

JAPAN INTERNATIONAL COOPERATION AGENCY
THE SOFIA GREATER MUNICIPALITY, THE REPUBLIC OF BULGARIA

THE STUDY ON
THE SOLID WASTE MANAGEMENT FOR
THE TERRITORY OF
THE SOFIA GREATER MUNICIPALITY

MASTER PLAN MANUAL

July 1994

Yachiyo Engineering Co., Ltd.
Tokyo, Japan

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CHAPTER 1

INTRODUCTION

1. Introduction

1.1 Necessity of a manual for the preparation of a SWM master plan

The rapid pace of socio-economic development caused by the change of social system from socialism to liberalism in Bulgaria has brought about an increase in the generation of solid waste with increasing variety of composition. Solid waste collection and disposal has become a social and public health problem of great magnitude and this is evident in the numerous reports published in the country.

The Bulgarian Government is firm in its new policy of maintaining clean urban centers by publishing the new regulation "Act on limiting the harmful impact of household, construction industry and industrial waste on the environment" (Waste Act (Draft)) for SWM.

Under Government regulations (1980), local government authorities (LGA) such as the SGM are given the responsibility of collection and disposal of solid waste in urban areas. However these Sofia LGA's are facing acute difficulties in meeting their responsibilities, due to problems such as limited capacity of existing landfill sites, shortage of funds, lack of citizen cooperation, absence of an appropriate management systems and a lack of expertise. Waste management has been given a very low priority in the past and the problems have been conveniently left to the local government.

Solid waste services are one of the most expensive services provided by local governments in Bulgaria. Although substantial resources are committed to this service every year, its cost-effectiveness is uncertain because of the lack of appropriate planning at the short-term, medium-term and long-term levels.

New Regulations (Collection of laws and regulations pertaining to SWM (SWM) of settlements) for Solid Waste published in 1993 require the preparation of a Solid Waste Management Master Plan for each Local Authority in Bulgaria. Experience has shown that is the most effective approach, technically as well as financially, to resolve SWM problems and plan for the needs in the years to come.

As such, the formulation and implementation of municipal SWM master plans has been adopted as one of the most important strategies of the Waste Act (Draft). In SGM for

example a plan for an "Ever Growing, Never Aging Clean Sofia" will be launched in the future based on the New Regulations for Solid Waste.

To assist the Bulgarian Government in implementing this new strategy, to overcome the problems stated earlier and to improve the situation in a systematic manner, the Japan International Cooperation Agency (JICA) decided to prepare a Manual for the Preparation of a Solid Waste Management Master Plan and to establish a Master Plan of Solid Waste Management (SWM) in cooperation with SGM (SGM).

The first step is the formulation of a model master plan and this shall be done through JICA's SWM Master Plan Study for SGM.

The second step is to transfer this valuable experience and know-how of master plan formulation to other Local Authorities. This manual for formulation of a solid waste master plan has been prepared to facilitate the implementation of the second step.

1.2 Purpose of the manual

A SWM master plan is necessary for the efficient and effective execution of urban cleansing services especially for long-term planning. This manual is a guide for preparing such a SWM master plan for local government.

The basic objective of the Manual is to help local officials in Bulgaria who are given the task of preparing a SWM master plan study on their own. It is also expected to assist the consultants who will carry out the study.

1.3 Persons who are expected to use the manual

Local government shall be expected to prepare the SWM master plan to make the city center, towns and villages cleaner and to employ more effective and economical systems. Persons who are in charge of the SWM in the Local Government such as the Deputy Mayor and the Head/Senior Expert of Environment Department, middle managers such as Ministry of Health Inspectors/Ministry of Environment/Ministry of Regional Development, Housing Policy and Construction and Engineers who will carry out the study should use and refer to this manual.

The Local Government cleansing services generally consist of

- Waste collection
- Street sweeping
- Waste transportation
- Treatment/recycling
- Disposal at landfill sites

Based on "Local Self-Governing and Local Administration Act (1980)", local government is responsible for providing the cleansing services in their respective areas.

For SGM the Environmental Department is mainly responsible but is assisted by Government owned organizations such as BKC and CHISTOTA in carrying out these services. However, some parts of the services such as monitoring or supervision of the environmental preservation and sanitation in the respective areas are provided by other Departments of the Local Government.

1.4 Limitations of the manual

This manual does not cover immediate improvement plans and feasibility studies. A second manual for feasibility study has also been prepared under this Study and is submitted separately.

1.5 Definitions of terms

(1) General

- | | |
|--------------------|---|
| - Waste collection | : Works to collect waste discharged from waste generation sources. There are several methods for collection such as door to door collection, point collection, and stationary container collection. |
| - Treatment | : Physical, chemical or biological processes that change the characteristics of the waste in order to reduce its volume or hazardous nature, facilitate its handling or enhance recovery. |

- Sanitary landfill :A land area where solid wastes are disposed of using sanitary landfilling techniques.
- Sanitary landfilling :An engineered method of disposing of solid waste on a land in a manner that protects the environment, by spreading the wastes in thin layers, compacting it to the smallest practical volume, and covering it with soil by the end of each working day.
- Operation area :Area to be provided for waste collection and street sweeping.
- Tipping fee :Charge for the waste hauled directly to a disposal site, a transfer station or treatment facility.
- Collection fee :Charge for the waste collection service.
- Controlled treatment of waste activities :Activity carried out at places under conditions to be specified by competent authorities
- Management of activities connected with waste: :Synthetic decisions, actions and activities connected with waste generation, its ecological treatment based on certain information as well as controlling methods.

(2) Type of solid waste

- Domestic waste :Waste generated and discharged from households (Municipal waste)
- Commercial waste :Waste generated and discharged from commercial activities (Municipal waste)
- Bulky waste :Waste such as furniture which cannot be collected by the normal domestic waste collection system.
- Road sweeping waste :Waste generated by road sweeping and public area cleansing works.

- Industrial waste :Waste arising from manufacturing or industrial activities or processes and hazardous waste.
- Hazardous waste :Any waste which is covered by the catalogue of hazardous waste (an annex to the regulation 153/6.8/1993 on Hazardous Waste)
- Medical waste :Any waste originating from a clinic or hospital or a medical or similar civil or military or veterinary establishment which contains, in whole or in part, waste which is clinical, pharmaceutical or pathological in nature. A part of medical waste is hazardous waste.

(3) Classifications of source of waste

- Residential area :Area where mainly detached houses are located.
- Commercial area :Area where business and commercial establishments including shops are located.
- Bulk waste discharger :Business or commercial establishments generating more than 50 kgs of waste in a day.

(4) Waste collection system

- Alternate day collection :Not a daily collection. An area is divided into two zones in order to collect wastes in different days.
- 3 times a week collection :Each area divided into two zones. One zone is collected on Mondays, Wednesdays and Fridays, the other on Tuesdays, Thursdays and Saturdays.
- Door-to-door collection :System to collect waste from house to house.
- Station collection :System to collect waste from waste stations including communal containers.

- Communal container :Storage container of waste in a community.
- Household bin :Storage container of waste at household.
- Waste station :Collection point which is specified for several houses.

(5) Treatment

- Incineration :A system to burn combustible waste
- Composting :A system to convert waste organic component to soil conditioner.
- Pulverizing :A system to reduce the size of waste including bulky waste.
- Refuse Derived Fuel(RDF) :A system to make a solid fuel from combustible waste.
- Precompressed Waste Blocks :Product as a result of applying pressure to loose compressible waste material within an enclosed space and binding the compacted waste mass with steel wires in order that it remains in its compacted state.
- Pyrolysis :A way of breaking down burnable waste by combustion in the absence of air. High heat is usually applied to the wastes in a closed chamber, and all moisture evaporates and materials break down into various hydrocarbon gases and carbon-like residue.
- Crushing and Shredding :Mechanical operations used to reduce the size of solid waste.
- Sorting :To divide waste into groups of similar materials, such as paper products, glass, food wastes, and metals. Sorting may be done manually or mechanically with specialized equipment.
- Transfer station :A facility where collected waste is unloaded in order to permit its preparation for

further transport for recovery, treatment or disposal elsewhere.

(6) Disposal

- Sanitary landfill

:A disposal system which has measures for environmental protection.

- Landfill gas

:All the gases generated from landfilled waste, such as methane, carbon dioxide, hydrogen, nitrogen and oxygen.

CHAPTER 2

PURPOSE OF A SWM MASTER PLAN



2. Purpose of a SWM master plan

2.1 Necessity of a SWM master plan

Presently many Local Authorities face SWM problems such as heavy financial burdens, difficulty of obtaining disposal sites, difficulty in getting residents cooperation, lack of technology to prevent environmental pollution, and shortages of financial resources, staff, manpower and equipment.

A proper master plan for SWM which describes the action to be taken in the medium and long terms with financial statements is indispensable for solving these problems and improving the service quality in a systematic manner.

2.2 Purpose of a SWM master plan

The intention of a SWM master plan is to determine the future direction of SWM in the respective area including;

- Determination of the areas to be served
- Proper system of waste storage, collection, haulage, treatment and disposal
- Proper system of street sweeping
- Proper system of operation and maintenance
- Organization and institutional improvement
- Enforcement of laws and regulations
- Financial plan
- Residents cooperation and training program

Cleansing service is a relatively simple operation in the sense that it consists of the collection of generated solid waste and its disposal by means of landfill, and its operation can be efficiently conducted once sufficient numbers of vehicles, workers and disposal sites are acquired.

However, the development of a city makes the expansion of the collection service and the acquisition of new disposal site(s) necessary and the measures to deal with these new requirements should be adequately introduced on a year-to-year basis. It is important that a staged and systematic plan shall be prepared based on the medium and long-term objectives and on a correct understanding of the current conditions.

A circular interactive process is required in any field to achieve development, i.e. planning-execution-evaluation-

planning, etc.. Cleansing services are no exception. A proper SWM master plan is the starting point of this process, without which any improvement of cleansing services cannot be expected. It is essential to create a specific unit, e.g. planning unit, within the relevant department of the local government authority, which will take responsibility for the execution of the above-mentioned circular planning activities.

2.3 Relationship with other plans

(1) Related plans

A SWM master plan should be developed in accordance with the city development master plan of the respective area and the regional and national development plans around the local government.

The major plans to be based on and taken into account in the preparation of a SWM master plan are as follows:

- The city development master plan of the local government
- Waste Act (Draft) for an "Ever Growing, Never Aging, Clean Sofia"
- National Plan on toxic and hazardous waste (based on National Waste Management Program)
- Bulgarian national development plan

(2) Position of a SWM master plan

There are 3 types of plans that need to be prepared in relation to the SWM:

- A master plan for SWM
- Specified project plans
- Annual plans

There are close relationships between these plans, therefore each plan should be reviewed when any plans are established or modified.

This manual describes the procedures required for the preparation of a SWM master plan.

Specific project plans should be prepared for strategic projects such as the construction of a disposal site which is recommended for implementation in the master plan. These

project plans should be prepared through feasibility studies of each project.

Annual plans should be prepared every year by the Departments which are responsible for SWM. A yearly budget should be provided based on this annual plan. Actual performance of SWM including operation and management records, and modification of the master plan if required should be reported to the mayor of the respective municipality at the end of each year.

2.4 Contents of the master plan

The basic contents of a SWM master plan should be as follows.

