total number of 862 beds and 425 private clinics.

In Sriracha Town Municipality, there is a state hospital with 300 beds and 3 private hospitals with 400 beds. Furthermore, there is also a public health service center and 45 private clinics.

#### **b. Chachoengsao Province**

In Chacheongsao Town Municipality, there is a Chachoengsao provincial hospital with 503 beds, under the responsible of the Ministry of Public Health. There is also a private hospital with 100 beds and 63 private clinics in the municipality.

#### **c. Nakhonnayok Province**

There are 6 state public health facilities in Nakhonnayok province with a total of 1,110 beds. Pak Phli hospital, as a district hospital of Pak Phli near Koh Wai Sub-district Municipality, has 10-beds.

#### **d. Prachinburi Province**

There are 9 hospitals in Prachinburi; 8 are state hospitals and the remaining one is a private hospital with a total 957 beds.

### **e. Ratchaburi Province**

Ratchaburi Town Municipality has 2 public health facilities and 7 primary public health facilities in the municipal area.

## **2.4.3 Economic Conditions**

### **2.4.3.1 Economic Structure**

#### **a. Cholburi Province**

The total gross provincial product of Cholburi, ranked no. 2 in the eastern part, was 208,046.97 million Baht in year 2000. The main income comes from the industrial sector accounting for more than 62%. The per capita income is 218,997 Baht/year, while the average income per household is 14,075 Baht/month.

For Sriracha Town Municipality, the main occupations are trading and fishery as a result of the abundant natural resources and its tourism place.

#### **b. Chachoengsao Province**

The economic structure of Chachoengsao is agriculture which is the main food production source of regional areas and Bangkok. More than 70% of the total population in the province engages in agriculture. In year 1999, the per capita income of Chachoengsao province was 88,586 Baht/person/year while the Gross Provincial Product (GPP) was 55,544 million Baht. The main contributor to the income of the province is the industrial sector, which accounts for about 45.02% of GPP or 25,008 million Baht. The next largest contributor is agriculture, which accounts for about 14.82% of GPP or 8,233 million Baht.

#### **c. Nakhonnayok Province**

The main economic structures of Nakhonnayok are agriculture, wholesales, retails and service sector. In Year 2002, according the NESDB estimation the per capita income of Nakhonnayok was 42,219 Baht/year while the GPP was 11,062 million Baht. The main income of GPP came from wholesales and retails (about 24.53% of GPP, or 2,714 million Baht). The second largest contributor was agriculture, which accounted for about 21.14% or 2,339 million Baht.

#### **d. Prachinburi Province**

In Year 2000, the per capita income of Prachinburi was 53,599 Baht/year which is ranked no. 25 in the country. The GPP of Prachinburi is 26,585 million Baht. The main income of GPP comes from the industrial sector (about 34.07% or

equivalent to 9,058 million Baht). Next is wholesales and retails with about 18.11% or 4,816 million Baht. Agriculture is the third largest share of the GPP with about 14.08% or 3,745 million Baht. Although agriculture is the third largest contributor to the GPP, it is the most important production sector in terms of living, working, and income distribution including the supply of products to the province.

**e. Ratchaburi Province**

For people in Ratchaburi Town Municipality, the main economic structure consists of the commercial, service and industry sectors. There are many wholesale, retail and service shops in the municipal area.

**2.4.3.2 Agriculture**

**a. Cholburi Province**

Agricultural land in Cholburi is about 1,340,837 rai, or 45% of total area of the province. About 50% of agriculture land is field crops. Other main agricultural products are cassava, rice, sugarcane, pineapple. Agriculture in Cholburi is also important as a raw agricultural source for industries in the province related to the agriculture and fishery sectors.

For Sriracha Town Municipality, the agriculture and fishery sectors are also active.

**b. Chachoengsao Province**

As described before, farm production is the main activity in the agriculture field. However, the amount of products depends on the area, crops and climate. At present, the rice fields are decreasing as farmers are changing to shrimp farms which contribute higher benefit.

**c. Nakhonnayok Province**

Agriculture is the second most valuable sector of Nakhonnayok after the service sector. The most important product is rice, followed by fruits such pamelos, oranges, etc.

In Koh Wai Sub-district Municipality, almost agriculturist is farmer, vegetable and field crops.

