

CHAPTER 7
ENVIRONMENTAL
EVALUATION



CHAPTER 7 ENVIRONMENTAL EVALUATION

7.1 Basic Concept of Environmental Evaluation

7.1.1 Scope of Environmental Evaluation

The scope of environmental evaluation in this Study is as follows:

- To grasp and evaluate the water quality of several headwaters surrounding Astana City for examining the possibility of their utilization as a drinking water source in the future;
- To assess the negative environmental impacts of the proposed water supply and wastewater treatment projects and recommend requisite countermeasures to mitigate negative impacts.

In regard to the water quality evaluation, the results are described in the Section 2.6.

7.1.2 Focus and Methodology of Environmental Evaluation

(1) Evaluation of Water Quality for Drinking Water Source

Water quality evaluation of several headwaters was carried out based on Kazakhstan water quality standards, which is shown in Supporting Report C.1. The relevant water quality standards are shown in Supporting Report C.2. For grasping the water quality, a field survey was conducted, of the Vyacheslavsky Reservoir, the Nura River, the Nura-Ishim Canal and groundwater in the Ishim River and the Nura River catchment area. The analyzed parameters are organic and inorganic substances, heavy metals, and pesticides. The water sampling was conducted in three rounds from September to October. The sampling site and sampling date and are shown in Supporting Report C.3 and C.4 .

(2) Environmental Impact Assessment (EIA) of Proposal projects

1) EIA in Kazakhstan

In Kazakhstan, the "Tentative Instruction on Procedure for Environmental Impact Assessment of Planned Activities in the Republic of Kazakhstan (EIA) / RND 03.02.01-1993", which stipulate the procedure of EIA, was adopted in 1993, and EIA procedure according to this law has been mainly conducted on oil industry activities in the Caspian Sea. An outline of the defined procedure is shown in Table 7.1.1. According to the law, EIA is carried out by the implementing organization of the project undertaking with public hearings during the progress of project planning. The principal environmental items to

be considered are shown in Table 7.1.2. The methodology is not defined to predict the degree of environmental impact for each item in this law. Additionally, there is no by law which defines such procedures either.

Table 7.1.1 Outline of EIA Procedure in RND 03.02.01

Stage of economic activity	Stage of EIA	Public hearing
Declaration of project intent	Preparation of Environmental impact assessment	- Notification to mass media on local level
Adoption of project site	Preliminary environmental impact assessment	- Notification to mass media - Discussion with local representative bodies of environment - Meeting with inhabitants of project site
Feasibility study of proposed project	Environmental impact assessment	- Statement of environmental impact submitted by local representative bodies of environment - Meeting with inhabitants of project site
Project design	Environmental protection	-

Table 7.1.2 Environmental Items to be Considered in RND 03.02.01

Environmental Items
Air, Surface water, Groundwater, Discharge amount of Pollutant, Land (soil and topography), Subsoil (geology and mineral resource), Vegetation, Fauna, Social Environment, Risk

2) Methodology of EIA in this Study

JICA defines that EIA should be carried out during project planning in accordance with either the local environmental law or JICA Environmental Guidelines. Although there is a basic framework of EIA procedure in Kazakhstan, EIA of this Study is carried out in accordance with JICA Environmental Guidelines. The reason is as follows:

- At present, the project is at only proposal stage, therefore it is difficult to hold a public hearing by mass media by the organizer of the project (ASA).
- In regard to environmental items to be considered in EIA, the items defined in RND 03.02.01 are covered by JICA Environmental Guidelines (see Table 7.1.3) as required by Kazakhstan law.

The procedure of EIA in this Study is as follows:

- Confirm site description with field survey of water quality and offensive odor.
- Identify potential impacts of the proposed project by using the screening

- checklist with 23 environmental items of JICA Environmental Guidelines.
- Consider the degree of negative environmental impacts in regard to the environmental items in which some impacts will be expected.
 - Propose advisable mitigation measures and monitoring plan.