1. General condition of the study area
 2. Present condition and past achievements of solid waste management
 3. Identification of present problems
 4. Projection of future conditions
 5. Planning framework
 6. Generation of alternatives for the future waste management system
 7. Selection of the most appropriate alternative
 8. Examination of the master plan
 - 8.1 Collection and haulage
 - 8.2 Cleansing services
 - 8.3 Major facilities
 - 8.4 Organization and institution
 - 8.5 Privatization
 - 8.6 Phased development plan
 - 8.7 Financial plan
 - 8.8 Resident cooperation
 - 8.9 Training
 9. Recommendation for implementation
 10. Environmental guidelines for the SWM master plan
-
- 8.9 Training
 9. Recommendation for implementation
 10. Environmental guidelines for the SWM master plan

In other words, a master plan will present a technically and socio-economically appropriate and feasible course of modification/adjustment of the SWM system which could achieve the established goals and targets while continuously balancing the service supply with the changing service demand. This concept is shown graphically in Figure 2-4-1 below:

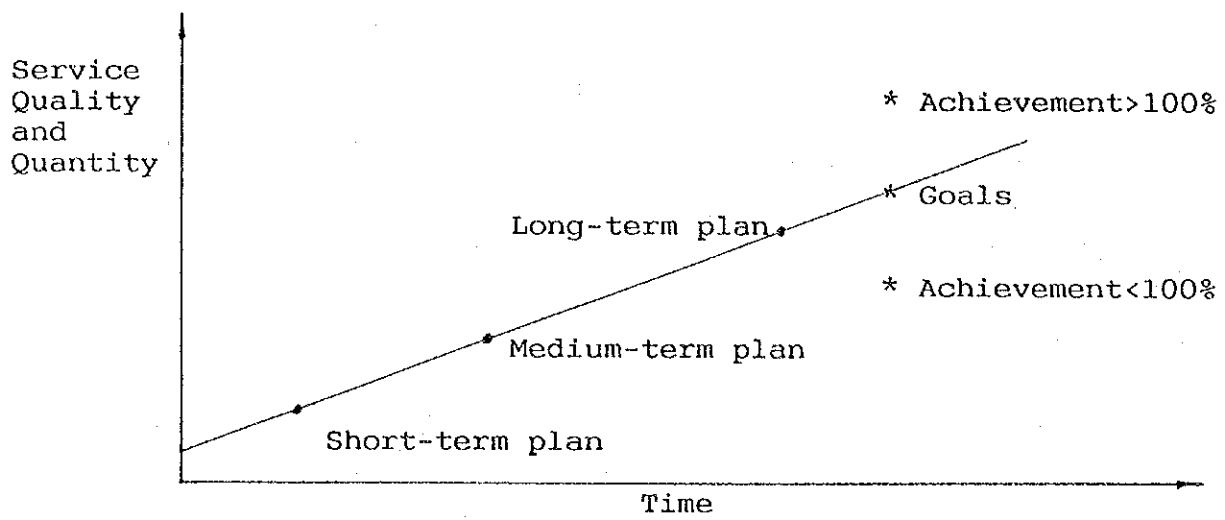


Figure 2-4-1 Master Plan Time Phasing and Achievement

CHAPTER 3

OUTLINE OF THE WORKS FOR THE FORMULATION OF A SOLID WASTE MANAGEMENT MASTER PLAN

3. Outline of the works for the formulation of a SWM master plan

3.1 Study flow of the master plan formulation

The master plan studies consist of two major stages; the preparation stage and the actual study stage. The preparation stage is very important for effective conduct of the second stage and it consists of two components; a) Preparation of terms of reference and b) Preparation of study plan.

At least, item-a) should be carried out by the local government through consultation with related authorities or persons if necessary.

To facilitate the preparation of terms of reference by each Local Authority, it is recommended that the related departments of the local government (eg. the Environmental Department of SGM), Ministry of Environment, Ministry of Regional Development, Housing Policy and Construction and Ministry of Health should develop a model terms of reference for master plan studies.

Item-b) will be carried out by the local government organizations and/or Departments which will conduct the actual study. However, evaluation and approval is the Environment Department's responsibility.

The study flow which was employed by the JICA Study Team in the master plan study for SGM is shown in Figure 3-1-1.

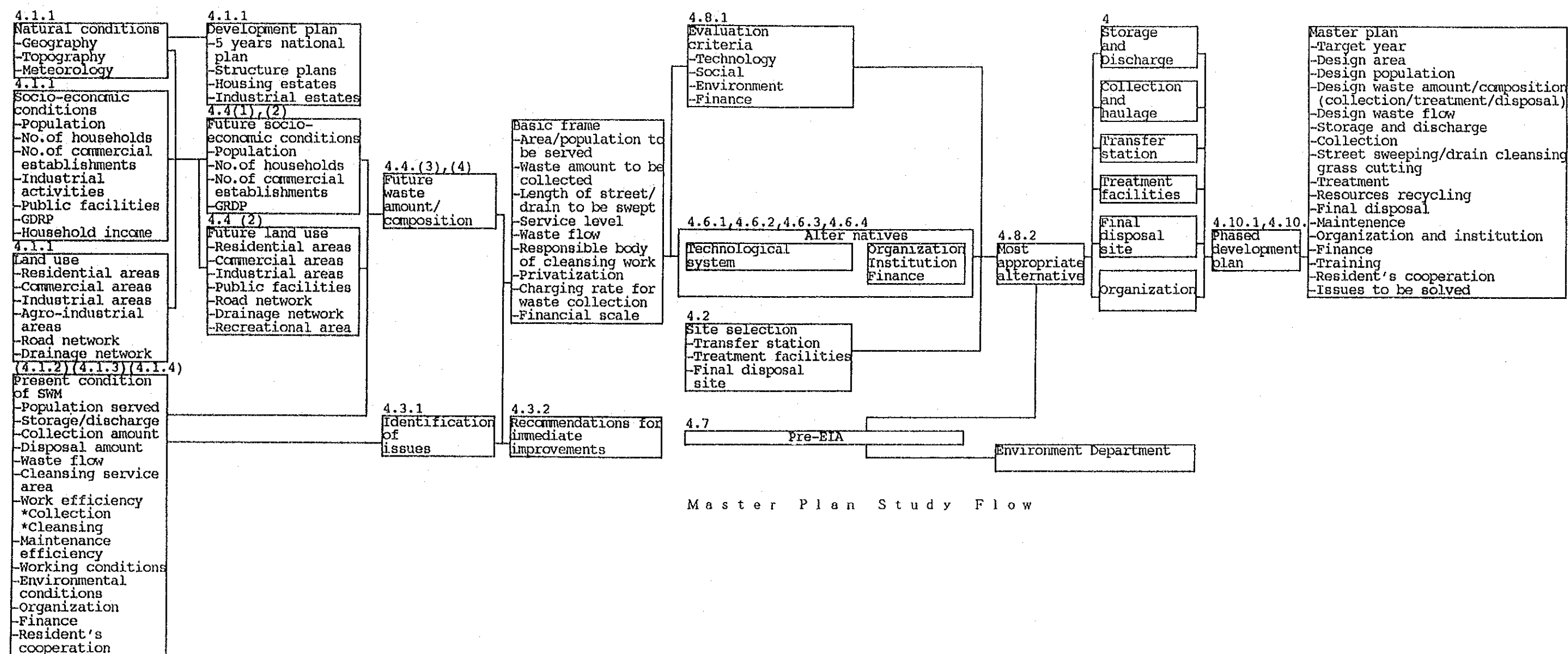
3.2 Study organization

The following organization should be established for the study.

- a. A committee which consists of related departments for decision making
- b. Working parties for necessary work

3.3 Resources needed to carry out the study

The preparation of a master plan may require an involvement of consultants, universities and some external experts. It is therefore necessary to secure a budget for using these professionals.



Master Plan Study Flow

Figure 3-1-1 Master Plan Study Flow

3.4 Terms of reference

Terms of reference should be prepared by the Environment Department in the local government authority which is responsible for SWM.

It is recommended that discussions should be held with the related authorities such as Ministry of Regional Development, Housing Policy and Construction, Ministry of Environment and Ministry of Health about the data and information on the SWM of other Local Governments, and the possibility of financing for implementation of the master plan study. The terms of reference should include the following:

- a. Title of the study and study area
- b. Background information
- c. Objective of the study
- d. Scope of the study
- e. Study schedule
- f. Reports to be prepared
- g. Study organizations and finance
- h. Related data, materials and information

3.5 Study plan

The study plan will be prepared by working parties based on the terms of reference. This should include the following contents.

- a. Detail of study contents
- b. Study schedule
- c. Work assignment
- d. Arrangement to be taken by the Environment Department of the Local Government
- e. Study organization

CHAPTER 4

STUDIES TO BE DONE FOR THE FORMULATION OF A MASTER PLAN

4. Studies to be done for the formulation of a master plan

4.1 Study on the present conditions

4.1.1 General conditions of the study area

Data collection and analysis should be made with regards to:

- a. Natural conditions
 - Location and area to be served
 - Environmental background
 - Topographical features (Topographical maps and aerial photographs)
 - Meteorological features (Climate, temperature, wind and rainfall)
- b. Area conditions
 - Land use
 - Road condition
 - Housing
 - Public service and utilities (Water supply, electricity, gas, sewage and steam/hot water supply)
- c. Present social and economic conditions
 - Population
 - Business and commercial activity
 - Regional economic production
 - Revenue of the Municipality
- d. Development plan of the Local Government
 - Future land use
 - Housing development
 - Road construction
- e. Relevant projects
 - Confirmation with Department of Architecture and Town planning of the Local Government, Ministry of Environment, and Ministry of Regional Development, Housing Policy and Construction about future development plans.
- f. Status of public health and public awareness

The following is a list of authorities likely to have related data.

- a. Natural conditions
 - Committee of Geology in Bulgaria (Topographic map, aerial photograph)
 - Department of Architectural and Town Planning of the local government
 - Institute of Ecology

- b. Area conditions and urban development planning
 - Department of Architectural and Town Planning of the local government
 - Central Institute of Statistics in the Local Government
- c. Social and Economic conditions
 - Financial Department in the local government such as that of SGM
 - Central Institute of Statistics in the local government
- d. Environmental conditions
 - Environment Department in the local government
 - Ministry of Environment
 - Ministry of Health

4.1.2 Present situation of SWM

A study and analysis should be made on the current SWM which includes such aspects as waste discharge, shortage, collection, haulage and disposal practices as well as those related to administration, organization and finance. The following items should be studied and analyzed:

- a. Amount and composition of solid wastes
- b. Methods of waste storage and discharge
- c. Collection and haulage systems
- d. Street sweeping
- e. Disposal system including illegal dumping
- f. Salvaging of reusable materials
- g. Equipment and their maintenance system
- h. Organization and institutional framework
- i. Financial situation
- j. Personnel administration
- k. Legislation and enforcement
- l. Existing capacity and degree of utilization of the private sectors in SWM
- m. The status of the public health hazard in relation to SWM
- n. Other related studies carried out in the area
- o. Existing standards, codes of practices and guidelines
- p. Environmental conditions

Cleansing services consists of many systems even if the study area is not so large. Therefore it is important to clarify the system based on; a) service frequency, b) collection point, and c) collection method. It is also important to clarify the area based on area conditions such as a) population density, b) land use, c) accessibility to collection vehicles, and d) number of premises and places which require special consideration for cleansing services.

In the case of SGM, the study area was classified into:

- Ordinary residential area
- High rise apartment
- Commercial area
- Market area
- Public facilities
- Hotel

From the waste generation data surveyed in each area and other recorded data, the unit waste generation amount per capita can be calculated and will provide a base for predicting the waste amount/composition in the future.

4.1.3 Study on the present situation in sample areas

Sample areas will be selected for investigation of the present SWM conditions, including the respective areas shown below:

- a. Individual houses
- b. Newly built individual houses and High rise apartment
- c. Gypsy houses
- d. Commercial area
- e. Markets area
- f. Public facilities
- g. Hotels

The sample area survey should include the following:

- Number of households
- Population
- Number of shops and business offices with floor areas and daytime population
- Size of market areas
- Number of guest rooms in hotels
- Waste collection frequency and collection points
- Interview of residents about collection service in their areas
- Frequency and laborer assignment for street sweeping

4.1.4 Study on solid waste amount and composition

The amount and composition of waste are fundamental data for planning the technical system of collection, transportation, treatment and disposal.

