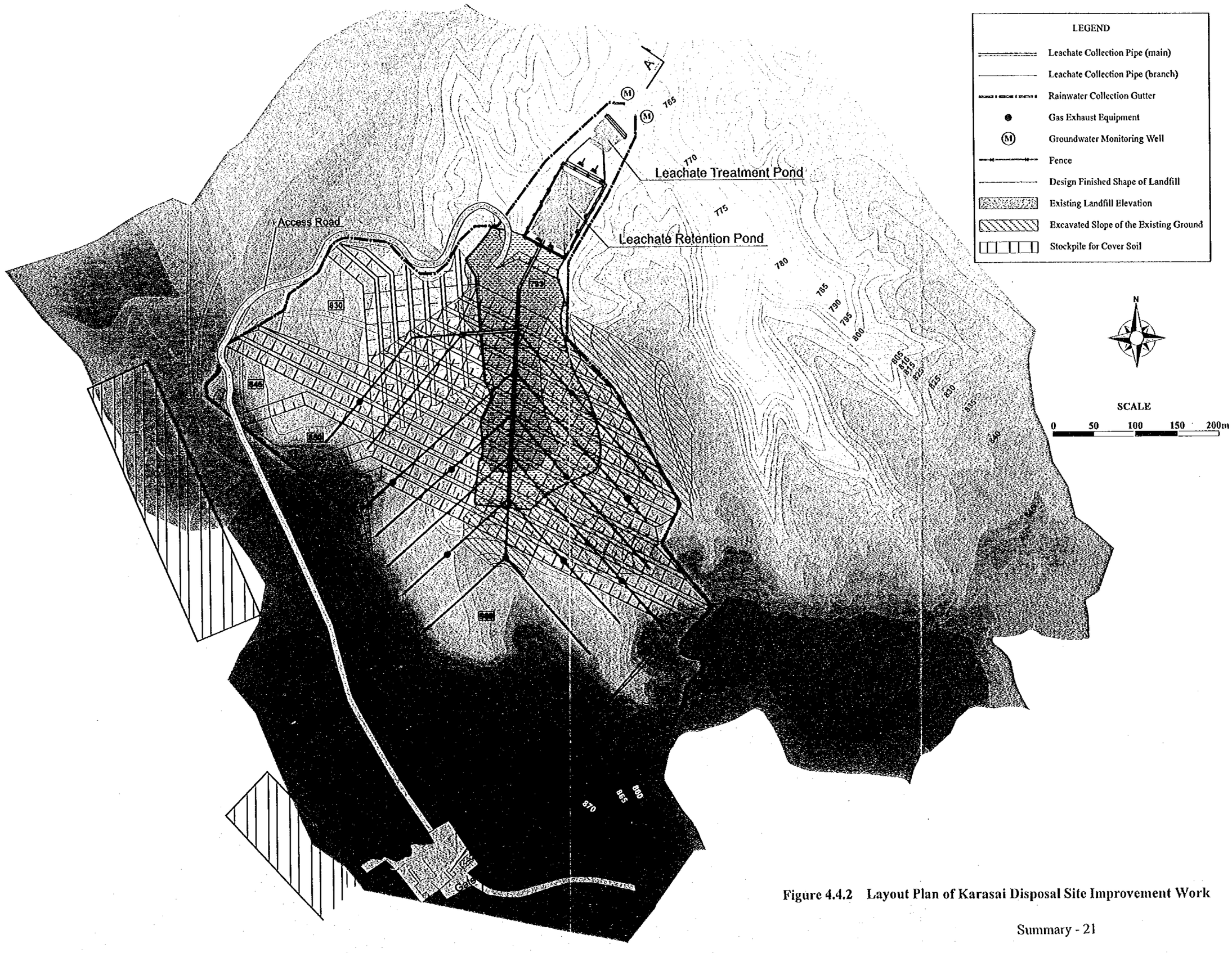


Figure 4.4.2 Layout Plan of Karasai Disposal Site Improvement Work

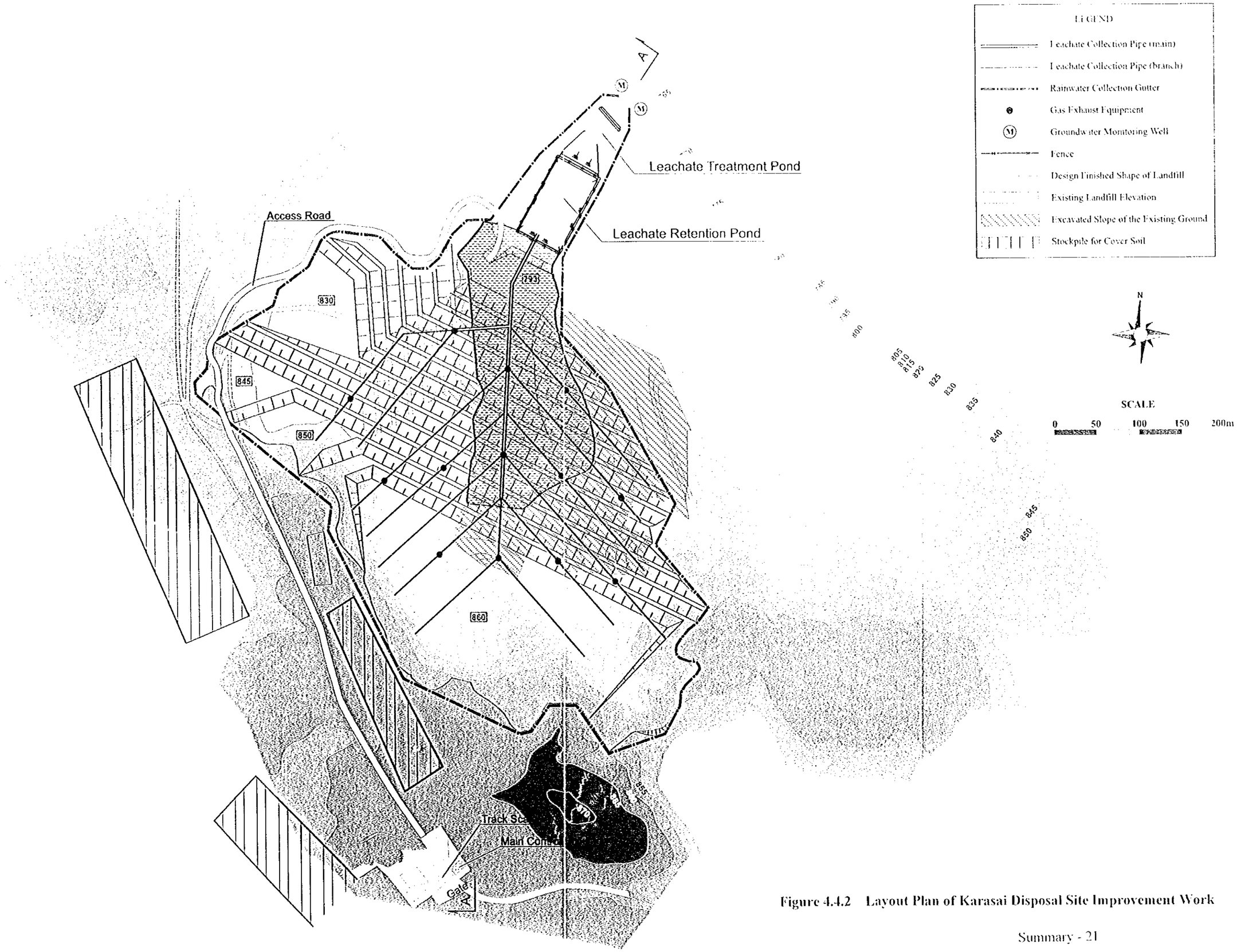


Figure 4.4.2 Layout Plan of Karasai Disposal Site Improvement Work

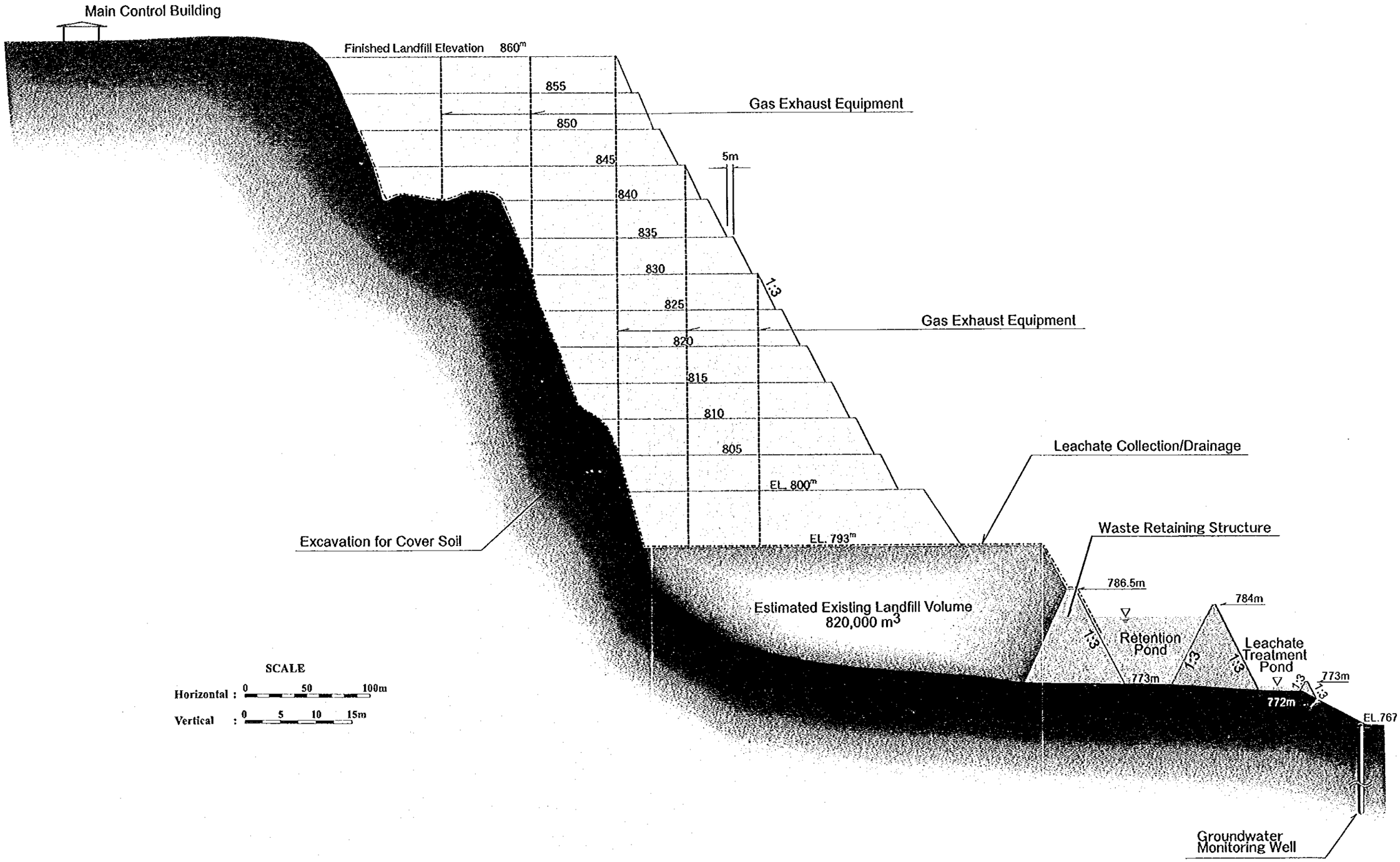


Figure 4.4.3 Longitudinal Section of Karasai Disposal Site Improvement Work

4.4.4 Recycling, Medical Waste, Industrial Waste and Street Sweeping

1) Recycling

To reduce solid waste quantities and to establish a proper recycling system, both separate collection of recyclable materials and amenity centers will be introduced. Paper, textile, plastic, metal and glass will be collected separately from pick up points distributed in the city and served by containers. The amenity center will receive recyclable material. It is proposed to establish the recycling system only after the economic recovery has taken root, anticipated after the year 2005.