Table 7.1.3 Environmental Items to be Considered in JICA Environmental Guideline

Environmental Items	
Social environment	Resettlement, Economic activities, Traffic and public facilities, Separation of communities, Cultural property, Water rights and rights of common, Public health condition, Waste, Hazards (Risk)
Natural environment	Topography and geology, Soil erosion, Groundwater, Hydrological situation, Coastal zone, Fauna and flora, Meteorology, Landscape
Pollution	Air pollution, Water pollution, Soil contamination, Noise and vibration, Land subsidence, Offensive odor

7.2 Legal Aspects for Water Resource Conservation

7.2.1 Water Quality Standard

In the Republic of Kazakhstan, there are several regulations and norms for water resource conservation. The main regulations and norms are listed in Supporting Report C.1. The water quality standardization shall be defined as Maximum Allowable Concentration (MAC). In the framework of the laws of Kazakhstan, MAC is defined as the limit concentration to prevent harmful effects to all living organisms, and the figures of MAC are stipulated for toxic and organoleptic substances such as heavy metals, mineral salts, and organic compounds in accordance with the hazard class of each substance.

There are more than 1,300 substances, which are stipulated in MAC, and these are established in compliance with reference to water use. Representative mineral salts and heavy metals in MAC and hygienic requirements are shown in Supporting Report C.2.

7.2.2 Effluent Standard

When discharging wastewater into the public water courses, the discharging location and the quality should be carefully examined beforehand. To select the discharging location, it is necessary to meet the conditions that the discharged wastewater does not enter into residential areas or any areas upstream. At the same time, the water quality of the receiving water courses should not be deteriorated whatsoever by the discharge as stipulated in SanPin No. 4630-88.

In regard to discharge, no common standards exist. However, a Maximum

Allowable Discharge equation exists for the discharge of wastewater with toxic substances. This equation takes into account the water quality, flow rate and capacity of the receiving water. Naturally, after discharging such wastewater into the receiving water courses, the water quality should remain within the figures stipulated in MAC with reference to the water use. Exceptions to the above however is wastewater discharge from factories that include pathogenic micro-organisms, sludge from the wastewater treatment plants, oils from pipelines and muddy water from mines and construction sites. Such wastewater is prohibited from discharge into the public water courses at any time.

7.2.3 Monitoring and Enforcement System

Water flows are measured by the Hydrometeorological monitoring center of Astana City and actions are taken by the Ishim River Basin Inspectorate to verify that flows within the river are within the required ranges. The Ishim River Basin Inspectorate is also responsible for verifying that the permitted users are abstracting the permitted volumes from the Ishim River.

Water quality in the river is also measured by the Hydrometeorological Monitoring center of Astana City. Verification of the water quality and inspection to maintain water quality is the responsibility of the Environmental Protection Department of Astana City.

Sampling and testing of drinking water at the water treatment plant and in the distribution system is carried out regularly by the State Sanitary and Epidemiological Supervision of Astana City. In a similar way wastewater arriving at the WWTP and treated wastewater discharged from the plant are sampled and tested.

This organization verifies the water quality against the required standards and cooperates with ASA to ensure compliance and advises the population of the appropriate action in case of emergency.

In future the same agencies will continue to carry out the same roles as being presently undertaken. This is especially important when changes in water and water quality will arise due to the completion of the IKC-Ishim pipeline. The agencies appear to be carrying out their duties as required by law and there is no reason to think that this situation will change.

7.3 EIA of Proposed Projects

7.3.1 Projects for Water Supply

(1) Project Description

The outline of the proposed projects is as follows:

1) Water Intake

- Utilization of the Vyacheslavsky Reservoir as an intake will be continued.
- A new intake pump station will be constructed 100 m upstream of the existing plant on the edge of the Vyacheslavsky Reservoir.