Therefore, periodical study and analysis (at least once a year) should be done to obtain trends that provide useful information for forecasting future waste amount and composition.

Since waste amount and composition at generation sources are different from those at the disposal site, the study analysis should be done at both places.

The types of waste to be studied are categorized as follows:

- a. Domestic waste
- b. Business and commercial waste (market, office and shops)
- c. Bulk waste dischargers
- d. Street waste

(1) Amount of waste

The amount of waste collected in each area should be analyzed by using waste amount data recorded at the disposal sites. The volume and weight of waste generated from a sample area should be measured during a one week period.

(2) Waste composition

In general, solid waste composition differs by type of waste generator. Domestic waste composition differs according to income level. Therefore, in a master plan study for a Local Government, samples should be taken from collection vehicles that collect waste from the respective areas as shown below:

- a. Individual houses
- b. Newly built individual houses and High rise apartment
- c. Gypsy houses
- d. Commercial area
- e. Markets area
- f. Public facilities
- g. Hotels

Waste composition analyses are usually made on two different bases: wet base and dry base. In addition, the chemical and element analyses are required if the introduction of incineration or composting plant is to be examined in the master plan study. In the master plan study for SGM, chemical and elemental analyses were done by the Institute of Hygiene.

4.2 Site selection for major facilities

In practice, it takes a long time to secure the lands for construction of facilities by reason of obtaining administrative and public consensus. Therefore, action for the site selection must be initiated as soon as possible.

(1) Criteria for site selection

In order to select appropriate sites for major facilities, the following should be considered as key factors:

- a. Possibility of land acquisition
- b. Technical possibility
- c. Possibility of getting neighborhood consensus
- d. Compatibility with regional development plan
- e. Economic advantages
- f. Financial feasibility
- g. Environmental acceptability
- h. Ecological acceptability

(2) Steps in site selection

It is not practical to evaluate all of the land in the study area for selecting the sites of major facilities (disposal site, incinerator, transfer station etc.). A staged procedure is recommended, divided into the following three steps:

- a. Selection of potential sites
- b. Selection of candidate sites
- c. Final selection

The method of selection is illustrated in Figure 4-2-1.

Potential sites should be selected taking into account the following aspects:

- a. Availability of area required for major facilities
- b. Possibility of land acquisition
- c. Possibility of getting neighborhood consensus
- d. Legal compatibility with regional development plan

Candidate sites should be selected from the potential sites by considering financial feasibility, technical possibility, economic advantages and environmental acceptability within the Bulgarian Waste Act, the EC Annex 1 Rules and the ETC 8.

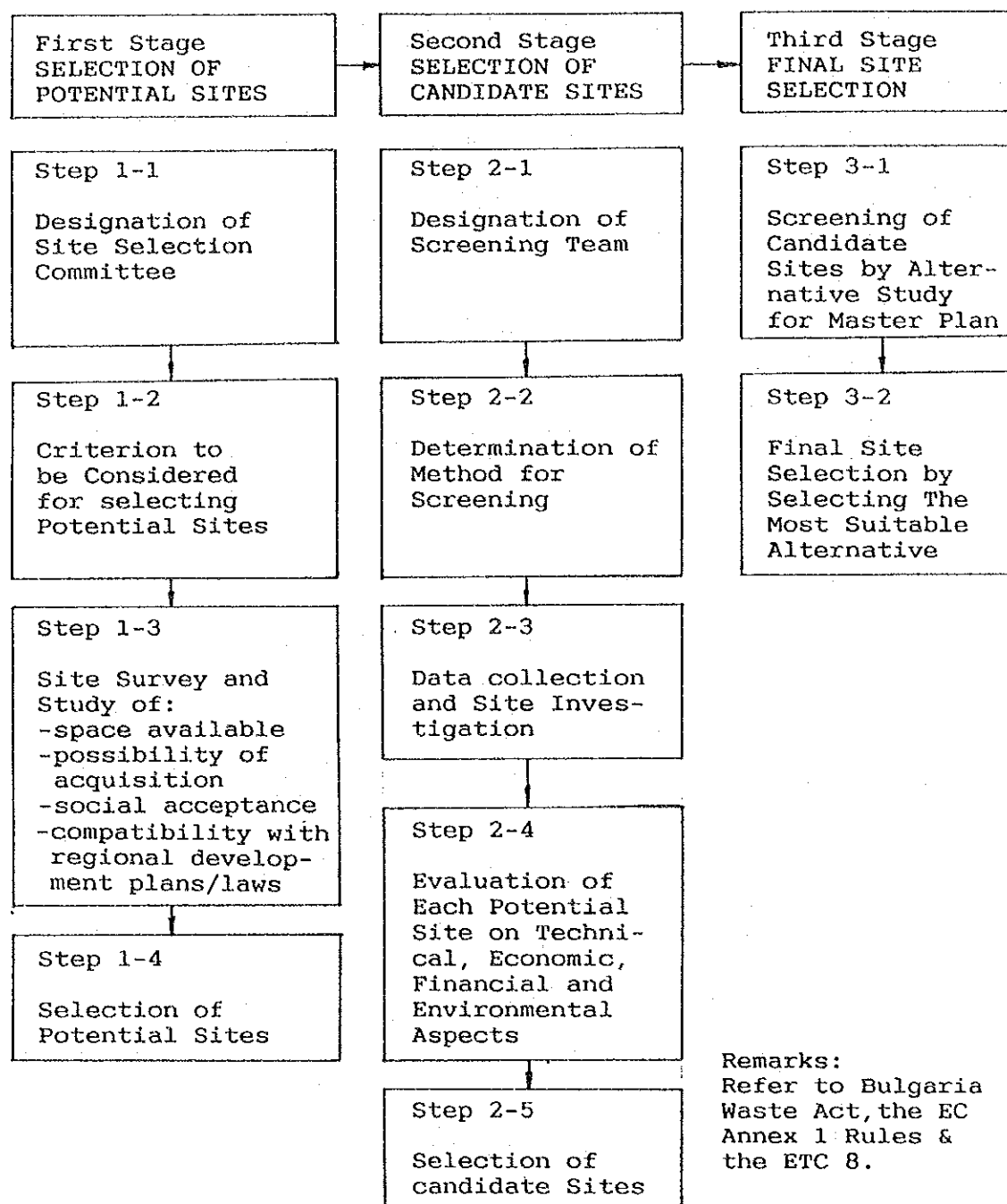


Figure 4-2-1 Site Selection Methods

Final site selection from the candidate sites should be carried out with consideration of the alternatives proposed for the master plan.

The approval of the local government, Ministry of Environment, Ministry of Health and Ministry of Regional Development Housing Policy and Construction and related organizations should be obtained through formal procedures after selection of the suitable sites.

The lands decided as construction sites of the facilities for SWM should be clearly stated in the urban development master plan.

4.3 Identification of issues

4.3.1 Identification of issues

The current conditions of SWM should be analyzed and evaluated from various aspects. The following points should be referred to in the course of identification of issues:

- a. Service coverage in term of population and area
- b. Service level of waste collection
 - Collection frequency
 - Collection point
 - Type of waste covered by municipal services
- c. Service level of street sweeping
 - Frequency
 - Length and classification of streets
- d. Solid waste amount
 - Generation amount
 - Collection amount
 - Disposal amount
- e. Efficiency of waste collection
 - Vehicle efficiency
 - Laborer efficiency
 - Cost efficiency
- f. Efficiency of street/sweeping
 - Laborer efficiency
 - Cost efficiency
- g. Working conditions
 - Safety
 - Sanitation
 - Work load
- h. Sanitary and environmental conditions
 - Storage and discharge

- Collection
- Transportation
- Treatment
- Final disposal
- Scavenging
- Squatter area (if any)
- i. Management of equipment
 - Shortage of equipment
 - Selection of equipment
 - Spare parts
 - Maintenance records
- j. Public attitude
 - Storage and discharge manner
 - Complaints
 - Fines
- k. Recycling
 - Amount of each recyclable material
 - Market prices
- l. Revenue and expense of SWM
 - Budget allocation for SWM
 - Collection fee
 - Tipping fee
 - Cost of waste collection, waste treatment, waste disposal and street sweeping
- m. Institution and legislation
 - Personal administration
 - Planning capability
 - Privatization and its management
 - Preparation and review of laws and regulations
 - Law enforcement

4.3.2 Recommendations for immediate improvement as necessary

Upon the identification of issues, it is then necessary to identify issues which may be quickly solved without spending much time and money, and prepare an immediate improvement plan for the quick solution of these issues.

4.4 Projection of future conditions

(1) Projection on future population

Future population should be projected until the target year at five year intervals maximum.

If the target year is covered by the urban development master plan, the population of the target year can be ob-

tained from this plan. It is desirable to consider the difference in character of the facilities/ infrastructure in question. Some facilities such as roads should be developed based on the optimum future population forecast because such facilities require a large investment and relatively small operation and maintenance costs. On the other hand, major facilities for SWM require large operation and maintenance costs together with relatively smaller investment cost. Therefore it requires a more realistic estimation of future population with consideration of future urban development.

(2) Socio-economic forecasting

Local authorities such as SGM generally cover the SWM expenses by general budget and the main resource is assessment (property tax). Therefore, the following items should be estimated for future conditions.

- a. Projection of regional economic growth
- b. Future financial scale of the Local Government
- c. Development of housing areas
- d. Road construction plans
- e. Re-development plans for urban areas

(3) Estimation of future solid waste amount

The future solid waste amount should be estimated in 5 years intervals up to the target year. The solid waste amount will increase according to the following:

- a. Increase of population
- b. Expansion of service coverage area
- c. Increase of generation rate with the rise of living standards
- d. Increase in economic activities

The future solid waste amount can be estimated according to the process as shown in Figure 4-4-1.

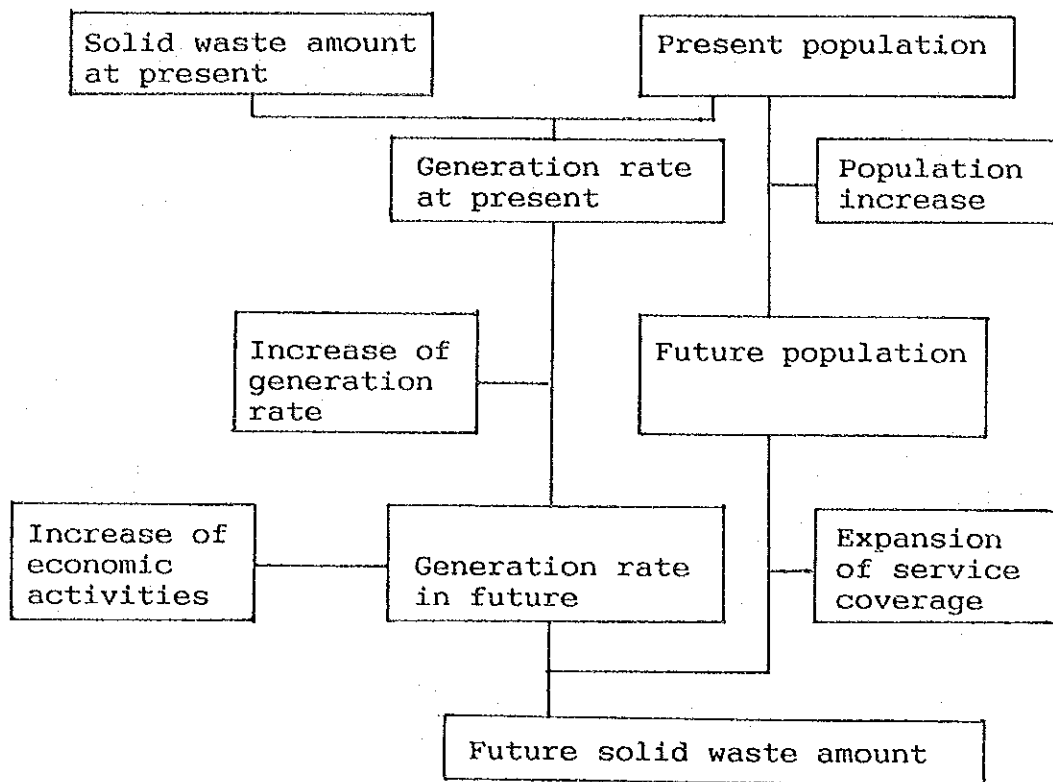


Figure 4-4-1 Estimation of future solid waste amount

(4) Estimation of future solid waste composition

With economic development and the rise of living standards, the proportion of paper, plastic and non-combustible waste will increase, while those of wood and garbage will decrease in general. As a result of these tendencies, density and moisture content will decrease. The solid waste composition in future should be estimated after considering those general characteristics and available data from other similar foreign municipalities or local governments.