Proposed system flow is shown in Figure 4.4.4.

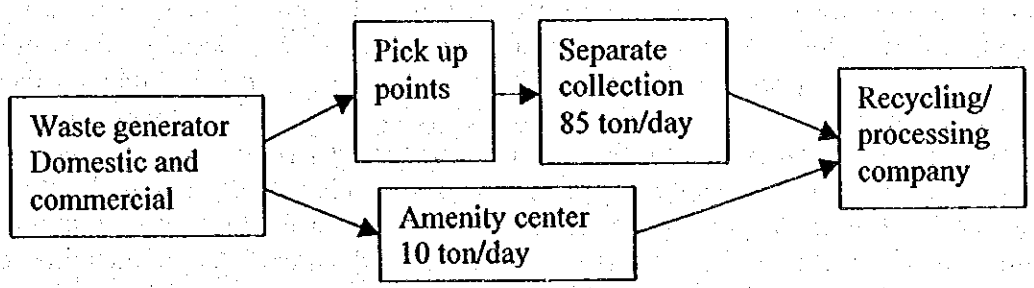


Figure 4.4.4 Flow of Recyclable Material

12 compactor trucks and 3 arm roll trucks will be prepared for separate collection and for the amenity centers. The Amenity Centers will be operated by the Contract Out system.

2) Medical Waste

Individual treatment system for infectious wastes is recommended because waste separation at the hospitals and clinics is essential for proper treatment. Individual treatment systems shall be established by the medical facilities themselves. Separation of infectious wastes should be introduced in all hospitals and clinics to reduce the risks of contamination during collection, transport and disposal.

It is also recommended to provide special arrangement for the collection of medical wastes in order to handle this waste type more carefully. The waste amount to be collected will be 9,600 ton/year (31 ton/day) including treated infectious wastes.

Collection of medical wastes is included in the collection plan.

3) Industrial Waste

Concerning industrial wastes, each factory shall be responsible for treatment, transport and disposal of its solid waste because the generator itself is most familiar with the waste characteristics.

However it is also recommended to arrange a system to accept non-hazardous industrial wastes at the disposal site against payment of a tipping fee. Therefore it is planned that such wastes be accepted at Karasai disposal site.

It is further necessary to establish a recording and documentation system for industrial wastes. The Waste Authority shall monitor the nature and extent of the wastes received at Karasai disposal site.

4) Street Sweeping

Street sweeping should continue under its present system because transferring the responsibility of such large operations will unnecessarily burden the newly established Waste Authority. However street sweeping wastes shall be received at the transfer stations and Karasai disposal site against payment of tipping fees.

5) Special Waste included in Domestic Waste

It is common knowledge that domestic waste may include some special wastes which can be hazardous. How to manage this special waste is an important issue in SWM. It is desirable to have a special system to collect and treat these wastes. Although their quantity is small, the treatment of these wastes requires large investment to avoid environmental pollution caused by the treatment process. Therefore the proper system for the management of these special wastes should be studied at the national level and not at the local level. At present the main system employed for these wastes in most countries of the world consists of separate collection and storage. As the quantities of these wastes is small, such temporary measures could be employed in Almaty City as well. Therefore, it is desirable to collect these wastes separately and landfill together with industrial toxic waste in the future as mentioned above.

4.4.5 Institutional and Legal Aspects

1) The Waste Authority

It is proposed to establish a "Waste Authority" to carry out all public management roles in this sector. Given the current limitations of the legal system, this should be established as an 100% state owned enterprise, with special provisions in its charter to ensure that it acts as a non-profit organization to ensure that this public service is delivered at the least possible cost to the residents. The key attributes of the Authority should be:

- Responsibility for management of a universal service: The Authority will be responsible for ensuring universal coverage, and can be held responsible by other monitoring bodies - ACDEP, the Sanitary and Epidemiology Body or other responsible body - if it fails in this duty. It should be accountable for its actions and be liable to prosecution if it fails to carry out its duties.
- Financial independence from other arms of Government: The Authority will have separate accounts, and will not be required to pay dividends to Government; the reserves that it may accumulate will also be limited to the levels necessary to ensure future financial stability.
- Freedom to enter into commercial contracts: The Authority should be free to enter into commercial contracts where these are in the interests of the residents. This may require some revision of over-restrictive pricing regulations currently imposed on state enterprises.
- Freedom to set tariffs: The authority to set tariffs should be transferred to the Authority from the AMC. However the Authority should be free to involve the AMC if a company acquires undue market power in the sector, and abuses this power to prevent the development of competition.

- Powers to collect Charges: The Authority will be given adequate powers to collect charges from residents who are not exempted from paying these charges. It will be the responsibility of the akimate to provide the Authority with a list of residents who should be exempted from payment of collection fees.

2) Ownership of State Assets

The M/P provides for the development of two new transfer stations and the redevelopment of the existing disposal site. Ownership of these three facilities should permanently reside with the Waste Authority which will contract out their operation. It also recognizes that the private sector will not be capable of financing the acquisition of most of the new equipment needed by contractors. Hence most equipment will be acquired by the Authority using funds borrowed by the City Akimate. These assets will be leased by the Authority to contractors. Title to this equipment will remain with the Department of Communal Services of the Akimate, but management of leases will be exercised on a day to day basis by the Authority. The contracting out arrangements will be designed to encourage contractors to acquire their own equipment once their financial position improves, and it is hoped that this role of the Waste Authority will be greatly reduced over the next ten years.

3) Enforcement of Environmental and Public Health Standards

For the time being the existing institutions should be retained, but their budgets should be increased as quickly as fiscal conditions permit to allow them to refocus their activities from revenue raising through selective collection of fines to proper enforcement of existing standards.

In due course a major overhaul of these institutions is needed to rationalize these institutions and to ensure that the law provides realistic enforcement mechanisms. To avoid too many changes at the local Government level, such restructuring should be left until after a major overhaul of Republican-Local Government relations which codifies in law the responsibilities and powers of local Governments.

In view of the need for prior reform of Republican-Local Government relations, and the limited human resources available to the akimate to carry out such reforms, the study concludes that all available resources should be concentrated on making the Waste Authority fully operational. Reform of the enforcement organizations has been deemed to be outside the scope of the current M/P.

4.4.6 Public Awareness

To improve SWM, the cooperation of waste generator (residents and commercial entities, etc.) on proper storage, discharge, separation and reduction of waste, and residents' acceptance on service level, tariff and facilities construction are necessary. To ensure cooperation from residents, the Waste Authority shall make effort to explain, persuade and educate residents to understand the importance of sanitation.

According to the implementation schedule the main M/P events and corresponding campaign topics are shown in Table 4.4.5. Efforts shall be concentrated on related topics and public awareness survey shall be conducted to check the effect of campaign and other activity.

It is desirable that the Waste Authority should work together with KSK and KSD associations concerning the public awareness program. Also it is important to educate residents concerning the necessity of separation of special wastes which may be hazardous to avoid environmental pollution.

Table 4.4.5 Main Events of Public Awareness Campaign

Timing	Events	Topics
2000 Jan.	Establishment of Waste Authority	Necessity, function and major program of Waste Authority
July	Introduction of interim tariff	Necessity, new tariff and payment method
2001 Apr.	Construction of West transfer station	Necessity, outline of transfer station, mitigation measure
2002 Apr.	Introduction of New tariff	Necessity, new tariff and payment method
Apr.	Introduction of new collection system in individual housing area	Necessity, system, frequency and time, and required cooperation
2002 Apr.	Construction of Spasskaya transfer station	Necessity, outline of transfer station, mitigation measure
2003 Apr.	Introduction of new collection system in block housing and commercial area	Necessity, system, frequency and required cooperation
2007 Jan.	Expansion of new collection system in block housing area	Necessity, system, frequency, and required cooperation
2008 Jan.	Introduction of new tariff	Necessity, new tariff and payment method
Jan.	Introduction of separate collection	Necessity, system, frequency and required cooperation

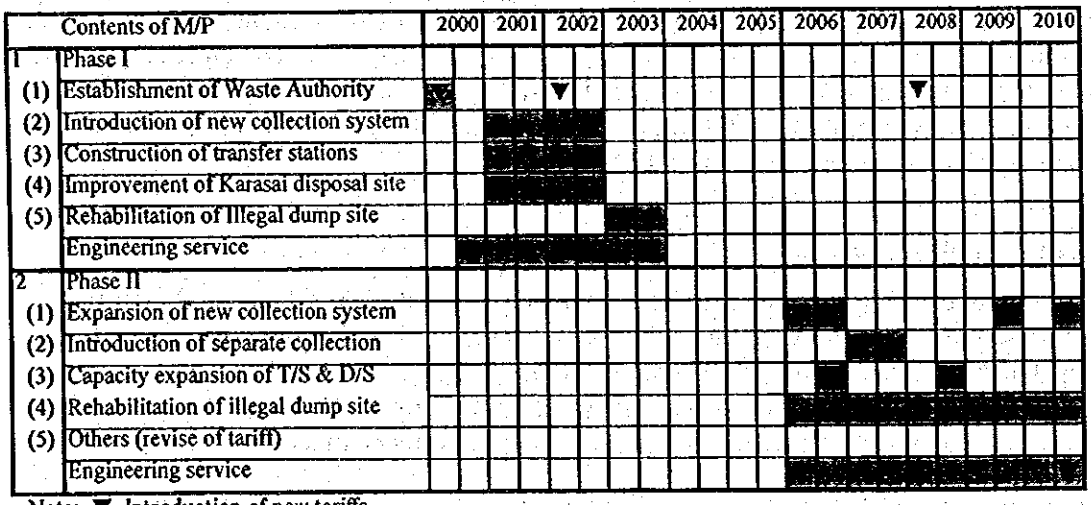
4.4.7 Schedule and Cost of M/P

1) Schedule

The M/P period will be divided into two phases:

- Phase I Up to the year 2005
- Phase II From the year 2006 to 2010

The schedule of the M/P is shown in Figure 4.4.5.



Note: ▼ Introduction of new tariffs

Figure 4.4.5 M/P Schedule

2) Investment Cost

The investment cost for the M/P is estimated to be KZT 4,544 million excluding VAT as shown in Table 4.4.6. VAT shall be paid by the government or exempted. It is noted that Almaty city shall provide the initial working capital of KZT 140 million for establishment of Waste authority.

Table 4.4.6 Investment Cost of the M/P

(Unit : KZT million)

	2000-2005	2006-2010	Total
(1) Establishment of Waste authority	4.6	0	4.6
(2) Introduction of new collection system	808.7	478.4	1,287.1
(3) Construction of transfer stations	1,149.4	39.6	1,189.0
(4) Improvement Karasai disposal site	1,123.3	33.8	1,157.1
(5) Rehabilitation of illegal dump sites	198.1	282.5	480.6
(6) Introduction of recycling system	0	208.9	208.9
(7) Engineering service	164.2	52.2	216.4
Sub total	3,448.3	1,095.5	4,543.8
(US$ million)	(30.0)	(9.5)	(39.5)
(8) VAT	689.7	219.1	908.8
Total	4,138.0	1,314.6	5,452.6

3) Basic Operation Cost

The Waste Authority shall be established and actual collection work and management of transfer stations and disposal site will be contracted-out. Contract-out cost consists of basic operation cost and other costs including profit and VAT. Basic operation cost (consisting of personnel, fuel and lubricants, maintenance, miscellaneous and depreciation, and excluding profit and VAT) will be KZT 872.9 million in the year 2010.