2) Water Treatment and Distribution

- Operation of the existing Water Treatment Plant (WTP) will be continued, and a new WTP with a set of sludge treatment facilities will be constructed.
- A part of the existing pipelines will be replaced for reducing leakage. Also new facilities will be constructed to distribute tap water in the new development area.

The main factors, which have the possibility to affect the surrounding environment, are as follows:

1) The Vyacheslavsky Reservoir

- Increasing the amount of intake water from Vyacheslavsky Reservoir.
- Construction work and occupation of land by the new pump station including an access road on the shore side of the Vyacheslavsky Reservoir.

2) WTP and Astana City area

- Increase in the amount of the sludge production with increasing quantity of the purified water.
- Construction work of new facilities and pipelines in urban areas.

(2) Site Description

1) The Vyacheslavsky Reservoir

The Reservoir is about 50 km to the south-east of Astana City. There is no settlement, items of cultural value, or cropland near the existing pump station and in the proposal site of the new pump station. The topography of the area is flat plain, and grassland is spread without any woodland. Several waterfowl exist on the large surface area of the Reservoir.

2) The existing WTP site

The existing WTP is in an urban area of Astana City. The site lies to the east of the Ashi-sai River and to the south of the railroad. There is one clinic about 100 m from the site, and one hospital about 500 m from the site.

3) Operation of the existing WTP

Several analyzed water quality parameters were analyzed at WTP and are shown in Table 7.3.1. Sedimentation with the coagulant agent is not conducted during the sampling period, so the decreasing of BOD and SS concentration were not observed between before and after the treatment. The amount of coliform was decreased by chlorination in the WTP. It is considered that cadmium in the tap water will not affect human health even if the figures exceed the standard in Kazakhstan as they do not exceed to WHO guidelines and Japanese standard.

There are no sludge treatment facilities at the WTP. The sludge generated by the WTP is discharged to the Ashi-sai River once a year in the spring time. The supernatant is also discharged to the river through a year.

Table 7.3.1 Results of Water Quality Parameters Measured at WTP

Sampling Period : September 2000 to October 2000

Item	pH	BOD	SS	Cd	Pb	Cr(6)	As	Hg	T-M	Cl	Coli-form
Unit	-	mg/l	mg/l	μ g/l	μ g/l	mg/l	μ g/l	μ g/l	mg/l	mg/l	MPN/100ml
Inflow to Sedimentation Tank in WTP	8.0-8.2	1.5-5.0	14-15	1.8-2.4	20	<2	<10	<0.2	608-648	156-157	2.2
Distribution Pump Station in WTP	7.5-7.6	1.7-7.7	15-16	1.9-2.8	20	<2	<10	<0.2	542-676	159-167	<0.3
Tap Water in Astana City (6 site)	6.7-7.9	1.8-4.0	6-21	1.6-2.8	20	<2	<10	<0.2	600-686	159-174	<0.3
Drinking water Standard (Kazakhstan)	6-9	-	-	1.0	30	50	50	0.5	1,000	350	ND
Drinking water Guideline (WHO)	-	-	-	3.0	10	50	10	1.0	1,000	250	ND
Drinking water standard (Japan)	5.8-8.6	-	-	5.0	50	50	10	0.5	500	200	ND

(3) Selection and Evaluation of Environmental Impacts

The summarized result of environmental impacts, which are selected for

consideration, is shown in Table 7.3.2. The entire list of all items of the JICA environmental guidelines are shown in Supporting Report C.8. Evaluation of the environmental impacts that would rise as a result of the major factors of the proposed projects is described as follows:

Table 7.3.2 Selection of Environmental Impacts for Water Supply Projects

Factor		Remark	Item to be Considered
Construction phase	Construction work of new pump station	- No settlement exists in and around the site.	-
	Construction work of new WTP	- The clinic exists near the proposed construction site.	Noise and Vibration
	Construction work of distribution facilities	- The rehabilitation of existing pipelines will be conducted in the urban area.	Noise and Vibration
Land occupation by new facilities	New pump station	- Alteration area is not large. - Any significant natural environment does not exist in the site.	-
	New WTP	- Construction site is in existing facilities site.	-
Operation phase	Intake	Increase of Water intake amount - Water intake amount is within the yield of the Vyacheslavsky Reservoir based on Master Plan Study	-
	Purification	Increase of sludge amount - The way of dried sludge disposal should be considered.	Waste (Dried Sludge)

1) Construction phase

a) Construction of the new Pump Station

There is no settlement and items of cultural value in and around the proposed site, so no significant impact is expected from the construction work, such as noise and vibration. It is noted however that contractor should pay attention to water pollution from the excavation runoff to the Reservoir.

b) Construction of the new WTP

A clinic exists approximately 100 m a way from the existing WTP. It is possible to disturb the amenity of the hospital due to noise and vibration such a piling operation. After the detail of construction work plan are confirmed, the impact should be considered.

c) Construction of distribution facilities

Noise impact by the rehabilitation of the existing pipelines is possible in the urban area. The length of the existing pipeline proposed for rehabilitation

extends approximately 10 km. In this Study, the candidate pipelines are decided by pipe diameter and the degree of deterioration so the locations for construction are not confirmed. After they are confirmed, the impact should be considered.

2) Land Occupation by New Facilities

The area to be altered by the new pump station, including a new access road, is not large (approximately 3,000m²). Any social facilities or notable natural environment do not exist in and around the proposed site. In regard to the new WTP, the facilities will be constructed within the existing WTP site. Consequently, significant impacts are not expected.

3) Operation Phase

a) Increase of Water Intake Quantity

The proposed plan for the intake will have the least potential for environmental deterioration as no other new water resources are proposed which would require new development. Additionally, the daily maximum water demand in 2010 is 173,000m³/day which is under the daily yield of the Vyacheslavsky Reservoir of 244,000m³/day based on the Master Plan Study. It is considered that significant impact will be prevented by the appropriate operation of the dam at the Vyacheslavsky Reservoir even after increasing the intake quantity.

b) Increase of Sludge Amount

In the proposed plan, generated sludge will be controlled by a set of new sludge treatment facilities, and its discharge to the Ashi-sai River will be stopped. As a result, the impact to the river will alleviate. On the other hand, the final disposal method should be confirmed for dried sludge.

Although, the supernatant will continue to be discharged to the River, the impact will also alleviate. This is due to the use of coagulant agent, decreasing the quantity to about 800 m³ from about 7,000 m³ of the current discharge quantity.

(4) Methodology of Mitigation and Monitoring

It is considered that significant environmental impacts will not be expected due to the proposed water supply plan. Nevertheless, the following matters should be considered to mitigate any possible impacts for the items shown in Table 7.3.2 are

as follows:

1) Noise and Vibration

Noise and vibration impact due to the construction of the new WTP and rehabilitation of existing pipeline are possible. In the detailed design phase, the degree of the impact will be examined in accordance with the construction method and necessary countermeasures should be recommended such as confinement of construction work in night time with the reflection of inhabitant's opinion.

2) Waste

The quality of the dried sludge from the WTP is better than that from the average treatment facility, although it is undesirable to discharge to a river. It is desirable to consider the reuse of the dried sludge such as base material for forestation. In case that the dried sludge will not be reused, the disposal will be carried out in accordance with waste management plan which is proposed by the Master Plan Study. The dried sludge generated from the proposed WTP can be disposed by landfill because the ratio of water content will be lower than the regulation value of 85% which is regulated to prohibit the landfill of the sludge. The amount of forecasted sludge generation, estimated at approximately 2,600 m³/year is much smaller than the current amount in Astana City mentioned in Chapter 2, therefore the disposal by landfill will not affect the future waste management.