4.5 Planning framework and target year

4.5.1 Goals and targets

(1) Goals

Clearly identified goals should be qualitatively presented to the citizens and authorities concerned. Such goals must be acceptable to them from the social and economic view point.

In the waste study of SGM the following goals are proposed:

"Development of a Clean Environment and Sanitation through establishment of a rational SWM system including waste amount reduction under the spirit of an Ever Growing, Never Aging, Clean Sofia."

(2) Targets

Improvement subjects and targets should be presented in a concrete manner. Targets to be achieved by respective target years should be defined as quantitatively as possible in order to be able to evaluate with accuracy.

Targets must be identified with respect to the following aspects.

a. Technical system

- Storage and discharge method at generation sources
- Service level of waste collection and street sweeping
- Method and equipment to be provided for cleansing
- Treatment facilities to be introduced
- Final disposal method
- Final disposal site(s) to be constructed
- Recycling method

b. Operation

- Efficiency of cleansing works
- Efficiency of treatment
- Quantitative and qualitative control of wastes at disposal site
- Working conditions in terms of work load, safety and sanitation

c. Organization

- Establishment of efficient organizational structure
- Promotion of privatization

- d. Finance
 - Appropriate allocation of budget
 - Development of charge system
- e. Law and enforcement
 - Preparation of by-laws and regulations for SWM
 - Enforcement of by-laws and regulations
- f. Training
- g. Public participation

(3) Target year

The master plan should cover the period from the year of the master plan study to the target year by which all of the recommended works in the plan should be implemented. Target years should also be set for the short term plan, medium term plan and long term plan using the following as a guide:

Table 4-5-1 Target Year (Example)

Plan	Target Year(from year of study)
Master Plan	up to 20 years
Long Term Plan	10 to 15 years
Medium Term Plan	6 to 10 years
Short Term Plan	3 to 6 years
Immediate Plan	1 to 2 years

4.5.2 Preconditions of master plan

Certain preconditions exist upon which a master plan is prepared. Such preconditions should be examined based upon the projection of future conditions as explained in Section 4.4 and goals and targets as discussed in 4.5.1. Preconditions to be examined include the following:

(1) Plan period

The plan period for a medium term plan is usually 7 to 10 years from the year that the master plan is prepared to the Target Year. A 15 year plan period, or even more, is possible when a longer period is required for introduction of new treatment systems or the construction of a large scale disposal site.

(2) Service area

The service area is defined as the area where cleansing works should be provided at the target year. It is also recommended to utilize other information such as documentation for registering houses and the fee collection systems for the city water supply, electricity, hot water supply, etc.

(3) Population and number of bulk dischargers

The present and future population and the number of bulk waste dischargers (Market, Hotel, Shopping complex and Flats) should be defined.

(4) Waste amount and composition

Present and future waste amount and composition should be defined.

It is important to note that the waste amount and composition may differ depending on waste handling stages, collection stage, treatment stage and final disposal stage.

(5) Division of Responsibility for SWM

Organizations involved in SWM may be related Departments of the local government, Ministry of Environment, Ministry of Health and Ministry of Regional Development Housing Policy and Construction, other local offices of central government agencies, and private companies (if any). The SWM system indicating the roles of these organizations in dealing with different types of solid waste and the treatment/disposal processes should be clearly determined.

(6) Contracting out of cleaning services

Rates of contracting out of the cleansing services should be determined taking into consideration the district characteristics such as population density, land use, road network, traffic condition, etc.

(7) Financial conditions

The budget scale of the local government and the share of budget for SWM at each target year should be stated with consideration of other income and resources.

The tariff system for waste collection and waste receiving at treatment plants or disposal sites shall also be set out with consideration of the operation and maintenance cost of SWM and citizen acceptability.

4.6 Generation of alternatives for future systems

4.6.1 Policy for the generation of alternatives

The future system will not be the same as the present one even if the present system is well managed. Some system components may be changed to suit future conditions in the long term planning. Each component of the SWM system should be studied and evaluated in the light of possible future changes in social, economic and financial conditions, environmental aspects, technical systems and public awareness.

Cost effectiveness of cleansing services and sanitary land-fill operation in accordance with the Waste Act are major targets to be achieved at present. Therefore, the master plan should provide the measures to achieve these two targets at least.

Alternatives should be generated and examined in terms of both:

- a. Technical systems (technological aspects) for storage, collection, transportation, treatment and disposal, and
- b. Managerial, organizational, institutional and legislative aspects.

The creation of cost-effective SWM systems is the main issue in the generation of alternatives because SWM costs place a heavy financial burden on most local governments.

From this view point, preparation of the master plan should start with the selection of optimum technical systems which are most suitable in terms of cost-effectiveness, and then examination should be made regarding such aspects as management, organization, finance and legislation which are compatible with the technical systems selected.

Components of the technical system correspond with the waste flow as shown in Figure 4-6-1. A desirable technical system depends not only on whether or not to introduce a treatment system but also location and capacity of final disposal sites.

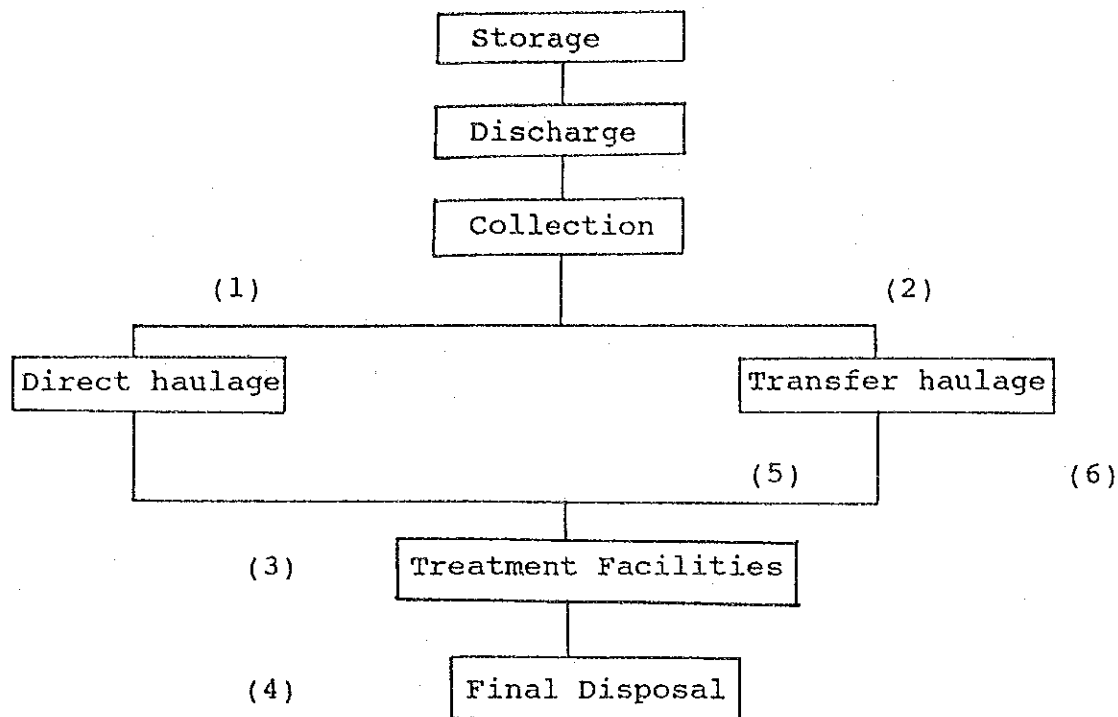


Figure 4-6-1 Components of Technical System

In other words, the selection of a desirable technical system largely depends on conditions of the final disposal sites such as capacity, location, distance from collection area, and land costs.

The site selection for facilities and selection of the optimum technical system are very important stages during a master plan study.

Selection of disposal sites and sites for other facilities is not an easy task. Several candidate sites are initially identified, then the screening process takes place, during which suitability ranking of potential sites may change, while a master plan study is being carried out. A feedback process is required before final selection of these sites is eventually made.

4.6.2 Alternative plans for the SWM system components

(1) Storage and discharge of solid waste

Proper storage and discharge methods should be examined considering area conditions. Proper method may differ by area shown below.

- a. Residential area by housing type with population density
- b. Commercial area (Shops, Offices)
- c. Market area
- d. Public facilities
- e. Hotels

As the solid waste storage and discharge methods are closely related to the type of collection equipment and collection method to be introduced, their conformity with an efficient collection system based on the local characteristics must be taken into consideration.

An example of suitable basic methods by area are as shown below:

	Detached House	High rise Apartment	Commercial Area	Bulk Waste Discharger
Plastic Bag	0	0	0	0
Container	0	0	0	-
- 40 - 70lit.				
- 70 - 100lit.				
- 1 m3				
Hauled Container	-	-	0	0
- 4 - 6 m3				
- 8 - 10 m3				

Remarks: Plastic bag should not be used for cinder, because of the possibility of burning.

0 = suitable, - = not suitable

Measures to reduce the waste amount by means of recover the reusable materials and recycling them should be proposed at generation source of solid waste.

Also, waste separation at the generation source may be necessary when intermediate treatment facilities will be intro-

duced. Furthermore, toxic and hazardous wastes generated in the household, shop and office, shall also be separated at the source for securing the safe landfill operation.

(2) Waste collection and haulage

A solid waste collection and haulage plan should examine various types of collection system as possible to flexibly deal with diverse solid waste discharge methods and local requirements.

Collection system should be examined considering area conditions such as:

- a. Residential area
 - Detached houses
 - Flats
 - Gypsy area
- b. Commercial area
- c. Bulk waste discharger (Markets, Public facilities, Hotels)

The basic system of waste collection should be as follows:

- a. Residential area
 - Frequency : Daily, alternate day, 2 or 3 times a week
 - Collection point: Door to door or waste station
 - Vehicle : Compactor truck
 - Storage : Plastic bag and/or container
- b. Commercial area
 - Frequency : Daily, alternate day, 2 or 3 times a week
 - Collection point: Door to door or waste station
 - Vehicle : Compactor truck
 - Storage : Plastic bag and/or container
- c. Gypsy area
 - Frequency : Daily, alternate day, 2 or 3 times a week
 - Collection point: Door to door or waste station
 - Vehicle : Compactor truck
 - Storage : Container
- d. Bulk waste dischargers (Market, Hotel, Public facility)
 - Frequency : Daily, alternate day
 - Collection point: Door to door (at each premise)
 - Vehicle : Large compactor or arm-roll

- Storage : Hauled container, container or plastic bag

There are so many alternatives for waste collection so that 2 or 3 alternatives should be selected for a detailed comparative study through screening and preliminary evaluation.

The collection and transportation plan should include the following items for each collection system (ie. domestic waste, commercial waste, bulky waste and market waste, and etc.).