Table 4.4.7 Basic Operation and Maintenance Costs in 2005 and 2010

(Unit: KZT million)

Item	2005	2010
1. Waste Authority (Head office)	15.3	15.3
2. Collection	331.1	388.4
3. Transfer stations	192.8	203.6
4. Karasai disposal site	191.2	202.1
5. Recycling	0	63.5
Total	730.4	872.9
(US$ million)	(6.4)	(7.6)

4.4.8 Financial Plan

1) Financial Principles for SWM

(1) Waste Authority is established as the responsible organization for SWM in Almaty City.

(2) SWM services should be funded by fees collected from users.

(3) Fees from users should cover all costs including operation and maintenance costs, depreciation and financial costs.

(4) Tariff rates should be lower for low income households in order to lighten the burden on these households. Households whose incomes fall in the lowest quartile will be exempted from SWM fees.

(5) Actual operation of SWM is contacted-out to private companies.

2) Tariff for Solid Waste Management

Waste authority shall collect fees for solid waste collection and for discharging waste at the transfer station or final disposal site.

Expenses of the Waste Authority accrued in 2005 and 2010 are KZT 1.2 billion and KZT 1.4 billion respectively excluding VAT and profit tax. To cover these costs, tariffs shall be set as follows.

	2005	2010
Domestic	KZT 75 /person/month	KZT 90 /person/month
Commercial	KZT 3,900 /ton	KZT 4,680 /ton
Medical	KZT 3,900 /ton	KZT 4,680 /ton
Transfer Station	KZT 1,750 /ton	KZT 2,100 /ton
Disposal Site	KZT 770 /ton	KZT 924 /ton

3) Revenue of Waste Authority

Revenue of the Waste Authority consists of service charges. The deemed leasing charges for use of equipment are not actual revenues of the Waste Authority.

4) Expenses of Waste Authority

Expenses of the Waste Authority consist of its head office cost, contract-out cost, handling charge for fee collection, ownership cost of equipment and facilities, depreciation, financial cost (interest), other costs, VAT and profits tax. Other costs includes payment to Environmental Protection Fund to dispose of solid waste at Karasai disposal site and rehabilitation cost of existing illegal dump sites.

Financial cost will vary depending on the conditions of the loan. Total expenses of the Waste Authority will be KZT 1.23 billion, and 1.36 billion respectively under the conditions described in the following items 6) and 7).

5) Contract-out Cost

To ensure fair competition between bidders using the Waste Authority equipment and bidders using their own equipment the deemed contract cost for bid evaluation purposes will be:

a. Basic operation cost (personnel, fuel, maintenance and other)
b. Deemed equipment leasing cost (from Waste Authority)
c. Own equipment cost (Depreciation, ownership cost and financial cost)
d. Overhead

e. Business reward (to be specified by bidder -- assume 20 % of above excluding b.)
f. VAT (20 % of above excluding b.)

Note that there will be no actual payment of item b. to the Waste Authority by the qualified contractor.

6) Financing of Investment

Investment will be financed by loans because there is no possibility of receiving financial support from Almaty City or the Government of Kazakhstan. Conditions of loans are assumed to be:

Interest rate (real, %)	Repayment period (years)	Grace period (years)
8	20	0

7) Cash Flow of Waste Authority

The only revenue of Waste Authority will be user charges. Cash flows of the Waste Authority until year 2010 are projected for two cases: one is including VAT and profit tax, the second excluding VAT and profit tax. Result is summarized as follows:

- In the case where VAT and profits tax are included, there is an overall loss of KZT 167.5 million in 2010 which shall be funded by short term loan. Net outstanding debt in 2010 is KZT 2.93 billion. Therefore, Waste Authority cannot survive.
- On the other hand, in the case where VAT and profits tax is excluded, total drawings of long-term loan of KZT 3,448.4 million is necessary. Investment after year 2006 is funded from internal cash reserves. Waste Authority has an accumulated surplus of KZT 0.38 billion in 2010 and net debt outstanding in 2010 will be KZT 1.63 billion.

The results shows that the Waste Authority cannot pay VAT and corporate income tax. Thus, the Waste Authority should be exempted from VAT and corporate income tax in order to avoid increase of tariff rates.

4.5. Effectiveness of the M/P

1) Technical Aspect

The technologies chosen in the M/P were selected for their suitability for Almaty city. The M/P includes the following technical systems.

	Technical system	Application in Kazakhstan
Collection	Separate collection Compactor truck New containers	Ordinary waste & reusable material Used all over the world Used all over the world
Transportation	Transfer station	Simple type transfer station
Intermediate treatment and disposal	Sanitary landfill -Liner -Leachate treatment	 Clay liner Aeration pond and re-circulation
Recycling	Separate collection Amenity center	
Medical waste	Auto-clave	
Industrial waste		Receiving non hazardous wastes at the disposal site
Street sweeping	Existing system	Existing system

All the systems recommended in the M/P satisfy the requirements of cost effectiveness, simplicity, acceptability by and adaptability for residents.

2) Economic and Financial Aspect

(1) Economic Effectiveness

In any urban environment SWM services are necessary to minimize the environmental impact of wastes and to minimize public health risks associated with these wastes. The plan has greatly reduced environmental and public health risks by the following measures:

a. Raising the collection ratio to 100% by the year 2010
b. Improving the cleanliness and effectively eliminating overflows at collection points by specifying better containers and more effective collection trucks
c. Minimizing the incentives for illegal dumping
d. Improving the enforcement procedures to deter illegal dumping
e. Introducing superior performance transfer stations
f. Introducing sanitary landfill principles
g. Introducing a recycling system at a later stage of the M/P period when both the strengthened economy and increased public awareness can sustain that system

The M/P achieves this improved performance at a minimum economic cost. The M/P has contained costs by:

a. Introducing a range of collection trucks to better suit the collection needs of different areas of the city

b. Provide incentives for the more effective utilization of collection trucks, while ensuring universal coverage
c. Minimize transport costs by improving transfer station capacities and locations
d. Provide a mechanism to introduce recycling when this becomes feasible to help offset collection costs

(2) Financial Effectiveness

Central to the plan is the creation of a financially stable "Waste Authority" to provide overall SWM services in Almaty City. This Authority will be financially independent of the City and will not pose any financial burden on the City.

The M/P creates a new charging mechanism for SWM services which will ensure that funds are available for carrying out this essential public service, and ensures the financial stability of the Waste Authority as well as the collection companies.

At the same time the interests of the poorest strata of society have been protected. The M/P provides for a cross subsidy system so that the poorest households will be exempt from the tariff. For the average household, the SWM tariff will be approximately 1% of the average household income.

3) Social and Institutional Effectiveness

The M/P provides a blueprint for effective cooperation between the public and the private sector for the provision of SWM services. It separates public responsibilities from operational procedures that can best be carried out by competitive private firms. It provides for the creation of a public entity the "Waste Authority" to discharge these public responsibilities largely through contracting out actual operations. Key social concerns – responsibility for ensuring that the service is universal to protect public health and the environment, and the protection of the interests of the poorest members of the community – remain in the public sector. Operations – such as the management of truck fleets etc. – are carried out by the private sector.

At the same time the plan recognizes that the private sector in Kazakhstan is currently extremely weak and has only very limited access to capital. Hence the plan provides for Government involvement in funding much of the equipment needed through foreign aid. Key fixed facilities will remain state property controlled by the Waste Authority and operated by private contractors. Collection vehicles will be leased to private contractors through the Waste Authority.

The M/P also provides for important reforms to separate more effectively system operation from enforcement in order to improve compliance with environmental protection laws. The changes to institutional structures and contractual relationships will also make it realistic for citizens, commercial firms and collection companies to comply with the law.

For the first time there will be a body; the "Waste Authority" that is both accountable for the overall effectiveness of the system and has access to resources that make it possible for it to achieve its objectives. On the other hand enforcement activities will be consolidated in the ACDEP, whose effectiveness in monitoring and enforcement should

improve progressively as reforms of republican laws and relations between the republican and local levels of Government are undertaken.

The role of various state institutions in managing the overall system and in protecting the state assets employed are summarized in the following table.

	Relation with Waste Authority
a. AMC (Anti-Monopoly Committee)	Supervise tender process for fair and open competition.
b. GKI (Territorial Committee of State Property and Privatization)	Supervise efficient use of state property
c. Dept. of Communal Property of Almaty City	Supervise efficient use of state property
d. Almaty City Government	Overall control of Waste Authority
e. ACDEP (Almaty City Department of Environmental Protection)	Monitoring of performance of Waste Authority and companies
f. Almaty Oblast Department of Environmental Protection	Monitoring of performance of Waste Authority and company concerning disposal site
g. KSK and KSD (Resident Cooperative Organization)	Payment of service charge to Waste Authority
h. Companies related to SWM	Collection of solid waste, management of disposal site and transfer stations
i. Ministry of Finance	Provision of Government Guarantee for foreign loans

The M/P also proposes to introduce a cross subsidy to support the poor who need social support. It will reduce the burden on low income households and will contribute to acceptance of the "beneficiary to pay principle" in public service.

Although there will undoubtedly be some objections to the proposed sites for new facilities, the proposed transfer station sites are in more acceptable locations than the existing transfer station and compost plant. The M/P proposes to continue to use the existing disposal site which is located far from residential areas.

4) Environmental Aspect

The rapid development of new transfer facilities will contribute greatly to the elimination of illegal dumping. Currently waste collection companies are effectively forced to dump illegally as there is insufficient capacity to transport all waste to the disposal site. Once the new transfer station and transfer trucks become operational collection contractors will no longer need to dump illegally.

In general, proper collection service contributes to maintain cleanliness and healthy living environment of the city. Rehabilitation of existing illegal dump sites will improve environment conditions of surrounding area. Therefore, implementation of the M/P will have great contribution to improve the environment of Almaty city. However, the environmental impact on the areas surrounding the disposal site and transfer stations will be examined.

The M/P proposes to continue to use the existing disposal site with improvement of its facilities and operation. At present solid waste is tipped in an open dump. It is proposed

to cover waste daily with soil according to sanitary landfill principles. The environmental impact will be reduced through improved operation in the site.

Areas surrounding the new transfer stations will be affected by increased traffic, odor etc. However, it is planned to avoid overnight storage of solid waste at the transfer station. Also, mitigation measures against water pollution and odor will be taken to minimize environmental impact in design stage. Therefore, the environmental impact on the surrounding area will be minor.

Chapter 5

FEASIBILITY STUDY

5. FEASIBILITY STUDY

5.1. Priority Project

The M/P has proposed to implement its proposals in two phases according to the priority of components. First phase of the plan, the priority project, shall be implemented by year 2005 and consists of the following components.

a. Establishment of Waste Authority
b. Introduction of new collection systems
c. Construction of transfer stations
d. Improvement of Karasai disposal site
e. Model rehabilitation of Spasskaya illegal disposal site

This feasibility study is conducted for the above Priority Project which shall be implemented by the year 2005.