**d. Prachinburi Province**

Prachinburi is an agricultural area. The main agricultural product is rice which is farmed on about 721,301 rai or 63% of the total agricultural area of the province. Apart from rice, corn, cassava and bamboo shoots are the main products.

For Prachantakham Sub-district Municipality, about 30% of the land is used as agricultural land, which consists of mainly rice fields, gardens and field crops.

**e. Ratchaburi Province**

Agriculture in Ratchaburi Town Municipality is not considered important.

**2.4.3.3 Industry**

**a. Cholburi Province**

Cholburi is the major area for industry both at the regional and national levels as a result of the eastern seaboard development project. There is huge investment from many types of industries in the province. Nowadays, there are 2,065 factories, which directly contribute about 62.70% of the GPP of Cholburi, or 130,456.13 million Baht.

**b. Chachoengsao Province**

At present, industry has also become the main sector of Chachoengsao. The area where people seek to set up factories is Muang Chachoengsao district, the capital district of the province. The types of industries in Chachoengsao are plastic parts, electrical equipment, construction products, cosmetics, etc.

In Chachoengsao Town Municipality, there are 90 factories. However, most of them are small scale such as rice mills, welding factories, and factories that produce and repair agricultural machines.

**c. Nakhonnayok Province**

According to statistics from 2001, Nakhonnayok has 222 factories and the industrial sector is now ranked as no. 8 of the GPP of the province which is valued about 659 million Baht or 5.96%.

**d. Prachinburi Province**

According to the policy of the central government, Prachinburi is the place for industrial estate or investment promotion zone no. 3. There are 650 factories in the province now. Almost all the factories are related to agriculture, chemicals, plastic, metal, etc. The total work force in the industrial sector in Prachinburi is about 49,000 persons.

In Prachantakham Sub-district Municipality, there are 9 factories. Almost all of them are small-scale factories with less than 50 workers each. Most of the factories are related to agriculture such as rice mills. The total work force in the

industrial sector in Prachantakham Sub-district Municipality is less than 200.

**e. Ratchaburi Province**

There are 142 factories in Ratchaburi Town Municipality with a total of about 2,400 workers. The main industries are garage, welding, ceramics and textiles.



## **3 Present SWM in Target Local Authorities**

### **3.1 Current Situation**

This chapter presents the current situation of municipal solid waste management of 6 target local governments namely;

- Cholburi Provincial Administration Organization (Cholburi Province)
- Sri Racha Town Municipality (Cholburi Province)
- Chachoengsao Town Municipality (Chachoengsao Province)
- Koh Wai Sub-district Municipality (Nakhonnayok Province)
- Prachantakam Sub-District Municipality (Prachinburi Province)
- Ratchaburi Town Municipality (Ratchaburi Province).

The study on current solid waste management for the target local governments lays stress on 2 major aspects i.e. technical aspect and institutional aspect. The technical aspect involves waste discharge and storage, collection and transportation, road sweeping and drain cleansing, intermediate treatment and recycling, final disposal, maintenance of vehicles and equipment, and medical solid waste management. For the institutional aspect, it presents related information on administration and organization, legislation and enforcement, financial status and refuse collection charge, privatization and contracting system, monitoring and information management system, human resources development, public education and cooperation, NGOs and community groups in solid waste management activities.

### **3.2 Cholburi Provincial Administration Organization**

Cholburi Province has divided its administration into 10 District, 1 Sub-district, 92 Tambol, and 677 Villages. There are local administrative bodies: 3 Town Municipality, 23 Sub-district Municipality, 1 Provincial Administration Organization, and Pattaya City.

#### **3.2.1 Administration and Organization**

Cholburi PAO has been established under the law on provincial administration and presently controlled by the Provincial Administration Organization Act Year 1997 (B.E. 2540). Cholburi PAO provides its organizational structure and administration as follows:

- 1) Direction Department comprises of General Administration Division, Personnel Division and Legal Division;
- 2) Council Affair Department comprises of Regulation and Meeting Division, and Secretariat Division;
- 3) Budget and Planning Department comprised of Plan Development Division, and Budgeting Division;

- 4) Finance Department comprises of Financial Division, Accounting Division, Procurement Division, and Revenue and Asset Division;
- 5) Engineering Department comprises of Technical and Planning Division, Construction and Maintenance Division, and Mechanic Center Division.

Organization Structure and Administration of Cholburi PAO is shown in Figure 3-1.