- Discharge method(household bin or plastic bag, etc.)
- Discharge (collection) points (door-to-door collection or station collection)
- Collection frequency
- Collection zones
- Collection equipment
- Collection crew
- Garage for collection vehicle
- Maintenance plan

Provision of a transfer station may prove feasible if long distance haulage is required. Therefore, it should be examined carefully by comparing with the introduction of large collection vehicles which also have advantages in the case of long distance haulage.

There are 2 types of transfer station for studying as alternatives. One is the compactor type and the other is the non-compactor type that costs less for construction and operation.

The following items should also be examined for the cost effective operation of the transfer station.

- Location
- Capacity of station
- Capacity of transfer haulage vehicle
- Type of transfer system
- System flow (Vehicles and/or Rail Transfer)
- Operation and maintenance plan

(3) Treatment and recycling

Treatment has the advantage of reducing the amount of waste disposal and land required for final disposal. It also has the advantage of reducing environmental impacts and operation

cost of final disposal, in addition to the earlier stabilization of waste. Resource recovery can be expected through the treatment.

There are several systems for treatment which could possibly be introduced for SWM. However, the financial capability for introduction of these treatments system should be carefully examined because they require not only large investment costs but also higher maintenance and operation costs as compared to sanitary landfill.

Where treatment facilities are considered feasible, types and sizes of the facilities to be constructed (ie. incineration plants, composting plants, and refuse derived fuel, etc.) should be described. Characteristics of each treatment facility are shown in Table 4-6-1.

Types and sizes of treatment facilities to be introduced largely depend on the characteristics of solid waste in question, difficulty in securing final disposal sites, location of final disposal sites and location of treatment facilities. The contents of a treatment facility plan should be summarized under the following headings.

- Location
- Size and type
- General plan
- System flow
- List of main equipment
- Access road(s)
- Environmental conservation plan (pollution control plan)
- Operation and maintenance plan

(4) Final disposal

Introduction of a sanitary landfill system is required to meet the Bulgarian Waste Act, EC Annex 1 Rules and the ETC 8, and also to achieve a higher standard of public health.

The concepts of sanitary landfill are summarized as follows:

- a. Clear boundary of landfill site with fence and clear buffer zone
- b. Embankment surrounding the solid waste landfill
- c. Daily cover and compaction of solid waste
- d. Gas removal system
- e. Impermeable liner to prevent seepage of leachate, if required

Table 4-6-1 Characteristics of Treatment Facilities

Treatment Facilities	Re-Covered Materials	Main Purpose of System	Contribution to Landfill			Special Caution			Marketability of Recovered Material or energy	Environmental Impact	Remarks
			Volume Reduction	Harmless	Stabilization	Reliability of Technology	Pre-Treatment	Rejected Substances	Acceptability of Refuse Quality	Initial & Operation Cost	
Composting	Compost	Conversion to Fertilizer	F	F	F	E	F	Glass, Stone, Plastic, Dry Cell	F	F	F (Odor)
RDF Plant	Solid Fuel	Conversion to Fuel	F	F	F	F	F	Incinerable	F	F	F (Noise & dust)
Pyrolysis Gasification	Gas or Oil		G	G	G	F	F	Incinerable, Carbon	F	P	G
Slagging Pyrolysis	Gas and Slag	Volume Reduction & Prevention of Water Pollution	E	E	G	F	F	-	G	P (Additional Fuel Expenses)	G
Incineration	Heat (Residue), Ash, (Covered Soil), Ferrous (Residue)	Volume Reduction & Energy Conversion	G	G	G	E	G	-	E	F	G
Crushing & Shredding	Ferrous etc.	Volume Reduction	F	F	G	G	(Extra-ction of Explosive objects)	Discharged Material	F	F	F (Noise & dust)
Sorting (Mechanical or Manual)	Ferrous, Glass, Paper, Plastic etc.	Recycling	F	F	F	E	F	Discharged Material	F	F	G

Legend: E-Excellent, G-Good, F-Fair or () to be considered, P-Poor and () showing reason

- f. Leachate collection and treatment
- g. Drainage system for surrounding area
- h. Protection measures for insects, rodents, etc.
- i. Control and check of waste amount and composition to be disposed of

Landfilling is classified into the following 4 levels according to the types of environmental protection measures provided:

- Level 1: Controlled tipping with periodical soil covering (anaerobic)
- Level 2: Landfill with daily soil covering and boundary structure (anaerobic)
- Level 3: Landfill with leachate collection and circulation (Semi-aerobic)
- Level 4: Landfill with leachate treatment and gas removal system (aerobic)

It is desirable that priority be given to Level 4 sanitary landfill operation in the light of the Waste Act and ETC 8.

The master plan should clearly state the steps required to achieve these targets up to the target year based on the financial capability of the Local Government.

Policies regarding the final disposal site significantly affect the entire SWM system and, therefore, it is necessary for the final disposal plan to be clearly defined in terms of capacity and location up to the target year.

The covering materials required throughout the landfill period should be secured with enough quality and quantity, and the future use of the landfill sites after filling up should be examined. In addition, the following points should also be clarified when the construction of a landfill disposal site is planned:

- Social and natural conditions
- Surrounding topography and geology
- Current use of water resources (surface and groundwater) in adjacent areas
- The current and future land use of adjacent areas

The contents of a final disposal plan should be summarized under the following headings:

- Location and site area

- Landfill shape
- Disposal capacity
- Required covering materials
- Life expectance
- Types of storage structures
- Rainfall drainage facility
- Seepage protection of leachate
- Leachate collection facility
- Leachate treatment facility
- Gas removal system
- Site office
- Weigh-bridge
- Access roads
- Disinfection
- Fire protection
- Fences, gates and green buffer zone
- List of main equipment
- Monitoring (pollution control) facility
- Organization and manpower plan
- Operation and maintenance plan

(5) Street sweeping

The frequency of street sweeping should reflect the priority ranking of the classification of road/street such as main trunk road, trunk road and streets in commercial or residential areas.

Reduction of solid wastes scattered in roads/streets can be achieved if residents and street passenger are made aware that they should not throw or dump wastes arbitrarily, and the sweeping frequency can be accordingly reduced. This aspect should be carefully considered when determining the sweeping frequency at the target year.

The possibility of introducing mechanized sweeping should also be examined instead of manual sweeping.

The contents of a plan for street sweeping should be summarized under the following headings.

- Total length or area subject to sweeping
- Sweeping frequency
- Cleansing method (manual or mechanized)
- Equipment and tool
- Manpower plan
- Operation and maintenance

(6) Finance and charges

To establish a concrete financial base on SWM, waste collection charges and service level should be examined. An appropriate level of service should be planned considering the financial condition of the local government. Generally it should be kept in mind that more than 50% of the assessment revenue is used for SWM. Therefore, the following points should be examined carefully.

- a. Collection charges
- b. Assessment ratio and service level
- c. Tipping charges

4.6.3 Preparation of possible alternatives

Alternatives to be selected should be those that serve the targets which are set based on the local condition in the local government area under consideration. Many alternatives can be made by combining the possible components produced through consideration of the aspects mentioned above.

An alternative plan may therefore consist of several different technical system components. Numerous alternative plans might possibly be generated with several combinations of those components. It is advisable that the number of alternative plans should be limited to eight or so by means of preliminary screening.

Generation of possible alternatives must consider both the technical view point and the institutional and financial view points. It is relatively easy to evaluate proposed technical systems, and setting clearly defined targets (level of achievement) helps the persons concerned to direct their efforts towards attainment of the goals. However, some technical systems may prove to be unfeasible from financial or managerial view points, so careful consideration of this aspect is also required.

4.6.4 Cost estimation for alternatives

Total costs of SWM should be fairly estimated. The costs can be estimated in terms of both investment costs and annual expenses.

- a. Investment costs
 - Purchase cost of collection vehicles and communal containers.
 - Construction cost of major facilities such as final disposal sites, treatment plant, garage, workshop and cleansing office.
 - Purchase cost of heavy equipment required in disposal sites or treatment plants.
 - Land acquisition cost for major facilities.

- b. Annual expenses at target year
 - Operation and maintenance costs
 - Worker salaries
 - Utilities
 - Spare parts
 - Fuels
 - Depreciation

Estimation results of the investment costs and annual expenses should be summarized as shown in Tables 4-6-2 and 4-6-3.

The revenue of each alternative should be estimated for evaluation purposes. The following are major sources of revenue to be considered:

- Waste collection charges
- Tipping charges for the waste hauled directly to disposal sites or treatment plants
- Resource recovery
- Future land value expected after completion of disposal sites

Table 4-6-2 Investment cost

(US\$ million)

	Alt 1	Alt 2..	Alt n	No change
<hr/>				
1) Construction				
(1) Transfer Station				
- Building and foundation works				
- Machinery & Equipment				
Subtotal				
(2) Incinerator				
- Building and foundation works				
- Machinery & Equipment				
Subtotal				
(3) Disposal Site				
- Building and foundation works				
- Machinery & Equipment				
Subtotal				
(4) Other facilities				
- Building and foundation works				
- Machinery & Equipment				
Subtotal				
2) Purchase of Vehicles & etc.				
(1) Collection Vehicles				
(2) Haulage Vehicle				
- Transfer Station				
- Incineration				
(3) Heavy Equipment				
- Transfer Station				
- Final Disposal site				
3) Land Acquisition/compensation for facility sites				
<hr/>				
Total				
<hr/>				

Table 4-6-3 Annual Expenses at Target Year
(US\$ million)

	Alt. 1	Alt. 2..	Alt. n	No change
<hr/>				
- Collection				
Depreciation				
Personnel Cost				
Maintenance Cost				
Fuel & etc.				
Subtotal				
- Transfer Station				
Depreciation				
Personnel Cost				
Maintenance Cost				
Fuel & etc.				
Subtotal				
- Incinerator				
Depreciation				
Personnel Cost				
Maintenance Cost				
Fuel & etc.				
Subtotal				
- Final Disposal				
Depreciation				
Personnel Cost				
Maintenance Cost				
Fuel & etc.				
Subtotal				
- Cleansing Work				
Personnel Cost				
Fuel etc.				
Subtotal				
- Supervisor & staff				
Personnel Cost				
<hr/>				
Total Cost				

Note: "No change" refers to the "do nothing" situation.

4.7 Preliminary environmental impact assessment (EIA)

Environment quality order (Waste Act) (Environmental Impact Assessment) 1993 may come into force from 1994. Construction of final disposal sites, transfer stations and waste treatment facilities should be evaluated in terms of environmental impacts according to the procedure described in the Waste Act (EIA procedure).

A preliminary Environmental Impact Assessment should be executed during the site selection stage because it is important to select suitable sites to reduce the environmental impact to areas surrounding major facilities. One of major criteria for selection of candidate sites is environmental acceptability of potential sites. The environmental evaluation is necessary for selection of candidate sites for major facilities and selection of the most favorable alternative.

Environmental impacts of major facilities for SWM will differ according to the location of sites and functions of the facilities. It should be noted that environmental impacts of the present system should be evaluated in comparison with those of proposed facilities. For sanitary landfill, water pollution is a main cause of environmental impacts, while air pollution is a main factor if incineration is selected.

4.8 Selection of the most appropriate alternative

4.8.1 Criteria for evaluation

The criteria should be established in respect to the following aspects through discussions with related authorities.

- a. Technical aspects
- b. Economic and financial aspects
- c. Social and legal aspects
- d. Environmental aspects

Criteria should include improvement of working conditions of laborers. The necessity for such improvement will be an important issue for continuous operation of cleansing services by means of maintaining sufficient manpower.

4.8.2 Selection of the most appropriate alternative

Each alternative should be evaluated through the four criteria described in 4.8.1 above.

Economic and financial aspects are crucial points for successful implementation of a SWM master plan. All departments of the Local Government should carefully examine these points. It is a national statutory requirement to provide proper SWM services in order to maintain a clean and sanitary living environment.

Therefore, financial sources should be confirmed before selecting the most appropriate alternatives. The financial sources include the Local Government budget and waste collection and tipping fees.