5.2. Step-wise Approach

It is desirable to implement all of the Priority Project as soon as possible. However, it is necessary to implement the project step by step in view of the financial constraints. It is very important that some initial, if partial, improvements be realized as soon as possible not only to achieve the M/P target but also to stop further deterioration of existing system.

Thus it is proposed that the Priority Project shall be divided in two stages consisting of the First Priority Project (Urgent Improvement Project) and the Second Priority Project.

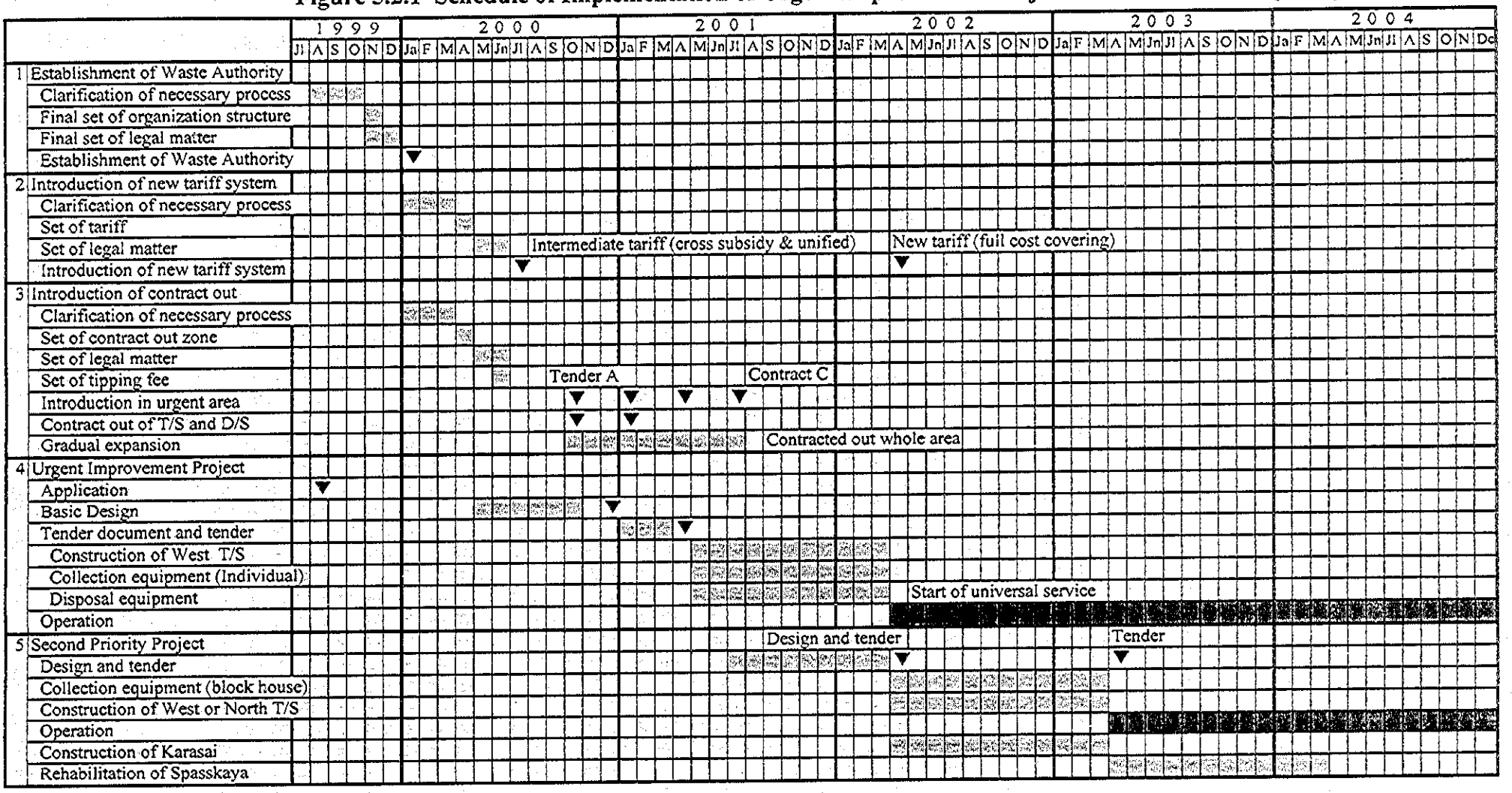
Implementation schedule of the Priority Project is set as shown in Figure 5.2.1. Because related organizations in this sector have poor financial base and there are no appropriate organizations to implement the priority project at present, the Waste Authority shall first be established in January, 2000.

The only financial source of the Waste Authority is the service charge of SWM. Therefore, new tariff system shall be introduced immediately. It is recommended that:

- Intermediate tariff shall be introduced in July, 2000 including cross subsidy and unified tariff when the responsibility to provide the service is transferred to the Waste Authority from the collection companies.
- New tariff shall be introduced in April, 2002 when universal service can be provided. The tariff shall be set to cover all projected costs in 2005.

The urgent improvement project shall start in January, 2001 and will be completed in March, 2002. The second priority project shall start in 2002. According to this schedule, universal service will be provided in April, 2002 using the new equipment procured through the urgent improvement project.

Figure 5.2.1 Schedule of Implementation of Urgent Improvement Project and Second Priority Project



5.3. Establishment of Waste Authority

The Waste Authority should formally commence operations on 1 January, 2000. To achieve this, a decree to establish this body will need to be issued by the Akim before this date. This decree is currently being prepared by the staff of the Akimate. The proposed contents of this decree are outlined in Section 14.1 of the main report.

The akimate must provide 140 million KZT in its 2000 budget to provide adequate working capital for the Authority. The charter fund of the Authority will be provided by the transfer to the Authority of all existing state assets in this sector.

The Authority should be fully operational by 1 July, 2000. By this date management of all existing collection arrangements should have been transferred from KSK's and KSD's to the Authority. The new tariff collection system should also have been introduced. The tariff rate will be increased to cover the costs of the cross-subsidy to the poorest households, and to allow the authority to start to accumulate some reserves to fund asset replacements.

Full implementation of the "contract out" system is planned by July 2001, by which date competitive tenders will have been held for collection in all currently serviced areas and for operation of the major facilities.

The Urgent Improvement Project should be complete by April 2002, so that the Authority will have the resources to achieve significant coverage of the City.

Proper implementation of the contract out system is critical to the effective privatization of the sector. During the first few years of operation, most of the equipment will be owned by the Waste Authority and leased to the contractors. These leases will be tied to the collection contracts. No actual payments will be made for this equipment by the contractor; the contract price paid by the authority to the contractor will cover only operational costs where equipment is supplied by the Authority.

However to encourage the contractors to acquire their own equipment, during the tendering process, bids by contractors wishing to use Authority owned equipment will be adjusted upwards by a "deemed lease payment" for comparison with prices offered by contractors supplying their own equipment. These deemed lease payments will be based on replacement costs of equipment (after adjustment for condition) and commercial interest rates ruling in Kazakhstan. This will encourage contractors to acquire their own equipment and encourage contractors to maximize the productivity of equipment whether they own it or lease it from the Authority. It will also discourage the Authority from wasteful use of capital.

Initially collection or site management contracts will be short term, say one year. However once some experience is gained in their operation, and some companies develop the capacity to supply their own equipment, longer term contracts – say three to five years – will be let to provide bidders with sufficient financial security to invest in their own equipment.

The contracts signed by the Waste Authority will provide some flexibility for the variation of the number of containers emptied, tonnage handled etc. This will allow the Waste Authority to fulfil its role of ensuring a universal and effective service. The

Authority will continually monitor operations and adjust collection points, numbers of containers etc. to ensure that the service provided has adequate capacity. Where the Authority has to increase capacity or provide new capacity, it will be responsible for identifying new waste generators and ensuring that they are included in the tariff collection system. The contracts signed between the Authority and the operators should include variation clauses which allow the Authority to vary the tasks to be carried out within specified limits, and of course also specify the corresponding change in the total contract price.

The contracts for management of the major facilities (transfer stations and disposal site) will allow the Authority to determine access arrangements and access fees for these sites, though they will probably require the contractor to provide the manpower to implement these arrangements. Continued control over access arrangements at these sites by the Authority is critical to prevent one or more contractors acquiring excessive dominance of the market.

The proposed organization for the Waste Authority is shown in Figure 5.3.1.

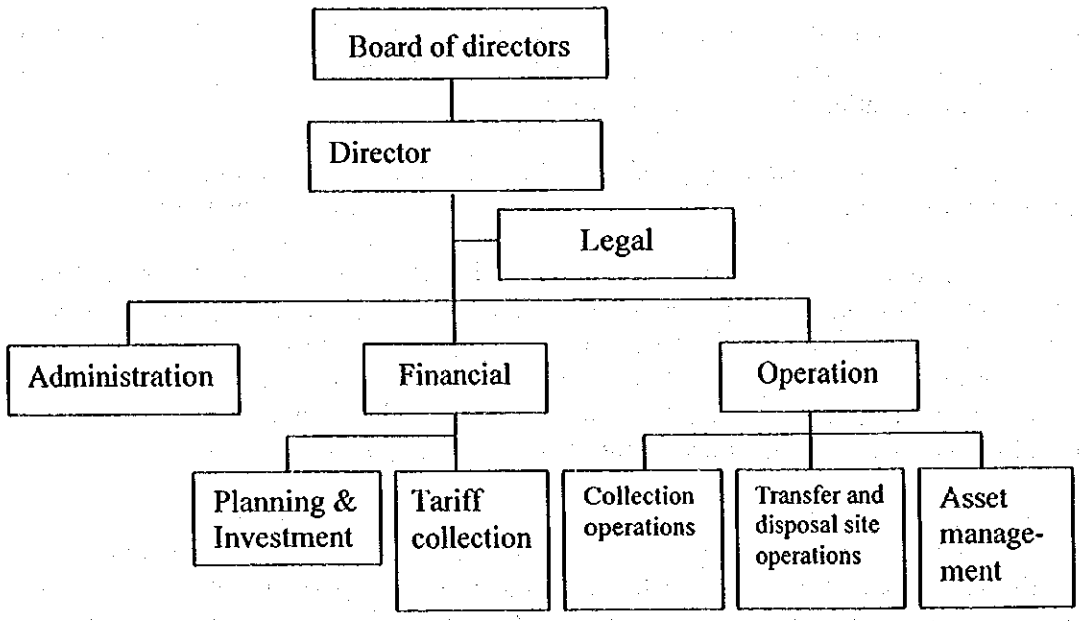
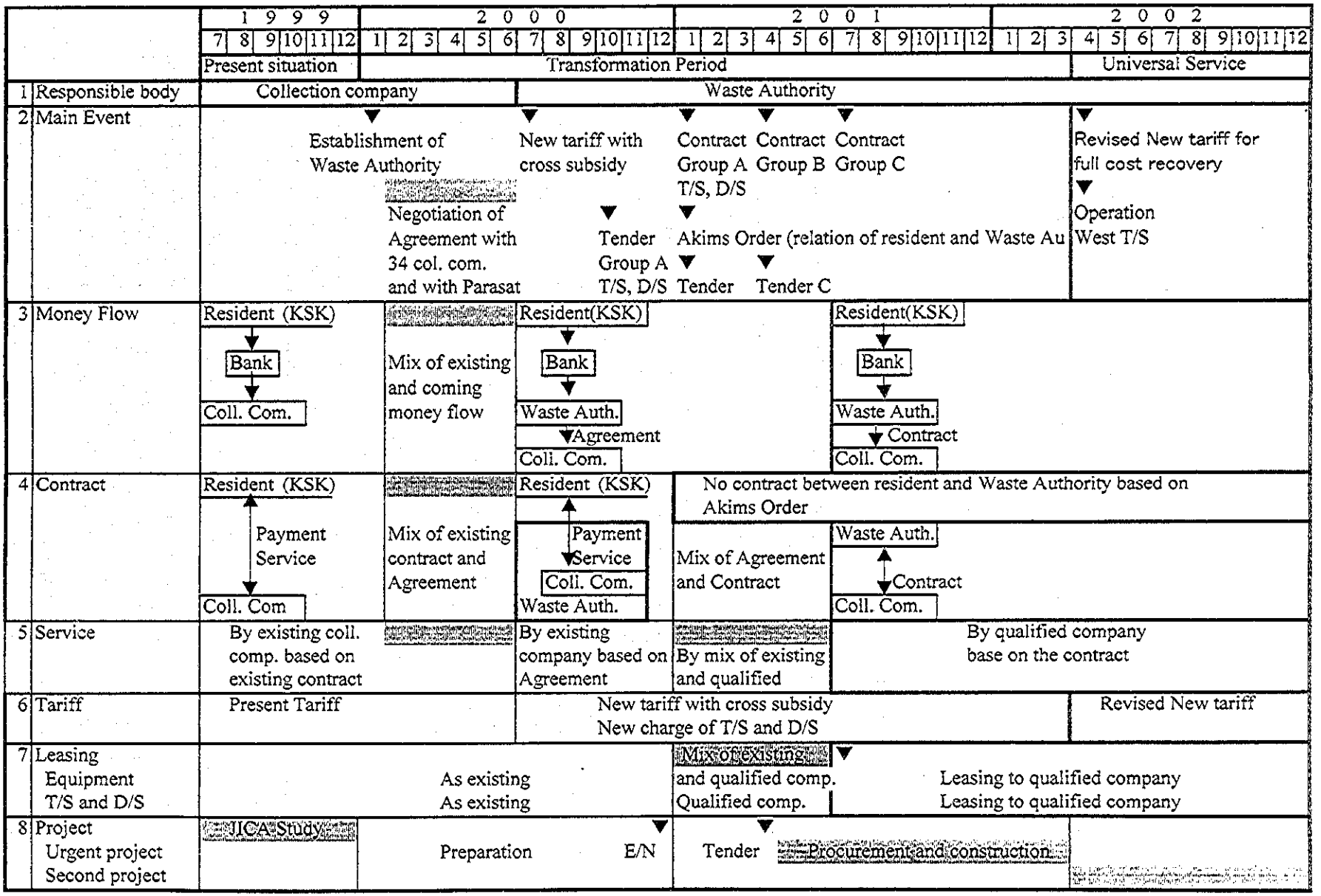