7.3.2 Projects for Wastewater Treatment

(1) Project Description

The outline of the proposed projects is as follows.

1) Wastewater Collection

- A part of existing pipelines will be replaced for reducing blockage. Also new facilities will be constructed to collect wastewater in new development area.

2) Wastewater Treatment

- The existing Wastewater Treatment Plant (WWTP) will continue operation with construction of new facilities.

3) Treated Effluent Discharging and Sludge Disposal

- The treated effluent will be discharged to the Taldy Kol Reservoir.

- Reuse of the treated wastewater and the sludge for agriculture is proposed.

The main factors, which have the possibility to affect the surrounding environment, are as follows.

1) Wastewater Collection

- Construction work of new facilities and pipelines in the urban area.

2) Wastewater Treatment

- Construction work and occupation of land by a set of new facilities.
- Offensive odor from the sludge drying bed.

3) Treated Wastewater Discharging and Sludge Disposal

- Increase in discharge quantity of the treated effluent.
- Increase in amount of the sludge production.

(2) Site Description

1) The existing WWTP site

The existing WWTP is sited on the shore of the Taldy Kol Reservoir. There is no settlement, items of cultural value, or cropland near the existing WWTP. The topography is characterized by flat plains with marshland spread out.

Based on the odor field survey results mentioned in Supporting Report C.6 and C.7, the odor from the sludge drying bed was detected around the WWTP, however, the impact of offensive odor was not observed in the urban area of Astana City. The concentrations of ammonia and hydrogen sulfide, which are the main causative substances of the offensive odor from sewage treatment plants, were lower than the threshold detection values.

2) Wastewater treatment in the WWTP and the Taldy Kol Reservoir

The mean concentration of selected parameters are shown in Table 7.3.3 (refer also Supporting Report C.6). The reduction of BOD, COD and SS concentration between inlet and outlet of WWTP shows the progress of the treatment of the organic substances and the suspended materials in WWTP. As nitrification progresses, the concentration of nitrate increases.

The water quality of the Taldy Kol Reservoir is characterized by a relatively high value of pH, high concentration of BOD₅, COD, T-N and T-P influenced by effluent. When the concentration of the phosphorous is compared with the estimated value of eutrophication as defined by OECD, the Reservoir is categorized as an eutrophic lake. The high concentration of nitrogen and phosphorous causes the progress of algae's growth in the Reservoir during the

summer season. This leads to additional natural treatment in the Reservoir for nitrogen, which is shown as lowered total nitrogen and nitrate concentration when comparing the effluent of WWTP with the Reservoir.

Table 7.3.3 Mean Concentrations of Selected Parameters at WWTP

Sampling Period : September 2000 to October 2000

Item	pH	BOD	COD	SS	T-N	NO ₃	T-P	Cd	Pb	Cr(6)	T-M	Coli-form
Unit	-	Mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	μ g/l	μ g/l	μ g/l	mg/l	MPN/100ml
Influent of WWTP	7.5	152	321	333	18	<0.2	4.0	3.3	27	<2 - 4	1,039	1,533
Effluent of WWTP	7.4	6.7	72	16	18	61	1.7	2.4	23	<2	962	47
Taldy Kol Reservoir	8.3	7.2	72	14	4	6.1	1.4	2.9	25	<2 - 6	1,102	47

The quality of the bottom sediment and the bathymetric conditions were surveyed and the results are detailed in Supporting Report C.6 and C.7. The results show no significant long-term observations of heavy metals from the treated wastewater from WWTP. The figures of nitrogen and phosphorous are relatively high in comparison with normal concentration of soil. This tendency appears not only near the treated wastewater discharging point but have in other areas of the Reservoir.