### **3.2.2 Human Resources**

According to the Cholburi PAO Notification dated 30 July B.E.2541, it fixed 82 positions in each department as follows:

- 1) Under Secretary General of Cholburi PAO: 1 position;
- 2) Direction Department : 14 position
- 3) Council Affairs Department: 10 positions
- 4) Budget and Planning Department: 10 positions
- 5) Finance Department: 26 positions
- 6) Engineering Department: 21 positions

From survey of powers and duties of each department of Cholburi PAO<sup>1</sup>, it found that there is not any department to be responsible directly to the waste management. Even though the Provincial Administration Organization Act B.E.2540 does not specify to do so but the Determination of Plan and Procedure for Local Decentralization Act B.E. 2542 fixes the power and duty of waste management. Therefore, the Direction Department, Budget and Planning Department, Finance Department, and Engineering Department will have direct powers and duties of waste management. Presently, the Government does not allow establishment of special body in charge with the said matter. Then the necessity of the said departments to play the said role will be unavoidable.

### **3.2.3 Financial Status**

Cholburi PAO has sources of incomes and expenses as follows:

#### **3.2.3.1 Sources of Incomes**

- 1) Tax and duty;
- 2) Fees and penalty;
- 3) Income from assets;
- 4) Income from public utility;
- 5) Sundry incomes;
- 6) Government support money;
- 7) Other incomes.

---

<sup>1</sup>Final Feasibility Study and Detailed Design for the Central Waste Disposal Facility of Cholburi PAO, Page 12-12.