Figure 5.3.1 Organization of Waste Authority

The proposed schedule for establishing the Waste Authority and the various activities related to it are outlined in Figure 5.3.2.

Figure 5.3.2 Establishment of Waste Authority – Transfer of Responsibilities



5.4. Introduction of New Collection System

5.4.1 Target of the New Collection System

At present although approximately 75% of the waste generated in the city is collected, only 55% reaches Karasai disposal site, while the remaining collected wastes are dumped illegally because of the long distance to Karasai and poor truck conditions. The construction of transfer stations and introduction of new collection equipment are urgently required. Therefore both are to be implemented before the year 2005. The target for collection service coverage is set at 95% in 2005.

5.4.2 Priority for Implementation

1) Components of the New Collection System

Table 5.4.1 describes the components of the new collection system.

Table 5.4.1 New Collection System Components in 2005

Equipment	Service waste	Waste amount (Ave. t/d)
Component 1		
Compactor 8m^3 with both manual and mechanical loading from containers 1.1m^3	Individual housing, block housing with partial conveniences (low rise housing) and old block housing areas in the city	243
Component 2		
Compactor 12m^3 with mechanical loading from containers 1.1m^3	Block housing with full conveniences and commercial waste from small and medium generators	145
Component 3		
Arm roll with containers 6m^3	Commercial waste from large generators and markets	193

2) Priority for Implementation

Due to the financial constraints the new collection system shall be introduced in the city in a step-wise approach. The newer trucks from the existing fleet will be used through the priority project period, up to 2005. Introduction shall be through two steps, as follows;

First Step: New Collection System Component 1 (Urgent Improvement Project)

- In identified areas requiring urgent collection improvement such as individual housing areas, old block housing areas and block housing with partial conveniences where present service is irregular or not available
- Population to benefit is 454,500 (41% of total population) in 2005
- Collection service coverage will be 85%

Second Step: New Collection System Components 2 and 3 (Second Priority Project)

- In some block housing areas and for commercial wastes to replace aging equipment
- Population to benefit is 123,600 (11% of total population) in 2005 in addition to all commercial waste generators
- Collection service coverage will be 95%

3) Required Equipment in Year 2005

(1) Utilization of Existing Trucks

The existing fleet in operation is estimated to be 213 trucks, of which 166 are below 10 years of age. The utilization of these trucks is considered. Based on the truck ages 166 units can be used up to the year 2001, 98 up to 2002 and 56 through 2005. Therefore it will be necessary to introduce new trucks in the years 2002 and 2003.

(2) Distribution of Equipment and Manpower in the Year 2005

In the year 2005 the new collection system will be operated at all individual houses, commercial areas and in parts of the block house areas. Existing trucks will be operated as well as explained above. Figure 5.4.1 shows the equipment and manpower distribution in that year. In total 123 trucks will be operated in that year, of which 67 will be new and a staff of 312 collection workers will be required (supervisors, drivers and collection workers).

4) Procurement of New Equipment

Taking into consideration the time required to prepare the capital to purchase the new equipment, and how many more years the existing equipment may be used procurement of equipment is necessary in the years 2002 and 2003 as shown in Table 5.4.2.

Table 5.4.2 Procurement Schedule of New Equipment

Equipment	2002	2003	Total
(1) Compactor 8m^3	32	—	32
(2) Compactor 12m^3	—	8	8
(3) Arm roll	—	27	27
(4) Container (6 m^3)	—	180	180
(5) Container (1.1 m^3)	1,304	676	1,980
(6) Container (0.7 m^3)	—	2,000	2,000

Presently about 15% of the collection trucks are directly owned by the private companies and the remainder are leased from GKI. Considering that this is a minor share and the weak financial conditions of the companies it is not expected that they can purchase the proposed collection trucks in the M/P in the near future. Therefore for the equipment to be procured in the years 2002 and 2003, the Waste Authority shall arrange the procurement and lease the equipment to private collection companies. However as the financial basis of the private companies stabilizes through the introduction of new tariff system and other measures it is considered that at the time of purchase of the new trucks in 2006, half of the trucks will be directly purchased by the private companies.

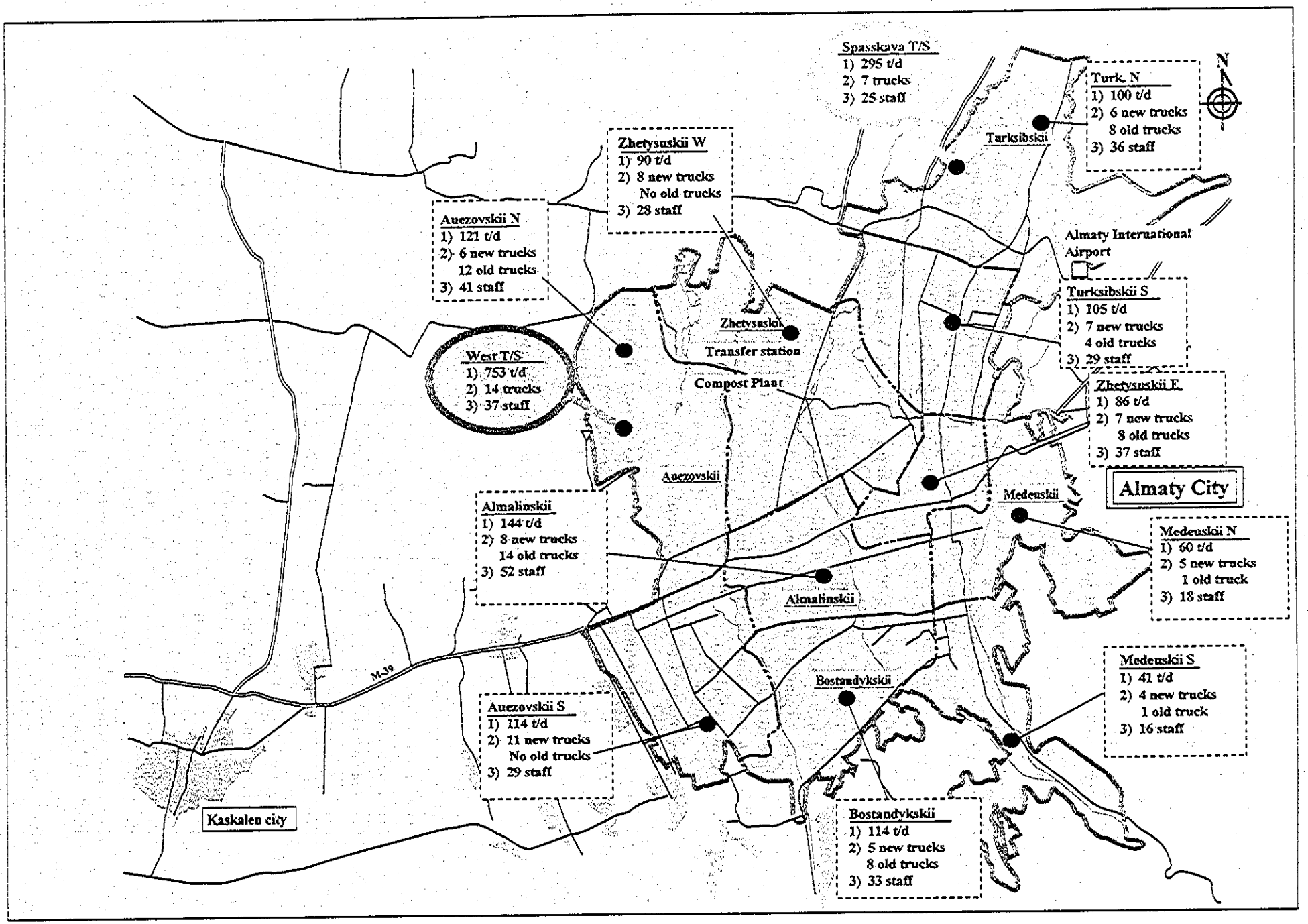


Figure 5.4.1 Equipment and Manpower Requirements by Collection Zone in 2005

5.5. Construction of Transfer Stations

Basic planning principles for the transfer stations are:

- All waste carried to the transfer stations will be re-loaded directly to transfer vehicles and transported to Karasai disposal site
- Simplicity and low investment and operation costs should be emphasized
- The leveling plan for the transfer station sites shall take advantage of topographic features of these sites
- Site plan should ensure smooth traffic flows for collection and transfer vehicles
- Layout plan of transfer stations shall minimize the impact on the surrounding environment

Planning conditions for West and Spasskaya transfer stations are shown in Table 5.5.1.