(3) Selection and Evaluation of Environmental Impacts

The summarized result of environmental impacts, which are selected for consideration, is shown in Table 7.3.4. The entire list of items of the JICA environmental guidelines is shown in Supporting Report C.8. Evaluation of the environmental impacts that would arise as a result of the major factors of the proposed projects is described as follows:

1) Construction phase

a) Construction of Wastewater Collection Facilities

In this Study, the replacement of existing pipelines are proposed at 14 sites with the length of approximately 19 km in the urban area of Astana City. Noise impact by the rehabilitation of the existing pipelines is possible. After the detail of construction work plan are confirmed, the impact should be considered.

b) Construction of new facilities of WWTP

There is no settlement and items of cultural value in and around the proposed site, so no significant impact is expected from the construction work, such as noise and vibration.

Table 7.3.4 Selection of Environmental Impacts for Wastewater Treatment Projects

Factor		Remarks	Item to be Considered
Construction Phase	Construction work of wastewater collection facilities	- The rehabilitation of existing pipelines will be conducted in the urban area.	Noise and Vibration
	Construction work of new facilities in WWTP	- No settlement exists in and around the site.	-
Land occupation by new facilities	New facilities in WWTP	- No settlement exists in and around the site. - Any notable natural environment does not exist in the site.	-
Operation phase	Wastewater treatment	- Presently, offensive odor is not significant impact.	-
	Treated effluent and sludge disposal	- Increasing the amount of the treated effluent and sludge - The pollution load to the Taldy Kol Reservoir will not be increased even if the amount of treated effluent increase. - The method of dried sludge disposal should be considered.	Waste (Dried Sludge)

2) Land occupation by new facilities

A set of new facilities will be constructed within the existing WWTP sites. Consequently, significant impacts are not expected.

3) Operation Phase

a) Offensive Odor

Although the odor from the sludge drying bed will be sensed around the WWTP, the impact of offensive odor to the urban area is not observed in the current condition. With the adopting of the proposed plan, the degree of odor from the sludge drying bed will decrease because of constant operation of the digestion chamber. Consequently, significant impacts are not expected.

b) Increasing of the Amount of the Treated Effluent and Sludge

The daily maximum effluent quantity in 2010 is estimated at approximately 112,000 m³ / day, as compared to approximately 104,000 m³ / day at present. However, it is considered that the pollution load, calculated by the effluent quality, multiplied by the quantity will be almost same due to the improvement of effluent quality by rehabilitation and development of WWTP.

It means that the impact to Taldy Kol Reservoir will not increase significantly.

In regard to the impact of surplus treated effluent discharging to the surrounding area, significant impact is not expected because of the naturally occurring purification in marshland such as the assimilation of nitrogen and phosphorous by plants in marsh land and absorption of organic substances or suspend materials by soil. This marshland area will not be planed to develop as urban area in the Master Plan Study until 2030, so the natural purification ability of the marshland is expected continuously. The surplus treated effluent will not also affect the water quality of the Ishim River significantly because the discharging point of the effluent lies about 5km from the Ishim River, so the surplus treated effluent will not affect the Ishim River directly.

In case of reusing the treated effluent however, the quality should be monitored. In regard to the sludge, reuse for agriculture is proposed, but circumstance is not decided, so it is necessary to consider the possibility of the disposal by landfill.

(4) Methodology of Mitigation and Monitoring

It is considered that significant environmental impacts are not expected from the proposed wastewater treatment plan. Nevertheless, the following matters should be considered to mitigate any possible impacts for the items shown in Table 7.3.4 and are as follows.

1) Noise and Vibration

Noise and vibration impact due to the rehabilitation of existing pipeline are possible. In the detailed design phase, the degree of the impact will be examined in accordance with the construction method. The necessary countermeasures should be recommended such as confinement of construction works in night time with the reflection of inhabitant's opinion.