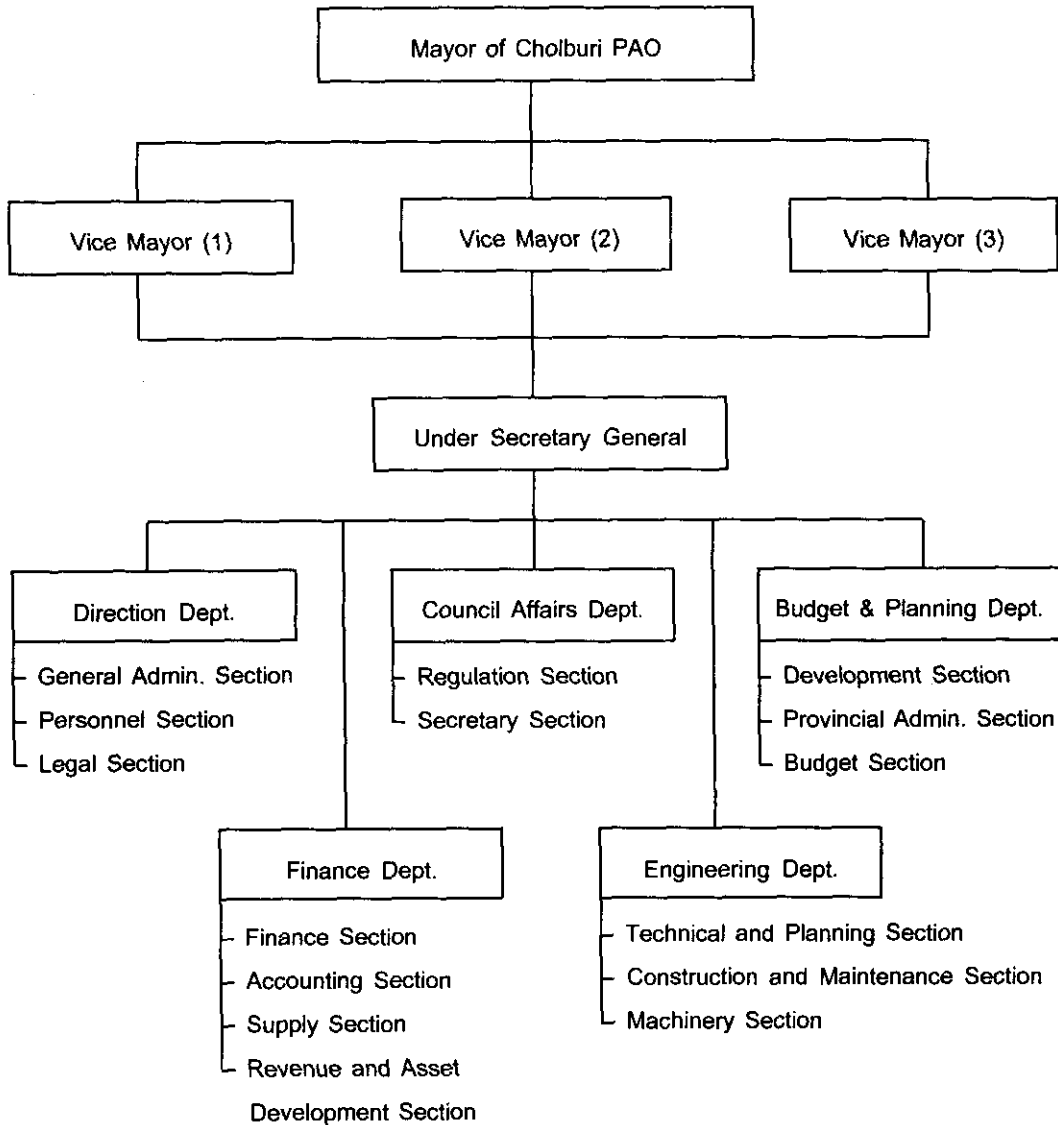


Figure 3-1: Organization Structure and Administration of Cholburi PAO

### 3.2.3.2 Sources of Expenses

- 1) Staff salary and wages;
- 2) expense for investment;
- 3) expense for public repayment;
- 4) others.

The establishment of central waste management center in Cholburi Province is co-operation among the local administrative bodies in waste management and Cholburi PAO is assigned to handle it. It is a joint venture between the government and Cholburi PAO in ratio of 80:20 of total investment of the project. The result from study of Cholburi PAO's income and expenses, and making income projection for development and ratio of loan ceiling is brought to analyze the financial ability of Cholburi

PAO, including its ability of loan repayment in case of loan for investment. It is found that Cholburi PAO has high financial ability and its income will increase upon the economic growth and tax/fee allocation because of local decentralization's consequence.

Estimated revenue for development and loan of Cholburi PAO is tabulated in Table 3-1.

Table 3-1: Estimated Revenue for Development and Loan Ceiling of Cholburi PAO

(Unit: million Baht)

Year	Revenue (1)	Deposit (2) = 10% x (1)	Revenue for Expense (3) = (1) - (2)	Fixed Expense (4)	Revenue for Development (5) = (3) - (4)	Loan Ceiling (6) = 25% x (5)
2000	250	25	225	94	131	33
2001	300	30	270	100	170	43
2002	350	35	315	110	205	51
2003	385	39	346	121	225	56
2004	424	42	382	133	249	62
2005	466	47	419	146	273	68
2006	512	51	461	161	300	75
2007	564	56	508	177	331	83
2008	620	62	558	195	363	91
2009	682	68	614	214	400	100
2010	750	75	675	236	439	110
2011	825	83	742	259	483	121
2012	908	91	817	285	532	133
2013	999	100	899	314	585	146
2014	1,095	110	988	345	643	161
2015	1,208	121	1,087	380	707	177
2016	1,329	133	1,196	418	778	195
2017	1,462	146	1,316	459	857	214
2018	1,608	161	1,447	505	942	235
2562	1,769	177	1,592	556	1,036	259
2563	1,946	195	1,751	612	1,139	285
2564	2,141	214	1,927	673	1,254	314
2565	2,355	235	2,120	740	1,380	345
2566	2,590	259	2,331	814	1,517	379

### **3.2.4 Cholburi Central Waste Disposal Project**

#### **3.2.4.1 Background of the Project**

In response to the government's policy on proper and efficient solid waste management by promoting adjacent local governments in each province to establish a waste disposal center, the Cholburi Provincial Administration Organization (PAO) led 22 local governments in Cholburi Province to mutually signed in October 1999 (B.E. 2542) a memorandum of understanding in establishing the first central waste disposal project in Thailand. To proceed on the project, Cholburi PAO entrusted in September 2000 the Sena International Development Co., Ltd. And Electromag Engineering Group in the feasibility study and detail design work. Followings are the listings of 22 local governments intentionally participated in the project.