Table 5.5.1 Planning Conditions of Transfer Stations

No	Item	West T/S	Spasskaya T/S
1	Service area (District)	Auezovskii, Zhetysuskii, Almalinskii, Bostandykskii, Medeuskii (south)	Turksibskii, Medeuskii (north)
2	Average haulage distance to Karasai disposal site	29 km	40 km
3	Site area	4.4 hectare	2.7 hectare
4	Access road/ improvement	2.0 km	1.5 km
5	Waste amount to be hauled-in and transferred	753 ton/day in 2005 782 ton/day in 2010	295 ton/day in 2005 318 ton/day in 2010
6	Plant capacity	800 ton/day	480 ton/day
7	Waste re-loading method	Direct-load type	Direct-load type
8	Types of waste handled	Domestic waste Commercial waste Street sweeping waste	

Outlines of West and Spasskaya transfer stations are shown in Table 5.5.2. Layout and vehicle routing plan for West Transfer Station is shown in Figure 5.5.1

Table 5.5.2 Outline of Transfer Stations

Item	West T/S	Spasskaya T/S
1. Major facilities		
a. Number of waste re-loading stations	3 stations ($540\ m^2$)	2 stations ($360\ m^2$)
b. Upper staging level of waste re-loading stations	GL+795.00 (4.5m higher than lower level)	GL+663.50 (4.5m higher than lower level)
c. Main control building	$216\ m^2$	$108\ m^2$
2. Equipment		
a. Transfer vehicles (semi-trailer)	14 units	7 units
b. Wheel loader	2 units	1 unit
c. Water tanker	1 unit	1 unit
3. Personnel	34	23

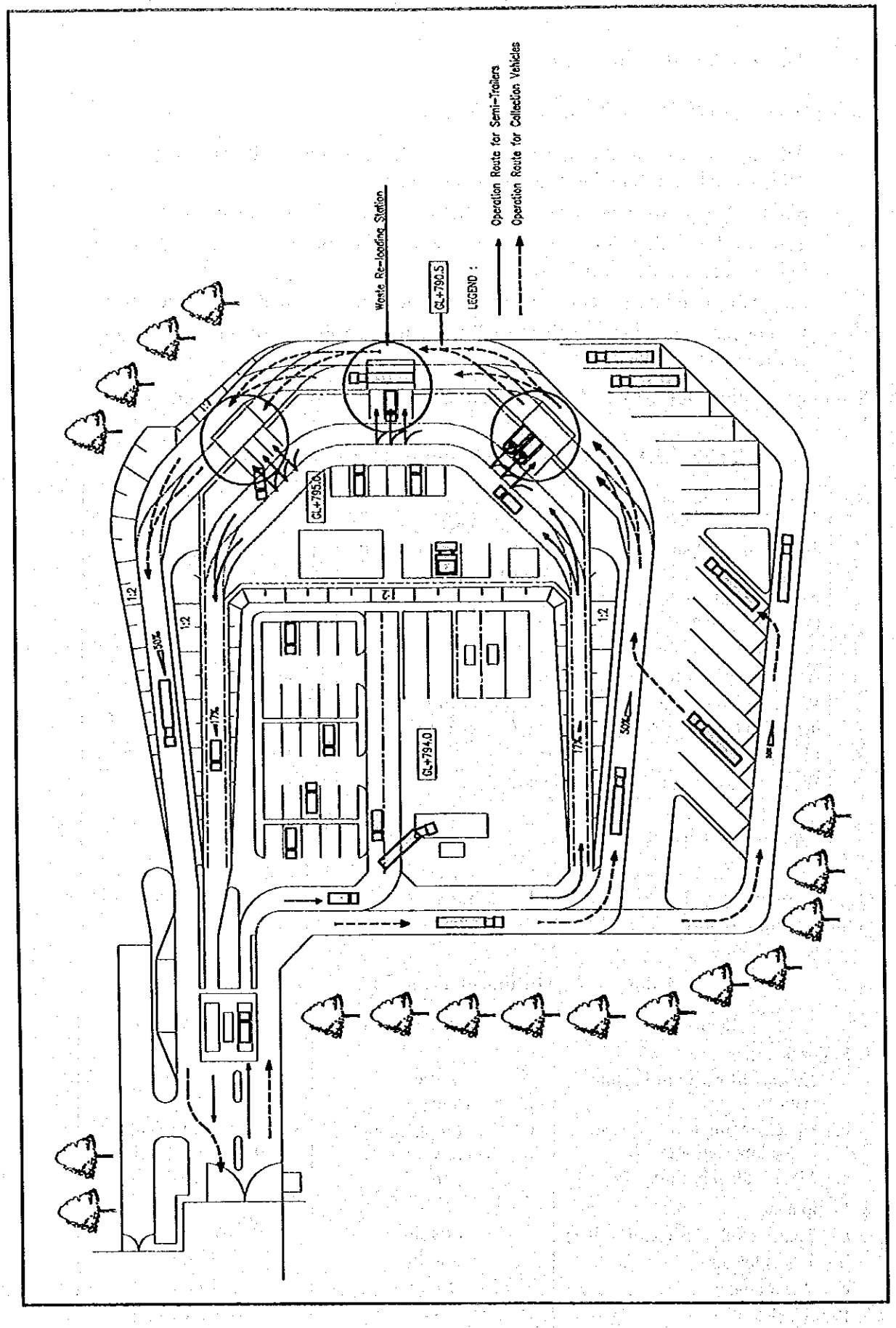


Figure 5.5.1 Layout and Vehicle Routing Plan of West Transfer Station

5.6. Improvement of Karasai Disposal Site

5.6.1 Outline of the Required Facilities

1) Planning Conditions

As described in Subsection 4.4.3, existing facilities and operation of the Karasai disposal site shall be improved. The site will remain in operation until 2010 and facilities shall be improved to reduce the impact on the surrounding environment. Major planning conditions are as follows:

a. Solid waste amount to be received

Type of waste	Year 2005	Year 2010
From Almaty City	827 t/day	869 t/day
From cities other than Almaty City	19 t/day	22 t/day
Street sweeping waste	82 t/day	86 t/day
Non-hazardous industrial waste from Almaty City	70 t/day	70 t/day
Total	998 t/day	1,047 t/day

b. Total disposal amount up to year 2010

Weight : 3,956,500 t*
Volume : 3,956,500 m^3

* Bulk density of waste in the site varies from 0.4 to 1.7 in general, so that it is assumed to be 1.0 in the estimation.

c. Total capacity of the disposal site

3,991,900 m^3

d. Expected useful life

11 years from year 2000

To improve the operation of the disposal site, the first priority is procurement of the heavy equipment required for the sanitary landfill operation in 2005.

2) Design of the Facilities

Based on the results of topographical and geological surveys, required facilities for improvement of the Karasai disposal site are shown in Table 5.6.1, and the layout plan of the site is illustrated in Figure 5.6.1.

Table 5.6.1 Summary of the Designed Facility

Facility	Item	Quantity	Remarks
Intermediate clay laying	Area	62,000 m^2	Thickness: 60 cm
Waste Retaining Structure	Banking	720 m^3	
Retention Pond	Design volume	16,500 m^3	Both liner and clay laying works included
Leachate Treatment Pond	Design volume	500 m^3	Retention time: 5 days, Treatment capacity: 100 m^3/day
Leachate Collection and Drainage	Perforated PVC pipe ϕ200-400mm	3,320 m	Covered with crushed stone

Rainwater Collection and Drainage Gutter	Width: 300-400mm Depth: 300-400mm	2,415 m	
Gas Exhaust Equipment	Extraction well	13nos.	
Access Road	Road construction and improvement	460 m	Includes 340 m of new on-site road construction
Groundwater Monitoring Well		2	
Fence	Net fence	305m	H=1.6m
Gate		1	
Administration Facilities	Building work	410 m^2	Main control bldg. with toilet, fuel warehouse, and workshop
	Truck scale	1	
	Storm water retention	12 m^2	
	Sewage discharge pond	14 m^2	
	Shelter over the pit	144 m^2	

5.6.2 Procurement of Heavy Equipment

1) Heavy Equipment Requirements

During the planning period of the Priority Project, i.e., year 2002 to 2005, equipment requirements are estimated based on the projected waste volume in 2005.

Table 5.6.2 Equipment Requirements during the Planning Period (2002-2005)

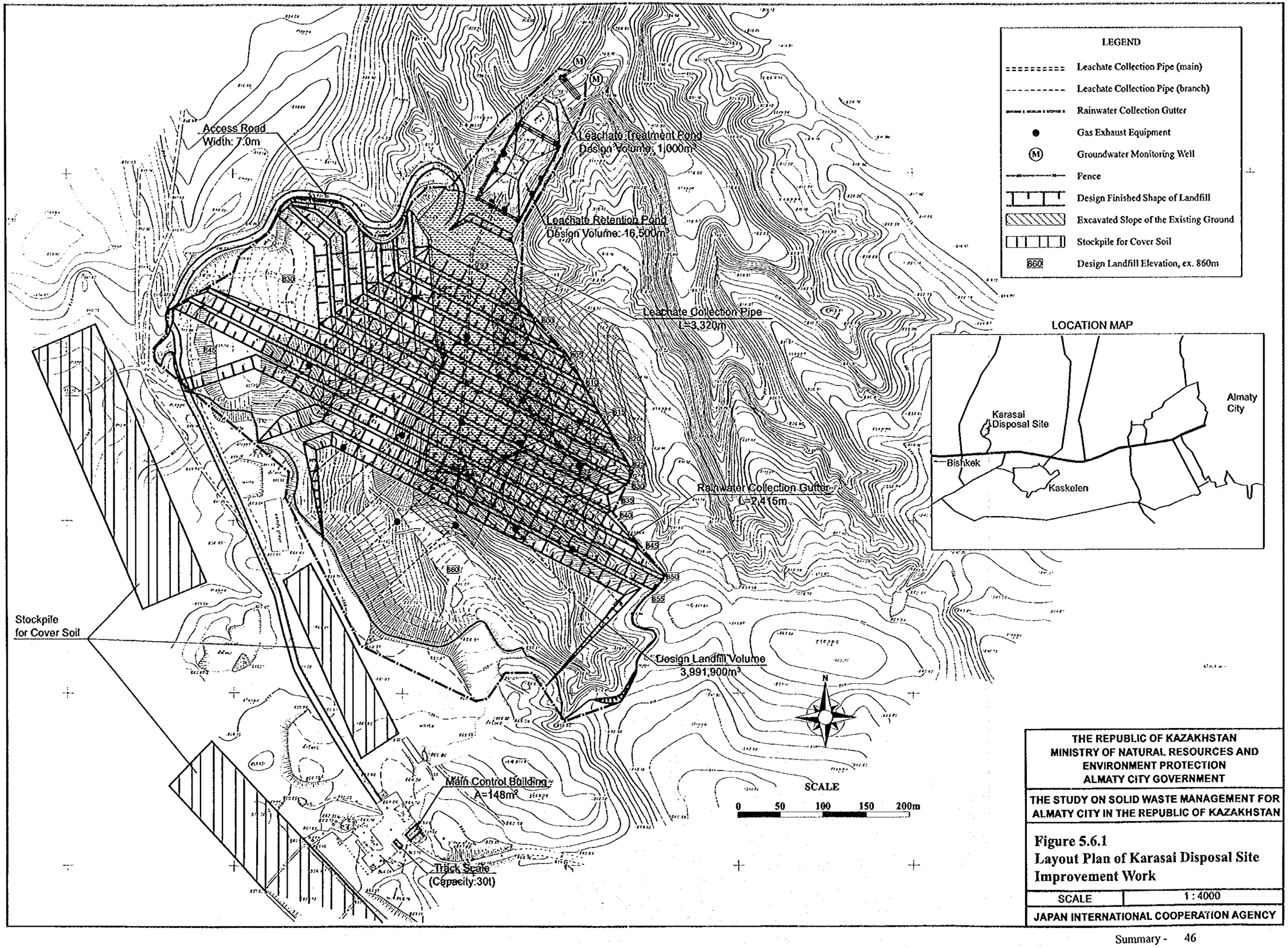
Item	Quantity
Bulldozer	4
(Landfill)	(3)
(Topsoil)	(1)
Excavator	2
Wheel Loader	1
Dump Truck	5
Water Tanker	1

2) Manpower Requirements

During the planning period of the Priority Project, i.e., year 2002 to 2005, manpower requirements are estimated as follows.