Based on the evaluation of alternatives from the aspects mentioned above, the most favorable alternative can be selected as a SWM master plan for the Local Government.

4.9 Organization, institution and finance

4.9.1 Organization

Responsibility for each service should be clearly assigned to the related authorities. The functions of each authority at the target year should be clearly determined and the organization capable of properly conducting these functions should be established considering necessary manpower.

It is desirable that one authority has complete responsibility for SWM in each local government.

The major functions of the executing body are generally as follows although they depend on the size of the Local Government and the systems employed:

- a. Cleansing service
- b. Treatment and final disposal operation
- c. Planning and development
- d. Supervision
- e. Procurement and maintenance of equipment
- f. Administration and accounting
- g. Public relations and education of residents
- h. Staff training and recruiting
- i. Fostering of private companies

Where some of these functions are assigned to other departments, the organization should be decided accordingly.

The work assignment and the manpower allocation for each organization involved in SWM should be clearly shown in the master plan.

4.9.2 Privatization

Privatization of the cleansing service is one of the policies of the Central Government. Each Local Government is expected to formulate its own policy and the privatization plans should cover such aspects as types of services, extent (percentage) of privatization and the schedule for implementation of privatization, etc.

The form of privatization should be to contract out services because the SWM comes under the responsibility of the Local Government as described in the Privatization Act 1992 (Transformation and Privatization of State-owned and Municipal Enterprises Act, Decree No. 187, 156, 155, and 105) and it is one of the basic services for residents.

Proper privatization requires consideration of the following:

- a. Proper tendering and evaluation system to select reliable contractors
- b. Proper scale and period of each contract project
- c. Budget preparation for contract project

The extent of privatization depends on several factors including:

- a. Extent of the difference in the cost-effectiveness between the contractors and the Municipality. (Larger differences will make it feasible to contract out more of the service.)
- b. Availability of reliable contractors. (The greater availability of reliable contractors will make it feasible to contract out more of the service.)
- c. In the shorter term, the current Municipal resources (manpower, equipment, office, workshop, land, etc.) should be carefully examined in order to fully utilize them before deciding the degree and manner of contracting-out.

4.9.3 Institution

Based on the national laws, regulations and standards stipulated by the Ministry of Environment, Ministry of Health and Ministry of Regional Development, Housing Policy and Construction, each Local Government should enact by-laws on the following in accordance with the local characteristics:

- Division of responsibility for SWM
- Contracting out work to the private sector and supervision
- Collection and tipping charge system
- Criteria for accepting solid waste for treatment and disposal facilities.
- Working conditions of laborers
- Recycling
- Requirements of proper waste discharge
- Penalty clauses

4.9.4 Residents cooperation

It is essential to enlist the active participation of residents (generators of solid waste) for the improvement of SWM. Measures to obtain residents' cooperation on the following three points should be examined:

- a. Proper storage of solid waste
- b. Discharge at the specified day, time and place
- c. Source separation for recycling
- d. Cooperation to keep the city clean

The SWM system should be changed from time to time to cope with changing socio-economic condition, in turn reflecting the progress of urbanization. Therefore the active cooperation of residents is indispensable for the success of these changes. Public relations and mass-education activities should be regularly conducted to sharpen awareness on the part of the residents of the importance of SWM to facilitate their cooperation. The necessary arrangements should be made regarding the following to enlist resident cooperation.

- Provision of a complaint desk
- Mass-education activities (newsletters and supplementary textbooks, etc.)
- Promotion of district cleaning day
- Promotion of recycling
- Cooperation of community, religious and other organizations

4.10 Phased development plan and financial plan

4.10.1 Phased development plan

Phased development to achieve the targets set out in the SWM master plan should be examined in detail while taking into account financial capability at each target year.

A phased development plan should be provided for:

- a. Expansion of service coverage
- b. Introduction of future collection system
- c. Introduction of future street sweeping
- d. Construction of major facilities such as treatment and a final disposal site.
- e. Procurement of equipment

4.10.2 Financial plan

The possibility of securing the necessary investment and operation funds to achieve the master plan by the target year should be assessed from the long-term financial perspective.

Though rationalization of SWM would contribute to a decrease in SWM costs, the decrease is unlikely to be large enough to offset an increase in future SWM costs due to the increasing waste amount, rising salaries, longer distances to disposal sites from urban areas, and changes in waste composition.

As it may be difficult to secure the initial investment funds because of the relatively small cost-reduction effect in the immediate future, it is particularly important to clearly show that the rationalization of cleansing service based on the master plan will be helpful in reducing the longer term financial burden on the Local Government. The financial feasibility of the master plan should be examined through the following aspects:

- Total investment amount
- Operation and maintenance cost
- Possible decrease of SWM budget share of the municipal budget
- Forecast of collection and tipping charges from business/commercial establishments
- Available loan sources and loan conditions
- Cash flow
- Sensitivity analysis on major factors.

4.11 Equipment maintenance and training program

4.11.1 Equipment maintenance

The maintenance of heavy machinery and vehicles is indispensable for stable cleansing services. Therefore, the maintenance system regarding machinery and vehicles should be clearly determined.

The basic components of proper maintenance of equipment are as follows:

- a. Preventive maintenance
- b. Proper replacement of equipment based on the economic life
- c. Maintenance record and spare parts control
- d. Training for drivers to prevent overloading, to maintain safe driving and to make a daily check and operation record of equipment.

The procurement and maintenance of cleansing equipment owned by the Local Government can be conducted by either the competent authority, by the private sector or by both.

4.11.2 Training program

A training program on SWM should be prepared to upgrade the managerial and technical skills of the staff including workers.

The Local Government should integrate any national training courses with its own training schedule, taking the local characteristics into consideration. Furthermore, a regular forum should be established for the exchange of opinions between managerial staff and workers:

In general, courses on the following subjects should be provided for staff and workers.

- Work manner (including attitude towards residents)
- Work rules
- Accident prevention
- Equipment handling

CHAPTER 5

GUIDELINES FOR IMPLEMENTATION OF THE MASTER PLAN

5. Guidelines for Implementation of SWM Master Plan

(1) Priority Projects

In developing the master plan a number of activities involving facilities construction, equipment procurement and renovation, institutional development and financing will be identified.

Based on such factors as urgent need for the activity in question, available financial resources, legislative conditions, technical skills, these activities will be scheduled in a phased plan.

In the SWM master plan for SGM projects of recognized urgency and not forming too heavy a financial burden were scheduled for the first phase of the master plan, ie the period of 1995 to 2000. These projects are as follows:

- Collection and haulage improvement plan
- Final sanitary landfill disposal site
- Recycling pilot project
- Establishing Public Limited Company for SWM
- Revision of waste fee system

Of the above projects the project that will require most time is the disposal site construction project. Identification of a site, land acquisition of that site and obtaining the approval of the involved parties is a tedious and time consuming exercise which may take several years. Bearing these conditions in mind, early phasing of this project is very important. Process for constructing a new disposal site should begin while there is at least 5-6 years of remaining capacity in existing disposal sites.

(2) Feasibility study

It is necessary to conduct a feasibility study for the priority projects selected from the master plan prior to implementing these projects. Feasible projects shall be those which fulfill the conditions listed below:

- a. Funding is feasible
- b. Land acquisition is feasible
- c. Securing of staff is feasible
- d. There are no legal problems
- e. The agreement of those concerned is obtainable

(3) Legal requirements

In addition to implementing the above, some legal requirements must be addressed. In the case of construction of new facilities in addition to obtaining land acquisition rights, Bulgarian law stipulates the need for an EIA on the effects the project will have on the surrounding environment.

Development of a new institutional structure, as the public limited company proposed in the master plan for SGM, should conform with existing laws. In some instances modifications to laws may be recommended when necessary. The same case applies with the introduction of a revised fee system proposed in the same study.

(4) Implementation schedule

For each of the priority projects an implementation schedule shall be prepared for the following activities:

- Feasibility study
- Basic design
- Detail design
- EIA
- Land acquisition
- Securing of funding
- Construction/procurement

ANNEX 1

SOLID WASTE SURVEY CONTENTS

ANNEX 1: SOLID WASTE SURVEY CONTENTS (EXAMPLE)

Solid waste survey methods are very important for evaluation of treatment and disposal facilities, and their design, as well as collection and haulage efficiency. Attached as an example is the survey methodology prescribed by JICA for the SWM study of Sofia Greater Municipality. These requirements can be used as a guide for solid waste surveys in other local government authorities, but should be amended as necessary to take local conditions into account.

TECHNICAL SPECIFICATIONS

1. GENERAL

This technical specifications document shall be applied to the Solid Waste Survey of the Solid Waste Management Study for the Territory of the Sofia Greater Municipality carried out by the Japan International Cooperation Agency (JICA).

2. CONTENTS OF WORK

The contents of the Work shall be as follows:

a. Quantity of the solid waste

Survey items at each of the two disposal sites (DOLNI-BOGROV and SUHUDOL) shall be as follows:

- (1) Number of all solid waste transportation vehicles entering the disposal sites
- (2) Types of all the solid waste transportation vehicles (Volume capacity, Type, etc.)
- (3) Collection area of each transportation vehicles (Classification by 24 district of Sofia)
- (4) Weight carried in of each transportation vehicle
- (5) Number of cleansing employees (other than the driver) in each vehicle

Period of survey shall be 7 days continuously.

b. Unit generation of solid waste

The total weight and volume of generated waste at 15 selected areas in the City shall be surveyed daily for 7 days continuously, and an oven-dry sample shall be collected from each area. The survey items shall be as follows:

- | | | |
|-------------------|---|--|
| Residential area | : | Number of houses and inhabitants
Weight and volume of waste generated
(Nine (9) samples) |
| Commercial area | : | Number of shops, offices, etc
Weight and volume of waste generated
(Two (2) samples) |
| Market area | : | Area of the market
Weight and volume of waste generated
(One (1) sample) |
| Public facilities | : | Number of the personnel
Area of Office floor
Weight and volume of waste generated
(Two (2) samples) |

Hotel : Number of the guest rooms
Weight and volume of waste generated
(One (1) sample)

c. Solid waste characteristics survey of 15 specified places

Within the specified 15 areas the following items shall be surveyed:

- (1) Residential area
 - Number of households and population
 - Frequency of waste collection
 - Collection route/collection time
 - Number of containers distributed
 - Type of container/collection vehicle
 - Fee for waste collection
- (2) Commercial area
 - Number of households and population
 - Number of shops
 - Frequency of waste collection
 - Collection time/route
 - Number of containers distributed
 - Fee for waste collection
- (3) Market area
 - Area of the market
 - Frequency of waste collection
 - Collection time
 - Types of containers/collection vehicles
 - Number of containers distributed
 - Fee for waste collection
- (4) Public Facilities area
 - Number of offices and total floor area
 - Frequency of waste collection
 - Collection time/route
 - Types of containers/collection vehicles
 - Number of containers distributed
 - Fee for waste collection
- (5) Hotels
 - Number of guest rooms
 - Number of office workers/clerks/workers
 - Collection time
 - Types of containers/collection vehicles
 - Number of containers distributed
 - Fee for waste collection

d. Properties of the solid waste

The obtained waste samples shall represent average solid waste at the 15 areas.

- (1) Chemical analysis : Net calorific value

- (2) Elemental analysis : Carbon (C)
Hydrogen (H)
Nitrogen (N)
Sulfur (S)
Chlorine (Cl)
Oxygen (O)
etc.
- (3) Three components : Combustible solid
Moisture content
Ash content
- (4) Bulk density
- (5) Physical Composition: Paper, Leather, Fiber,
Glass, Plastic, Metal,
Plant, Residues of ani-
mals, Vegetable and putres-
cent material, Sand and
stone, Fine dust & cinder,
Others

- e. Others
The following items shall be checked at the time of survey.
 - Temperature
 - Relative Humidity
 - Weather
- f. Existing data related to Items a)-d) shall be collected.
- g. Compilation of Data and Reporting
Five copies of the report shall be submitted in English, and shall include the followings;
 - (1) Location Map
 - (2) Survey Method
 - (3) Results of Survey

3. TIME SCHEDULE

The scheduled time for completion of works shall be one month.