- 1) Cholburi Town Municipality
- 2) Sriracha Town Municipality
- 3) Ban Suan Sub-district Municipality
- 4) Bang Phra Sub-district Municipality
- 5) Bang Sai Sub-district Municipality
- 6) Saen Suk Sub-district Municipality
- 7) Laem Chabang Sub-district Municipality
- 8) Ang Sila Sub-district Municipality
- 9) Ao Udom Sub-district Municipality
- 10) Pattaya City
- 11) Bang Lamung Sub-district Municipality
- 12) Na Chom Tian Sub-district Municipality
- 13) Bang Sare Sub-district Municipality
- 14) Huai Yai Sub-district Municipality
- 15) Sattahip Sub-district Municipality
- 16) Khlong Tamru Sub-district Municipality
- 17) Ban Bueng Sub-district Municipality
- 18) Phanat Nikhom Town Municipality
- 19) Phan Thong Sub-district Municipality
- 20) Nong Tamlueng Sub-district Municipality
- 21) Bang Phra TAO
- 22) Samed TAO

#### **3.2.4.2 Cholburi Central Waste Disposal Facility**

The proposed Cholburi Central Waste Disposal Facility (CWDF) is located in Bang Phra TAO, near the current landfill site of Saen Suk Sub-district Municipality in Bang Phra Sub-district, Sri Racha District, Cholburi Province. The existing landfill site

occupies an area of 167 rai while the Cholburi PAO has in the first phase secured an adjacent land area of 216 rai and another connecting land area of 142 rai in the second phase of project implementation, make it totally 525 rai.

To facilitate the facility operation, two designated transfer stations are proposed at Ban Bueng Sub-district Municipality and Pattaya City. In addition, Bang Phra PAO has set an urgent plan of fiscal year 2004 to construct 2 lanes road leading to the CWDF, and also growing trees along both sides of the road as buffer zone with the cost about 35 million Baht.

The flow diagram of the waste treatment in this CWDF is shown in Figure 3-2. It is an integrated disposal system consisting of the following processes:

- 1) Separation: Waste is Separated into 4 categories, ie.:- Organic waste, Recycle waste, Non-Recycle waste and toxic/hazardous waste.
- 2) Biological Treatment: Organic waste will be digested by anaerobic digestion process to produce biogas. This byproduct gas will be the fuel to generate electricity and co-generation heat that can be reused within the project. The residuals from digestions will be blended in the composting process to produce organic fertilizer which can be sold or distributed to farmers.
- 3) Recycling: The recycle waste will be sorted and packed to be ready for sale.
- 4) Stabilization and Sanitary Landfill: The solid non recycle waste will be stabilized before buried in the sanitary land fill.
- 5) Incineration: Toxic/Hazardous Waste will be burnt in the high temperature incinerator and the remaining ash will be sanitary landfill.
- 6) Wastewater Treatment: Wastewater generated from all processes will be pumped to the wastewater treatment plant to be treated before discharging into natural receiving water.