Table 5.6.3 Number of Required Manpower during the Planning Period (2002-2005)

Item	Number
Administrative	9
Operators	10
Drivers	9
Total	28


Access Road
Width: 7.0m
Leachate Treatment Pond
Design Volume: 1,000m³
Leachate Retention Pond
Design Volume: 16,500m³
Leachate Collection Pipe
L=3,320m
Rainwater Collection Gutter
L=2,415m
Design Landfill Volume
3,991,900m³
Stockpile
for Cover Soil
Main Control Building
A=148m²
Track Scale
(Capacity:30t)
LEGEND
Leachate Collection Pipe (main)
Leachate Collection Pipe (branch)
Rainwater Collection Gutter
Gas Exhaust Equipment
Groundwater Monitoring Well
Fence
Design Finished Shape of Landfill
Excavated Slope of the Existing Ground
Stockpile for Cover Soil
Design Landfill Elevation, ex. 860m
LOCATION MAP
Karasai
Disposal Site
Almaty
City
Bishkek
Kaskelen
N
SCALE
0 50 100 150 200m
THE REPUBLIC OF KAZAKHSTAN
MINISTRY OF NATURAL RESOURCES AND
ENVIRONMENT PROTECTION
ALMATY CITY GOVERNMENT
THE STUDY ON SOLID WASTE MANAGEMENT FOR
ALMATY CITY IN THE REPUBLIC OF KAZAKHSTAN
Figure 5.6.1
Layout Plan of Karasai Disposal Site
Improvement Work
SCALE
1 : 4000
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5.7. Model Reclamation Project for Spasskaya

5.7.1 Required Project Components

To minimize the environmental impact of the accumulated waste at the Spasskaya site, it shall be closed and reclaimed in a proper manner.

Main project features are moving the dumped waste, grading and compacting the waste, covering with soil, and construction of facilities to improve the existing conditions. The total reclaimed land area is estimated at 3.9 hectares.

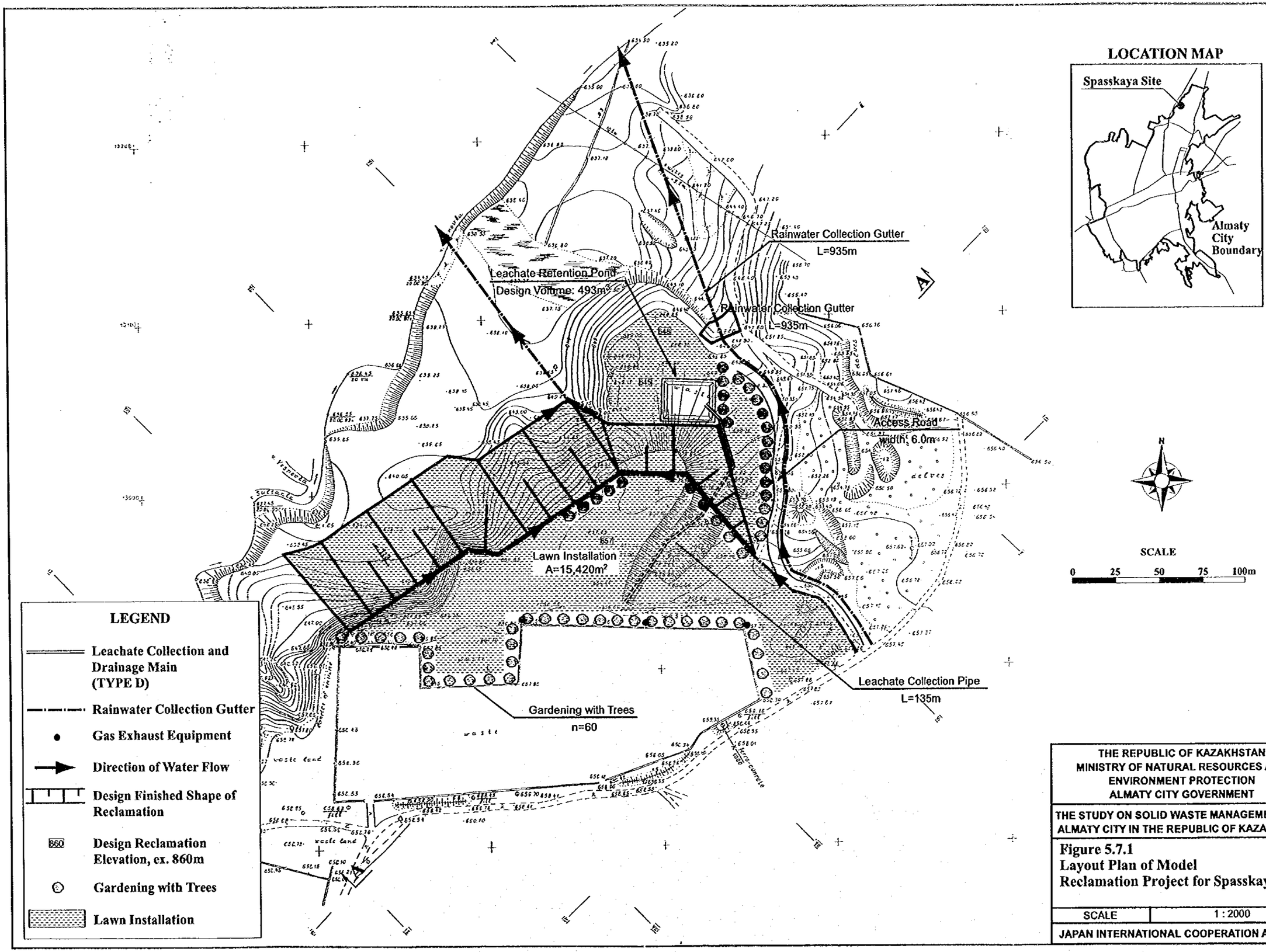
Quantity of work required is summarized in Table 5.7.1, and the layout plan of the site is illustrated in Figure 5.7.1.

Table 5.7.1 Summary of the Designed Facility

Facility	Item	Quantity	Remarks
Cover Soil	Grading & compacting	18,150 m^2	Thickness: 50 cm
Retention Pond	Liner and clay laying	372 m^2	Liner portion is 232 m^2
Leachate Collection and Drainage	Perforated PVC pipe 200mm	135 m	Covered with crushed stone
Rainwater Collection and Drainage Gutter	Width: 300-450mm		
Depth: 300-450mm	935 m		
Gas Exhaust Equipment	Extraction well	5 nos.	
Access Road		195m	
Fence	Net fence	198m	H=1.6m
Gate		1	
Landscaping	Gardening w/tree	60nos.	

5.7.2 Closure and Reclamation Schedule

The closure and reclamation work for the Spasskaya site will be undertaken in fiscal year 2003, if design and engineering of the work is carried out in 2002.



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ALMATY CITY GOVERNMENT

THE STUDY ON SOLID WASTE MANAGEMENT FOR ALMATY CITY IN THE REPUBLIC OF KAZAKHSTAN

Figure 5.7.1
Layout Plan of Model Reclamation Project for Spasskaya

SCALE	1 : 2000

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5.8 Cost of Priority Project

5.8.1 Investment Cost

The estimated investment cost of the priority project is shown in Table 5.8.1. Total investment cost of priority project will be 3,448 million KZT excluding VAT. VAT shall be paid by Government of RK or be exempted. It is noted that Almaty City shall supply the initial working capital for the Waste Authority from the City Budget. Working capital should be 140 million KZT at January 2000.

Table 5.8.1 Investment Cost of Priority Project

(unit: million KZT)

	Urgent improvement project	Second priority project	Total
1. Establishment of Waste Authority	4.6		4.6
2. Introduction of new collection system	330.6	478.1	808.7
3. Construction of transfer stations	705.8	443.6	1,149.4
4. Improvement of Karasai disposal site	248.8	874.5	1,123.3
5. Model rehabilitation of Spasskaya illegal disposal site		198.1	198.1
Sub total	1,289.8	1,994.3	3,284.1
Engineering services	64.5	99.7	164.2
Total	1,354.3	2,094.0	3,448.3
(million US$)	(11.8)	(18.2)	(30.0)
VAT	270.9	418.8	689.7
Grand total	1,625.2	2,512.8	4,138.0

5.8.2 Basic Operation and Maintenance Cost

Actual operation of solid waste collection and management of facilities will be contracted out. Contract out cost will consist of basic operation cost (including personnel, fuel and lubricants, maintenance, miscellaneous, and depreciation) and other costs including profit and VAT. Basic operation cost in year 2005 will be 730.4 million KZT as shown in Table 5.8.2.

Table 5.8.2 Basic Operation and Maintenance Cost

(unit : million KZT)

	Basic operation cost	Remark
Waste authority	15.3	Head office cost only
Collection	331.1	Including depreciation
Transfer stations	192.8	Including depreciation
Disposal site	191.2	Including depreciation
Total	730.4	(6.4 million US$)

5.9 Financial Plan

5.9.1 Investment Plan

1) Annual Investment

Annual investment for priority project is shown in Table 5.9.1. Total cost of priority project will be KZT 3.4 billion (excluding VAT).

Table 5.9.1 Annual Investment of Priority Project

	2000	2001	2002	2003	2004	2005
Construction		398.3	1,164.4	198.1		
Procurement		891.5	631.8			
Engineering service		64.5	89.8	9.9		
Total		1,354.3	1,886.0	249.6		

Note: VAT excluded

2) Assumed Financial Sources for Capital Investment

No financing arrangements have been finalized. Therefore, three options have been considered

- Case A Loan for Urgent improvement project and Second priority project
- Case B Grant for Urgent improvement project and loan for Second priority project
- Case C Same as Case 1 but with different loan conditions

Assumed conditions for loans from international financing organizations are as shown in Table 5.9.2. (It is noted that international loans will not cover the whole project cost. Therefore, it is assumed that 30% of project cost will be provided by local loan.)

Table 5.9.2 Loan Conditions

	Loan	Lender	Interest rate (real, %)	Repayment period (years)	Grace period (years)
Case A, B	Long-tern loan (Foreign) - 70%	International aid agency	8	20	0
	Long-tern loan (Local) - 30%	Local loan agency	8	20	0
Case C	Long-tern loan (Foreign) - 70%	International aid agency	10	10	2
	Long-tern loan (Local) - 30%	Local loan agency	10	10	2

5.9.2 Revenue and Expenses of Waste Authority

1) Service Charge

Expenses of Waste Authority in 2005 will be KZT 1.2 billion as described in item 3) below. Charge for residents shall be KZT 75 /person/month. This is 3 times the present tariff for block housing. Therefore, it is proposed to increase the tariff in two steps as shown in the implementation schedule for priority project (Table 5.9.3).

Table 5.9.3 Implementation of New Tariffs

Date	Domestic (KZT/person/month)	Commercial (KZT/ton)	Medical (KZT/ton)	Transfer Stations (KZT/ton)	Disposal Site (KZT/ton)
July, 2000	55.89	2,509	2,509	875	385
April, 2002	75	3,900	3,900	1,750	770

3) Revenue of Waste Authority

Estimated revenue of the Waste Authority will be KZT 1.21 billion in 2005 based on and collection rate of 90%.