ANNEX 2

SURVEY ON DEGREE OF CITIZENS' AWARENESS

ANNEX 2: SURVEY OF DEGREE OF CITIZENS' AWARENESS (EXAMPLE)

The attached survey methodology was prescribed by JICA for the Solid Waste Management Study for Sofia Greater Municipality. The requirements and questionnaire can be used as a guide for similar surveys for other local government authorities, but should be amended as necessary to take local conditions into account.

TECHNICAL SPECIFICATIONS

1. GENERAL

This technical specifications document shall be applied to the Survey of Degree of Citizen's Awareness of the Solid Waste Management Study for The Territory of The Sofia Greater Municipality carried out by the Japan International Cooperation Agency (JICA).

2. CONTENTS OF WORK

The contents of the work shall be as follows;

- 1) A hearing survey shall be carried out for one hundred (150) households from 15 areas of the city using a questionnaire form prepared by the Contractor and approved by JICA study team. Survey method shall be the distribution of questionnaire sheets and direct hearing survey. Sampling method for selection of households and distribution of households selected shall be prepared by the Contractor and approved by JICA Study Team.
- 2) The items in the questionnaire form shall cover the contents of the attached sample. The Contractor shall revise the attached sample and modify it taking into consideration local conditions and after discussion with the JICA Study Team. Questionnaire forms shall be prepared in the Bulgarian language, however the Contractor shall prepare an accurate English translation of the form for the JICA Study Team prior to the commencement of the Survey.
- 3) Existing data of citizen's awareness for Solid Waste Management shall be collected.

3. COMPILATION OF DATA AND REPORTING

Five copies of the final report in English shall be submitted. The final report shall include the following:

- 1) Location Map
- 2) Work Method
- 3) Results of Survey

The actual questionnaire forms used in the Survey shall be submitted to JICA Study Team at the end of the Survey along with the reports.

4. TIME SCHEDULE

The scheduled time for completion of works shall be three weeks.

HOUSEHOLD QUESTIONNAIRE SAMPLE

Date: _____
Name of Interviewer: _____

INTERVIEW DATA

- A. Serial Number (1 - 10) : _____
- B. Area Code (1 - 15) and Interview Number: _____ / _____
- C. Name of Area: _____
- D. Type of Building/Residence: _____
- E. Household size:
 - Number of Persons: _____
 - Number of Families: _____
 - Number of Males: _____
 - Number of Females: _____
 - Number over 55 years: _____
 - Number under 18 months: _____

QUESTIONNAIRE

1. STORAGE OF HOUSEHOLD WASTE (questions 1 and 2)

1) Container

1.1) Do you use any storage container in your house?

- (a) Yes (b) No

1.2) If Yes, then what type of container?

- (a) Cardboard Box (b) Plastic bin
(c) Plastic bag (d) Waste basket
(e) Tin container (f) Others: _____

2) Storage Problems

2.1) Do you have any troubles with stored household waste?

- (a) Yes (b) No

2.2) If Yes, then what kind of troubles?

- (a) Family health (b) Flies/Ticks
(c) Odor (d) Others: _____

2. DISCHARGE OF HOUSEHOLD WASTE (questions 3 to 7)

3) Where do you discharge your waste?

- (a) Outside the door (b) In front of building door
(c) Communal container (d) Open space

- (e) In house until collection truck arrives
 (f) Others: _____
- 4) How often do you discharge your waste outside the house?
 (a) Once a day (b) A few times a day
 (c) Once in 2 days (d) Once in 3 days
 (e) Once in 4 days (f) Once a week
 (g) Irregular (h) Others: _____
- 5) What time do you discharge your waste?
 (Indicate the time in parenthesis)
 (a) Morning () (b) Mid-day ()
 (c) Evening () (d) Late at night ()
 (e) Irregular
- 6) Who discharges the waste?
 (a) Housewife (b) Husband
 (c) Child (d) Elderly person
 (e) Servant (f) Others: _____
- 7) What container do you use to carry the waste from the house to outside?
 (a) Cardboard Box (b) Plastic bin
 (c) Plastic bag (d) Waste basket
 (e) Tin container (f) Paper bag
 (g) No container (h) Others: _____
3. COLLECTION OF HOUSEHOLD WASTE (questions 8 to 9)
- 8) Waste Collection Frequency
- 8.1) How often is the discharged waste collected?
 (a) Within the same day (b) Next day
 (c) In 2 or 3 days (d) Irregular
 (e) Rarely collected (f) I don't know
- 8.2) Do you think the present collection service is satisfactory?
 (a) Yes (b) No
- 9) Collection Fee
- 9.1) Do you pay for waste collection from your house?
 (a) Yes (b) No
- 9.2) If Yes, to whom?
 (a) Door man (b) BEKASE
 (c) CHISTOTA (d) Others: _____

9.3) How much is the charge per month?
_____ Leva _____ Stotinki per month

4. SEPARATION OF HOUSEHOLD WASTE (question 10)

10) Separation of Waste

10.1) Do you separate waste in your house?

- (a) Yes (b) No

10.2) If Yes, what do you separate?

- (a) Glass bottle (b) Can (c) Bone
(d) Newspaper (e) Rags (f) Shoes
(g) Plastic bottles (h) Metal (i) Books
(j) Others: _____

10.3) What do you do with the separated waste items?

- (a) Sell (b) Give away
(c) Discharge as separated waste
(d) Others: _____

5. STREET WASTE (questions 11 to 14)

11) Do you think the present condition of the street cleanliness near your house is good?

- (a) Yes (b) No

12) What trouble do you have with street waste?

- (a) Children' health (b) Residents' health
(c) Fly/tick (d) Odor
(e) Dirty streets (f) Aggravating traffic
(g) Others: _____

13) Citizens participation in street sweeping

13.1) Do you sweep streets near your residence?

- (a) Yes (b) No

13.2) If Yes, how often?

- (a) Every day (b) 2-3 times a week
(c) Every week (d) Once in a while

13.3) What do you do with the waste you sweep?

- (a) Leave on the street (b) Put in communal container
(c) Place in open space

14) Do you think the present condition of street waste station (communal container or site where waste is gathered) is good?

6. CONTAINER SYSTEM (question 15)

15) Date on Container System

15.1) Do you know that the city uses a communal container system?

- (a) Yes (b) No

15.2) If Yes, what is your opinion concerning the distance of the nearest communal container to you?

- (a) Close (b) A little far
(c) Very far

15.3) Concerning container size with respect to waste amount?

- (a) Too big (b) Adequate (c) Too small

15.4) Do you think the number of containers is enough?

- (a) Yes (b) No

15.5) Do you think the collection is done reasonably well?

- (a) Yes (b) No

15.6) Does the container fit in with the area's atmosphere?

- (a) Yes (b) No

15.7) Do you think collection by containers creates any problems?

- (a) No problem
(b) Containers are always full
(c) Garbage is scattered around the container
(d) Emptying of loaded containers is always late
(e) Others: _____

7. STREET SWEEPING (question 16)

16) Municipal Street Cleaning

16.1) Do you think the Municipality makes considerable effort to sweep the streets?

- (a) Yes (b) No

16.2) Is the street sweeping done near your building?

- (a) Yes (b) No

16.3) It is said that citizens' participation is necessary in this effort. Do you have any intention to participate?

- (a) Yes (b) No

16.4) What kind of contribution can you make?

- (a) Payment for the work
(b) Provision of actual labor
(c) Not throwing waste to the streets
(d) Others: _____

8. WASTE COLLECTION FEE (question 17)

- 17) How much are you willing to pay for waste collection service from your house per month?
_____ Leva _____ Stotinki per month

9. IMPROVEMENT OF SERVICES (question 18)

- 18) What do you think are the services that the Government has to improve?

(a) Roads	(b) Sewerage
(c) Water supply	(d) Electric utilities
(e) Education	(f) Greening
(g) Housing	(h) Transportation
(i) City cleansing	(j) Waste collection & disposal
(k) Others:	_____

10. WASTE TREATMENT AND DISPOSAL (questions 19 to 24)

- 19) Do you know the remaining capacity of the two waste disposal sites (DOLNI-BOGLOV and SUHODOL) presently in use?

(a) Yes (b) No

- 20) If yes, what methods do you think are suitable to counter the urgent need to find other disposal systems?

(a) New disposal sites (b) New incinerator facilities
(c) Others: _____

11. GENERAL QUESTIONS (questions 21 to 26)

- 21) How many persons are there in your family?

- 22) Husband's Occupation?

- 22.1) Does your husband have regular work?

(a) Yes (b) No
(c) On pension

- 22.2) If yes, what is your husband's occupation?

(a) Company or office name: _____
(b) Department: _____
(c) Position: _____
(d) Type of work: _____

23) Housewife's Occupation

23.1) Does the housewife work?

(a) Yes (b) No

23.2) How often does the housewife work?

_____ days per week

24) How do you rate your living standard?

(a) Low (b) Middle (c) High

25) What is your family income?

About _____ Leva per _____

26) How much do you pay for each of the following items?

(a) Food: _____

(b) Housing rent: _____

(c) Clothes: _____

(d) Health/medical care: _____

(e) Education: _____

(f) Electricity: _____

(g) Transportation: _____

(h) Water supply: _____

(i) Laundry and cleaning: _____

(j) Savings: _____

(k) Others: _____

(l) Total: _____

12. PERSONAL OPINIONS IF ANY

Please let us know any complaints, problems, requests and/or suggestions about waste collection fee, frequency, manner, desire to use plastic bags, municipal and citizen street sweeping, etc.

INTERVIEWER'S COMMENTS

This page shall be filled by the Interviewer after the Interview.

1. Is there a communal container or waste station (place where garbage is gathered for collection) near the site where the interview was done?
(a) Yes (b) No
2. If yes, what or where is it?
(a) Communal container
(b) Open area beside the building
(c) On the sidewalk
(e) In some part of the street
(f) There is no waste station
(waste scattered on the street or in an open area)
(g) Others: _____
3. How far is it from the building to the place indicated in question 2. above?
About _____ meters
4. What is the waste condition in front of the building?
(a) Clean (no waste is observed)
(b) A little dirty (some waste is observed)
(c) Dirty (waste is scattered here and there)
(d) Others: _____
5. Information about the street on which is located the building where the interview was conducted?
 - 5.1 Street width: _____ m
 - 5.2 Is the street paved?
(a) Yes (b) No
 - 5.3 Is there a sidewalk along the street?
(a) Yes (b) No
 - 5.4 Are there cars parked on the street which hinder access by collection vehicles?
(a) Yes (b) No
 - 5.5 Is the street easily accessible by waste collection vehicles?
(a) Yes (b) No
 - 5.6 If access is difficult, how is the waste collected?
(This question should be asked to people living near the street.)
(a) By BKC (b) By Chistota
(c) Nobody (d) Others: _____
6. Any special notes or comments by the Interviewer?

ANNEX 3

DATA COLLECTION FORMAT FOR TIME AND MOTION SURVEY

**Annex 3: Data Collection Format for a Time and Motion Study
(Example)**

This format should be modified and adapted to local conditions before use. Test use is strongly recommended to facilitate the proper adaption.