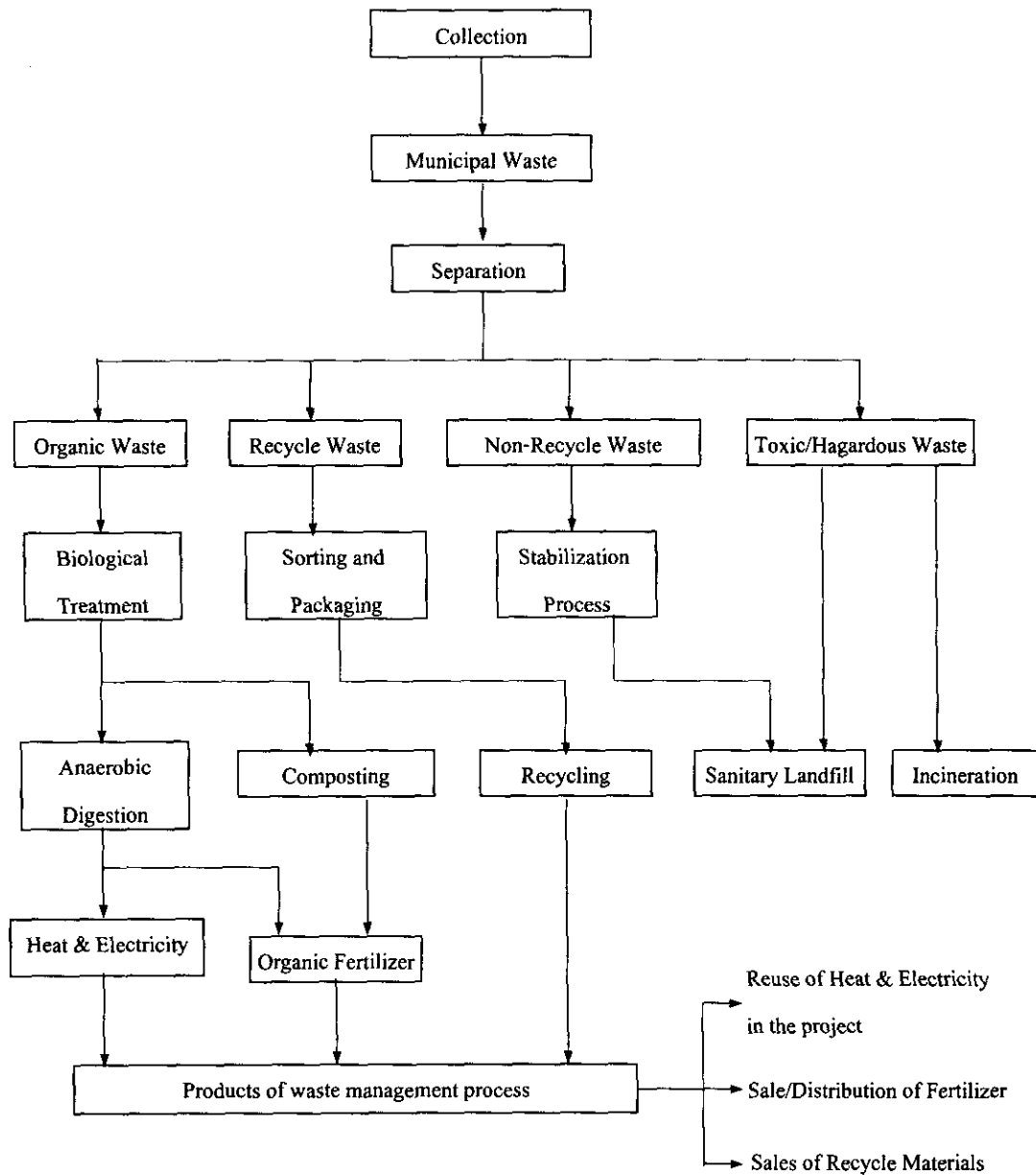


Figure 3-2: Waste Management Flow Diagram of Cholburi Central Waste Disposal Facility