4) Expenses of Waste Authority

Expenses of Waste Authority will be KZT 1.23 billion in 2005 excluding VAT and profits tax if all project costs are covered by loan, and KZT 1.13 billion if Urgent improvement project is covered by a grant. As mentioned in section 4.4.8, VAT and profits tax shall be exempted.

5.9.3 Financial Performance of the Waste Authority

The Waste Authority will be established in January, 2000. However, service by the Waste Authority will start in July 2000. Financial projections for the Waste Authority have been prepared up to the year 2010. Investment after the year 2006 is assumed to follow the M/P recommendations.

A summary of the balance sheet for the three cases is shown in Table 5.9.4 while the changes of net debt for the three cases are shown in Figure 5.9.1.

- In Case A, by 2010 there are accumulated profits of 871 million KZT including cash reserves of 608 million.
- In Case B, by 2010 cash reserves of 1,997 million KZT exceed outstanding debt of 1,266 million KZT so that the Authority can finance further investment from these cash reserves.
- In Case C the Waste Authority is forced to take additional long term loans after 2006 to cover principal repayments on earlier loans, and does not accumulate any cash reserves. Therefore, tariff must be higher in this case.

Table 5.9.4 Summary Balance Sheet for Waste Authority in 2010

	Case A	Case B	Case C
Assets	2,882.9	4,272.5	2,275.5
Cash	608.1	1,997.6	0.6
Facilities and Equipment	2,274.9	2,274.9	2,274.9
Liability/Equity	2,882.9	4,272.5	2,275.5
Short-term debt	0.0	0.0	0.0
Long-term debt	2,011.7	1,266.8	2,091.8
Grant	0.0	1,354.3	0.0
Accumulated profit	871.2	1,651.3	183.7

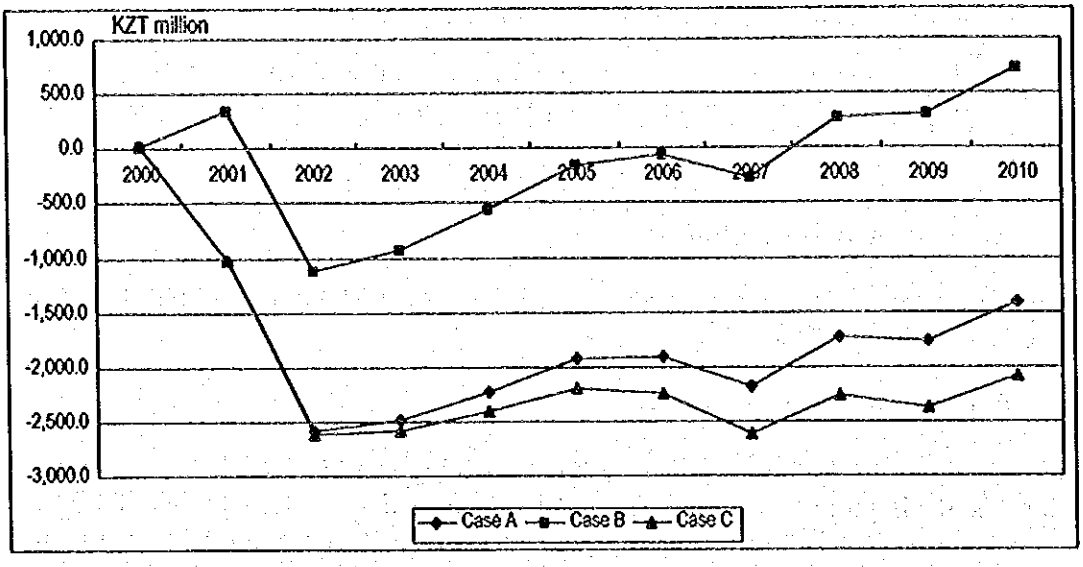

Figure 5.9.1 Changes of Net Debt

5.10 Evaluation of Priority Project

5.10.1 Technical Evaluation

The priority project has been formulated using technical systems which are well accepted both in Kazakhstan and the rest of the world. These are:

a.	Collection system	Individual housing area	Compactor-bag and/or bin
		Block housing area	Compactor-container (1.1 m^3)
		Commercial area	Arm-roll-container (6 m^3)
b.	Transfer station	Reloading method	Direct reloading
		Transportation	Open top trailer (40 m^3)
c.	Final disposal	Disposal method	Sanitary landfill
		Leachate treatment	Retention pond

The technical acceptability of these systems is described as follows.

(1) New collection system for individual housing area

At present in individual housing areas, solid waste is collected by dump trucks from bags or bins. Containers are not suitable in these areas. The new collection system will replace the dump trucks with compactor trucks which are more efficient (easier loading of waste and larger pay-load) and more suitable for these areas.

(2) New collection system for block housing area

At present in block housing areas, waste is collected from containers using side-loading trucks. Side loading trucks achieve only a very low rate of compaction. Compactor trucks will be more efficient and suitable for emptying the containers. Existing containers are not suitable for compactor trucks, so a new container design will be introduced.

(3) New collection system in commercial area

At present in commercial areas, most waste is collected from containers using side loading trucks. The new collection system will use Arm-roll containers (6 m^3) for large commercial waste generators which are more economical where there is a large volume of waste at the generation point.

(4) Transfer station

Direct reloading is the simplest method of reloading at transfer stations. Open top trailers (40 m^3) will be used as at present.

(5) Final disposal

Sanitary landfill is the most economical and simple disposal method for solid waste and is used throughout the world. Leachate will be treated using a retention pond system.

The proposed priority project will bring the overall Waste Management System back into balance. Currently there is an imbalance with insufficient capacity for transfer of waste at transfer stations and its onward transport to the final disposal site. Until this balance is restored illegal dumping is inevitable.

5.10.2 Environmental Impact Evaluation

The anticipated environmental impacts of the priority project are mostly beneficial. These include improvement of living environment and public health through better solid waste collection and curtailment of illegal dumping.

The environmental impact assessment study was conducted according to all applicable laws of Kazakhstan. Even though the project is an urban environmental improvement project, there are some potential adverse effects requiring proper management. Such potential adverse effects are principally confined to the new transfer stations and Karasai disposal site, and vicinity.

During the Feasibility Study, Environmental Impact Assessments (EIA) were conducted for the two (sub)projects within the Priority Project which are subject to EIA requirements under Kazakh law. These are:

(4) Construction of West and Spasskaya Transfer Stations, and
(5) Karasai Disposal Site Improvement Work.

The potential impacts of each component of the priority project and mitigation measures are described below.

(1) Construction of West and Spasskaya Transfer Stations

The environmental impact of the West transfer station will not be significant. However the design will incorporate mitigation measures against offensive odor, waste scattering and water contamination by leachate.

Major air pollution may be caused by collection and transportation vehicles. These impacts can be minimized by routing and scheduling collection and transportation so that, as far as possible, waste transportation is conducted when other traffic is light.

Landscaping with lawns and trees could also be considered to minimize the visual impact of the facilities.

(2) Karasai Disposal Site Improvement Work

Groundwater pollution by leachate is the major potential environmental impact. The facilities must be designed and constructed and operational procedures must be adopted to minimize these impacts. A proper leachate collection and drainage system must be installed and operational procedures adopted to ensure that waste is regularly covered with soil to reduce the amount of leachate generated. The lining system comprising clay and synthetic membranes will also minimize the impact.

In conclusion, the proposed priority project will have some potential negative impacts but the planned mitigation measures will minimize these impacts. The construction of new transfer stations will improve the efficiency of the collection service and improve the city environment, which is currently adversely affected by the existing sub-standard collection service. The existing disposal site at Karasai has some negative impacts on the surrounding environment. The proposed improvement plan will introduce sanitary landfill principles and reduce the impact of existing site operations on the surrounding environment.

Overall the proposed projects will have a beneficial impact on the environment and public health of Almaty City.

5.10.3 Economic and Financial Evaluation

1) Economic Evaluation

The expected environmental benefits of the proposed priority project represent significant economic benefits, though quantifying such benefits in any meaningful way is impossible.

The priority project is designed to maximize the productivity of the limited capital available through two key measures:

- Firstly a new transfer station is developed as quickly as possible. This maximizes the productivity of both the existing collection fleet and new collection vehicles. This minimizes the future investments necessary in collection vehicles which represent the largest investment in the overall system.
- The deemed leasing charge introduced in the contracting out system will force the contractors to maximize the productivity of both existing and new equipment to win further collection or site management contracts. This is in stark contrast to the existing system which actually discourages efficient use of existing capital resources.

The priority project and the management procedures to be introduced by the Waste Authority represent a major step towards improving capital utilization in the sector.

2) Financial Evaluation

Two key objectives have been met in the proposed tariff structure:

a. tariffs are sufficient to provide for the financial viability of the services and undertakings and generate a sufficient surplus to allow for financing a significant part of their own investment programs in the years to come, and
b. are set at levels which encourage efficient use of service capacity and avoid wasteful consumption.

The service charge is the only source of revenue for the Waste Authority. The proposed tariff is based on the cost of service and affordability. The tariff structure includes a cross subsidy that exempts residents whose income falls in the lowest 25% of the income distribution from any payment. Tariff in 2005 is set to be KZT 75 /person/month for these residents which will be about 1% of the average income of the remaining 75% of the population. Total revenue of the Waste Authority is estimated to be 1.2 billion in 2005 which will be only 0.43% of GRDP.

Based on the above tariff, the projected cash flow of the Waste Authority will be viable up to year 2010 if the loan (interest rate 8%, repayment period 20 years and no grace period) is provided and the Waste Authority is exempted from VAT.

Chapter 6

RECOMMENDATION

6. RECOMMENDATION

The M/P foresees that eventually most of the investment needed in this sector will come from the private sector, once stronger private companies emerge and the local banking system recovers some capability for long term financing. However the private sector is currently extremely weak and it is likely to be at least ten years before it can play a major role in financing of this sector. In the meantime, the Government must play a significant role in financing this sector.

Unfortunately the city government still does not appear to appreciate the changed role of financial institutions in the new economic order. Thus the first step to implementing priority projects must be a change in attitude by the city government.

Secondly a reassessment needs to be made of realistic financing options. In the opinion of the study team the only realistic option is "a loan from one of international development banks to the city government or the Waste Authority with a guarantee from the Republican government. This might be combined with a grant from one of the international aid organizations." Several other options appear to be unrealistic.

The city government should therefore concentrate on trying to arrange a loan from one or several of the international development banks. The city government should prepare for negotiations with potential lenders. Again it must stressed that each potential lender will insist on making their own assessment of its financial viability. The city must cooperate with that process.

Thirdly, the City government should proceed as quickly as possible with the formation of the Waste Authority. The city government is uncertain about the prospects for financing some of the priority projects, given its limited powers to influence the priorities assigned by the Republican Government for the use of foreign loans and grants. The City Government should not let this uncertainty slow the formation of the Waste Authority.

Formation of the Waste Authority is important not only for the implementation of new projects. It will play an immediate and critical role in management of the sector even if financing for new projects is delayed. It does not require external financing Its only financing needs is a contribution from the city budget for the year 2000 for working capital.

It is also necessary to mention that during the development of design documents for the construction of SWM facilities, Environmental Impact Assessment (EIA) should be made on full volume as well as the section for environmental protection. After that concordance with the corresponding agencies should be made and results of State Ecological Examination should be submitted as follows:

- Karasai disposal site – to Oblast Department
- New West and Spasskaya transfer stations – to ACDEP

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