Surveyor Name:
Operating Company:
No. of Drivers:
Vehicle Type:

Date:
Vehicle License no.:
No. of Workers:
No. of Trips:

Weather:
No rain ()
Cont. rain ()
Interm. rain ()

[illegible]

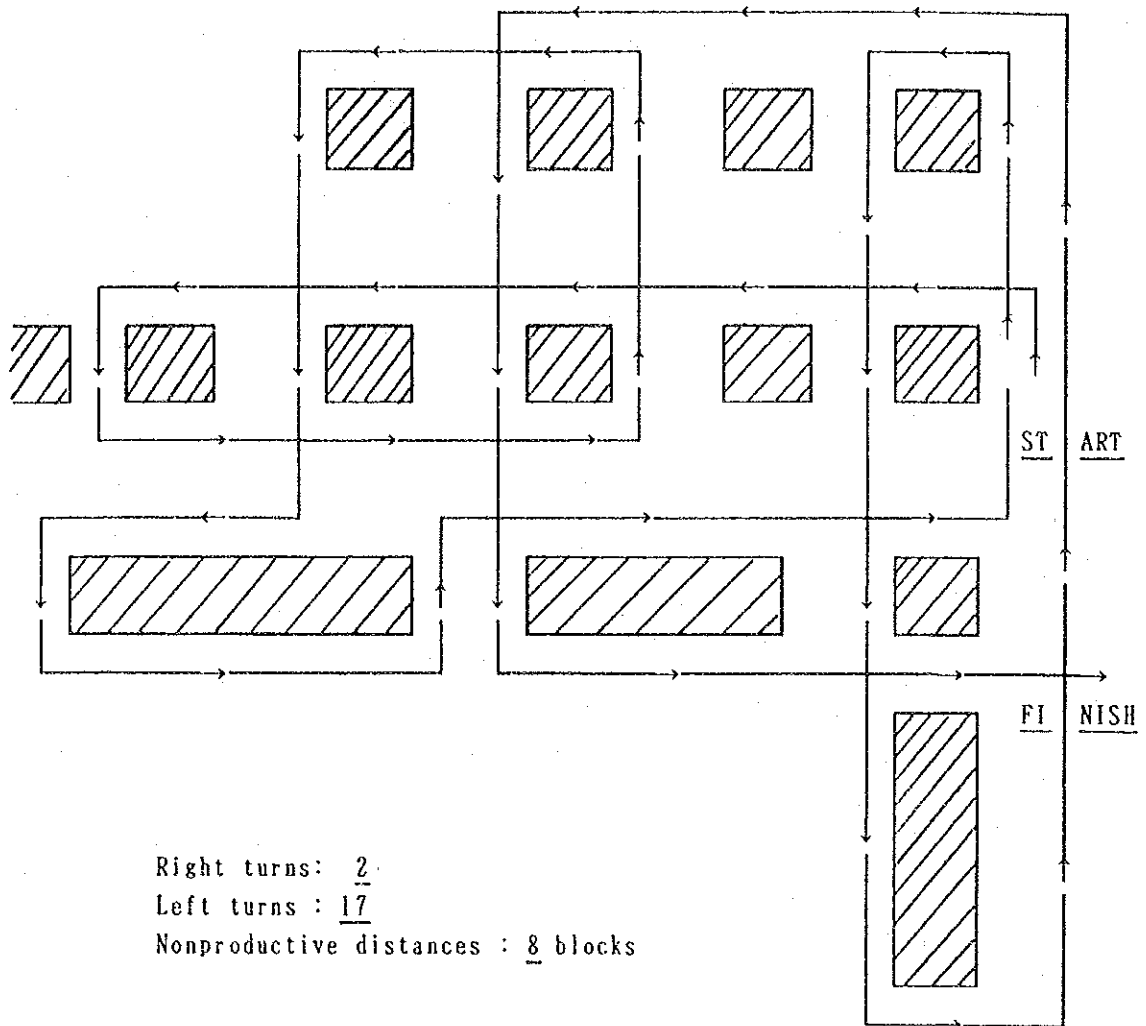
ANNEX 4

MODEL SOLUTION OF HEURISTIC ROUTING EXERCISES

Annex 4: Model Solution of Heuristic Routing Exercises (Example)

These are sample methods for a heuristic routing exercise. The sample methods given are not necessarily the best solution, and it may be possible to find better solutions using a trial and error basis. Improvement can be measured by comparing the number of right turns, left turns, U-turns and non-productive distances before and after the new routing.

Example Solution of Exercise-1



Right turns: 2
Left turns : 17
Nonproductive distances : 8 blocks

A - 21

ANNEX 5
EC REGULATIONS LIST

Annex 5: EC Regulations List (as reference)

1. COMMISSION OF THE EUROPEAN COMMUNITIES - COUNCIL DIRECTIVE on the landfill of waste
2. RICHTLINIE DES RATES von 15, July 1975 uber Abfalle
3. COUNCIL DIRECTIVE of 15, July 1975 on waste
4. COMMISSION OF THE EUROPEAN COMMUNITIES - COUNCIL DIRECTIVE on the disposal of polychlorinated biphenyls and polychlorinated terphenyls
5. COUNCIL DECISION, 1 February 1993 on the conclusion, on behalf of the community, of the convention on control of transboundary movements of hazardous wastes and their disposal (Basel Convention)
6. COMMISSION ON THE EUROPEAN COMMUNITIES - A community strategy for waste management
7. COMMISSION ON THE EUROPEAN COMMUNITY - Recommendation for a COUNCIL DECISION concerning Community participation in negotiation of agreements with non-member countries on mutual administrative assistance in customs matters (EFTA countries)
8. COMMISSION - Proposal for a Council Directive on the incineration of hazardous waste
9. COUNCIL RESOLUTION of 12 December 1990 on waste policy
10. COUNCIL DIRECTIVE of 12 December 1991 on hazardous waste
11. COUNCIL DIRECTIVE of 18 March 1991 on batteries and accumulators containing certain dangerous substances
12. COUNCIL DIRECTIVE, 18 March 1991 amending Directive 75/442/EEC on waste
13. COUNCIL DIRECTIVE, June 1989 on reduction of air pollution from existing municipal waste-incineration plants
14. COUNCIL DIRECTIVE of 8 June 1989 on the prevention of air pollution from new municipal waste incineration plants
15. COUNCIL DIRECTIVE, 12 June 1986 on protection of the environment, and in particular soil, when sewage sludge is used in agriculture

ANNEX 6

ENVIRONMENTAL IMPACT ASSESSMENT

ANNEX 6: ENVIRONMENTAL IMPACT ASSESSMENT

This is a summary of the Environmental Impact Assessment (EIA) regime relating to the development of the master plan for the solid waste management in local government.

(1) Sources of legislation relating to the environmental impact from development projects (including industrial and commercial development)

- Articles 19 to 23 of the EPL of 1991 (EPL)
- Regulation No. 1 on EIA of December 28, 1992 was adopted by the Minister of Regional Development and Construction, the Minister of Health and the Minister of Agriculture.

(2) Scope of activities subject to EIA process

Under the EPL, as amended, all activities of natural and legal persons and government bodies may be subject to EIA at the initiative of the Ministry of Environment, the regional Environmental Inspectorate of the Municipality, or concerned natural or legal persons.

In addition, the following projects are subject to mandatory EIA:

- National and regional development programs territorial and urban development plan and amendments thereto.
- Projects for reconstruction or enlargement of existing facilities which would be subjected to mandatory EIA before construction or adoption
- Major projects are subject to EIA to be carried out periodically as determined by the Ministry of Environment but at least once every 5 years
- Projects and facilities described in Appendices 1 and 2 to the EPL

Appendix 1 lists projects of international significance
Appendix 2 lists projects of natural and local significance

- Facilities for the neutralization of waste, underground storage sites and surface storage sites for wastes.
- Other projects:
Installations for the reprocessing, rendering harmless and storage of waste, unless included in Appendix 1
Treatment facilities
Sludge deposition sites

- Project modifications

Modifications of projects included in Appendices 1 and 2 to the EPL, undertaken exclusively or mainly for the development and testing of new methods or products and lasting for more than one year.

All existing programs, plans and projects as well as the firms, companies or operations could be subject to EIA if there is an indication that their operations are polluting the environment. In case of a negative EIA, the Ministry of Health may order an evaluation of the state of health of the affected personnel and an epidemiological study of the population. The polluters are given a time limit by the Ministry of Environment of no longer than five years to comply with the standards.

(3) EIA Process

a. Authority

The Ministry of Environment approves EIA of international importance.

The Regional Environmental Inspectorate with the participation of the Municipality, approves projects of local importance which have an effect on the territory under their control.

Under the regulation on EIA of 992 the Ministry of Environment approves, based on decisions of its Supreme Environmental Experts Council, the following EIA relating to:

- Listed projects of international importance
- Projects whose impact affects the region controlled by more than one Regional Environmental Inspectorate
- Projects which will generate waste water over 30 liters per second, or incinerated waste over 750 kg.

The Regional Environmental Inspectorate jointly with the Municipality approves EIA of all other projects, based on decisions of its advisory body, the Environmental Experts Council.

Representatives of the Ministry of Regional Development and Construction, the Ministry of Health and the Ministry of Agriculture participate in the meetings of the Environmental Experts Council ex officio.

b. Documentation

Under the EPL, as amended a planner must submit the following documentation to the Ministry of Environment or the Regional Environmental Inspectorate in order to EIA approval:

- Summary of the project
- Description of the environment which is expected to be affected
- Forecast of the expected impact
- Presentation of alternatives to implementing the project, including withdrawal
- List of the parties who could be affected by the project
- Any other materials required by Ministry of Environment
- Conclusion of the experts who have performed the EIA

Regulation no. 1 on EIA of 1992 requires the submission of a preliminary EIA report to the relevant authority which determines whether a final EIA will be necessary. The steps of the EIA procedure are described in the regulation as follows:

- Preliminary EIA report to be submitted to the relevant authorities at the same time as approval of the project is being requested
- Final EIA report to be submitted to the relevant authority at the same time as the application for a construction permit is being made
- Hearing on the EIA as a condition for approval of the planner proposal and the issuance of a construction permit
- Amending the final EIA report to reflect hearing discussions and public comments

Regulation no. 1 states that the preliminary EIA report must contain a project summary, a description of the environment to be affected, a forecast of expected impact and conditions.

The final EIA report in addition to the above documents must contain project alternatives and measures for reducing the harmful environmental impact, an evaluation of the damages, a plan of action in case of accidents and spills, and a plan for self-monitoring.

Where an EIA is required, the project subject to an EIA may not proceed until approval under the EIA process has been obtained. For example construction permits cannot be obtained without an EIA approval.

c. Standard of Review

The Regulation on EIA provides that the EIA is a procedure to study and analyze projects, facilities and activities and to prepare and adopt a conclusion relating to the protection of the environment, starting whether the projects, facilities and activities are permissible, in light of their compliance with the existing standards as well as their environmental and socioeconomic value.

EPL does not expressly set any standards for review of EIA but states that experts should be guided by the provisions of Article 2 of the Law, as amended, which states that: "Reducing the risk to human health and to the environment and its correlation to damages suffered and benefits forfeited shall constitute the basis for setting up of environmental policy".

The experts are also to be guided by the effective levels and standards for admissible environmental pollution.

Regulation no.1 sets criteria for assessing the state of the air, waters, soils, fauna, flora, noise and waste. It provides that an EIA maybe approved or denied. A request may be made to the planner to re-draft the final report.

Approval of the EIA may require the planner to meet certain conditions in the project implementation. The fulfillment of these conditions may be checked by the approval authority.

The Ministry of Environment or the Regional Environmental Inspectorate will approve the project if:

- The existing laws and regulations and the existing technical and environmental standards are complied with
- The report on the EIA is prepared in compliance with the requirements of Regulation no.1
- The necessary land use, urban development and technical measures for the rational use of natural resources, protection and remedy of the environment are provided for

If any existing laws, regulations and applicable standards are violated or the requirements of Regulation no.1 are not complied with, the authority will not approve the project.

If the necessary land use, urban development and technical measures for the rational use of natural resources, protection and remedy of the environment are not provided for, the planner may be required to redraft the final report.