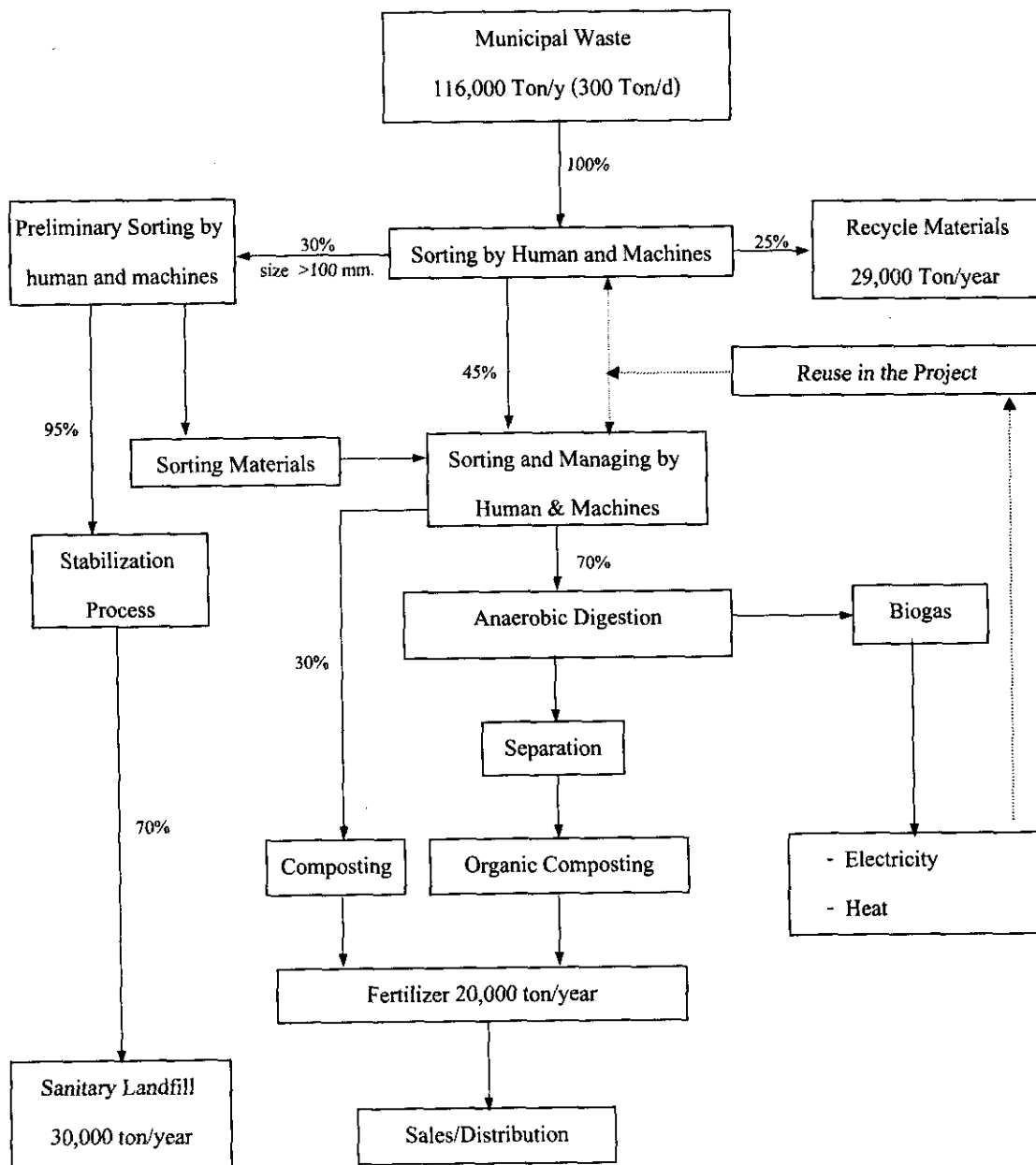


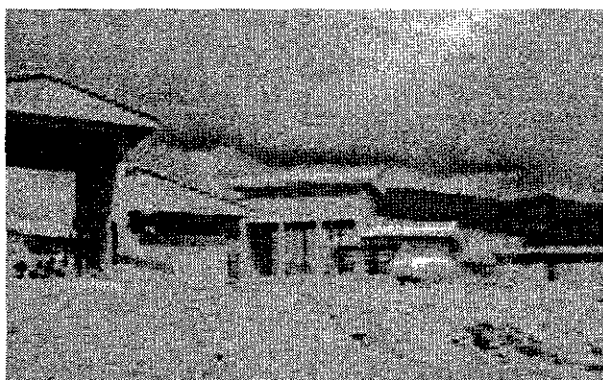
Figure 3-3: Estimated Flow of Cholburi Central Waste Disposal Facility

From the feasibility study and detailed design of the project, it is estimated the facility will receive municipal waste of 116,000 ton/year (300 ton/day average). After passing all the waste treatment processes, it will produce 25% of recycle waste (29,000 ton/year), 20,000 ton/year of organic fertilizer and 30,000 ton/year waste will be landfilled. A part from that, electricity and co-generation heat will be continuously produced and reused within the project.

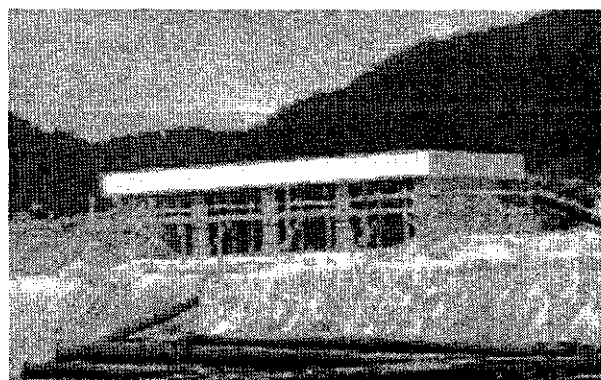


### **3.2.4.3 Current Status of Cholburi CWDF Establishment**

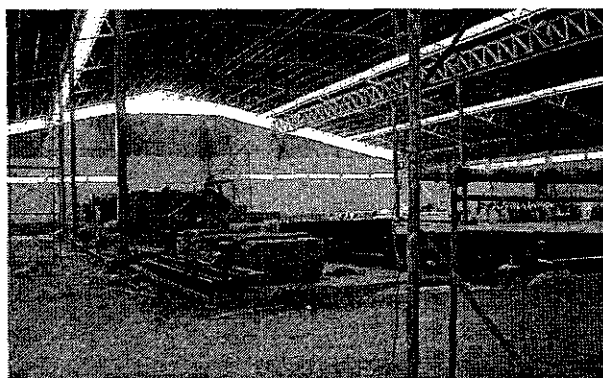
After the study and detail design task of Cholburi CWDF had been completed in 2001, Cholburi PAO went ahead on the project by seeking financial support from the Ministry of Science, Technology and Environment (MOSTE). On behalf of MOSTE, the Office of Environmental Policy and Planning approved the project and subsidized 60% of the total facility construction cost of 626 million baht of which Cholburi PAO would inject the remaining portion of 40%. Eventually the project construction activity started in 2002 and planned to complete in 2005.



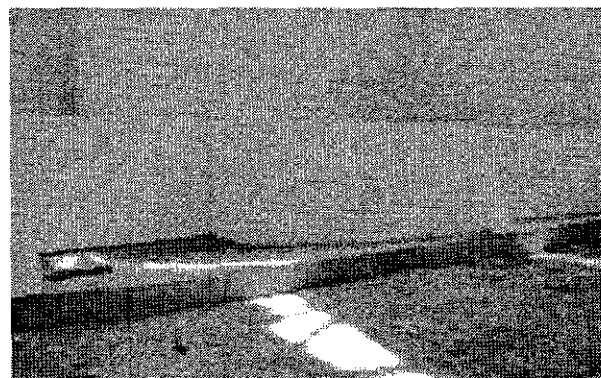
*Construction is in progress*



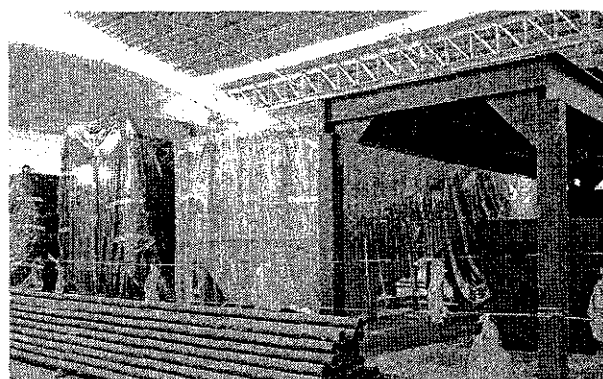
*One of the building in the site*



*In the sorting plant building*



*Waste Pit*



*Some of machines have been arrived*



*Waiting for installation*

**Picture 3-1: Construction Progress of Cholburi Waste Disposal Facility (Oct. 2003)**

The contract was signed on June 12, 2002 with the total period of 1,059 days. By the day that JICA study team visited the site (October 8, 2003), the construction has reached 483 days already, The remaining time will be 576 days. The progress of civil work has reached 80% while the average progress is only 30% as most of the remaining tasks are concerning with machinery works. The following construction has been finished so far; Separation and control building, Composting building, Recycle Building and testing room. About 40% of machines/equipment is imported. They are as follows;

- 1) Waste receiving and feeding machine, bag tearing m/c, weigh, scaling m/l.
- 2) Primary separation machines: sieve drums (using air and magnetic power)
- 3) Blending machine for composting plant.

All the equipment will be fixed after completing the construction of all buildings and reactors. By that time the work will rapidly make progress. According to the contract, the test run of all system must be completed before final work submitted.

Cholburi PAO planned to hire consultant to study for the disposal fee of CWDF with budget 1.5 million Baht. The study is expected to start at the beginning of 2004. It is expected the potential disposal charges at CWDF for prospective local governments are in the range of 100-150 baht per ton.

For the operation and management of CWDF, Cholburi PAO has an idea to contract out to qualified private operator through open bid tendering under the supervision of Cholburi PAO.

#### **Comments from JICA Study Team to the Project**

- 1) As the Pattaya City is requesting government budget to rehabilitate its own landfill site and may not send their waste to CWDF. Therefore, Cholburi PAO should plan in advance for the case that daily incoming waste from all local authority may less than the planned 300 Ton/day. One of the solution is allowing waste from other provinces or authority to use CWDF service. The prior contact and MOU signing is strongly recommended.
- 2) The waste input entering the plant is mixed waste as the waste separation at source was unsuccessful. The mixed waste that reached the CWDF will be contaminated and will already be sorted by the prior process of each local authority's waste collector staff. It is quite difficult to sort for qualified recycle and reuse wastes.