2) Waste

In this Study, reuse of the treated effluent and the dried sludge for agriculture is proposed. In the case of reuse, monitoring of the chemical quality should be carried out. In particular, the influent wastewater quality, especially heavy metals such as cadmium and lead that are observed in relatively high concentration on the field survey should be monitored. In case that the dried sludge will not be reused, the disposal will be carried out in accordance with waste management plan which is proposed by the Master Plan Study. The

dried sludge generated from the proposed WWTP can be disposed by landfill because the ratio of water content will be lower than the regulation value of 85% which is regulated to prohibit the landfill of the sludge. The amount of forecasted sludge generation, estimated at approximately 9,000 m³ / year is much smaller than the current amount in Astana City mentioned in Chapter 2, therefore the disposal will not affect the future waste management.

7.4 Overall Evaluation

Proposed projects for water supply and wastewater treatment do not impact to the environment significantly except noise and vibration during the construction work and waste of which the degree of the impact is not estimated. After the confirmation of the detail of the proposed plan, the impact should be considered.

CHAPTER 8
ORGANIZATION AND
INSTITUTION



CHAPTER 8 ORGANIZATION AND INSTITUTION

8.1 Background

The Republic of Kazakhstan is still young and not much time has passed since its independence in 1991, after collapse of the former Soviet regime. The legal framework and governance structure and systems required for the country have not been well established yet. They are still in the process of "trial and error" looking for more practical and efficient schemes and systems.

The most important laws regarding water supply and sewage services management are "Law of State Enterprises" and "Law on Natural Monopolies". The "ASA Charter" that defines the manner of management contract between the Astana City Government (Akimat) and Astana Su Arnasy(ASA) is based on these basic laws. Regarding the management concept, the principles of "self-supporting management" and "full cost recovery tariff setting" have been recently recognized. It is a big progress for the establishment to develop a modern public utility services management system.

The Astana Capital City Development is given the highest priority on the national development agenda, and various supportive infrastructure developments are on going. Among them, the reform of water supply and sewage system is given the highest priority. Nevertheless, the present situation of ASA, which is assigned with the responsibility for water supply and sewage services in Astana City, has been in serious condition in terms of technical and managerial aspects.

This is caused by obsolete equipment and facilities as well as the old-fashioned management style. Besides, a lot of water leakage of the existing facilities as well as the over consumption of water by customers without water meters are also big issues. The solution for those issues is important from the viewpoints of water resources conservation in order to secure the increasing demand as well as the revenue sources opportunity. This underlying environment shows that a drastic and immediate reform of ASA is necessary from both technical and managerial aspects.

Under such circumstances, ASA will be required to modernize the water supply and sewage system and to facilitate self-supporting management. The attainment of such objectives will definitely need institutional strengthening of the relevant stakeholders including ASA, represented by revision of present water tariff, improvement of ASA's management structure, fiscal support from the government and improvement of present regulations or rules imposed on ASA by the regulatory

agency.

The Study firstly focuses on existing legal and organizational framework, and then analyses constraints or problems encountered. Finally, the study presents recommendation and action plans to be taken towards the implementation of the Project.

8.2 Laws and Regulations

In the Republic of Kazakhstan, there are some basic laws and many relevant regulations, rules, instructions and standards based on the basic laws related to the operation and management of water supply and sewerage services. Among them, some specifically important basic laws and regulations are given below.

8.2.1 Basic Laws

- (1) The Law of the Republic of Kazakhstan on Environmental Protection (Parliament of the Republic of Kazakhstan)

It defines general regulations for environmental conservation and management.

- (2) Water Code of Republic of Kazakhstan, No.2061-12 (Parliament of the Republic of Kazakhstan)

It defines basic concepts for water resources use and conservation.

Based on those basic laws, a variety of regulations, rules, instructions and standards are issued by relevant ministries and authorized agencies including local governments.

8.2.2 Regulations for Surface Water and Groundwater

The following regulation covers all aspects of surface water protection and groundwater protection.

- Regulation of Surface Water Protection of the Republic of Kazakhstan, RND 1.01.03 – 94 (Ministry of Natural Resources and Environmental Protection)
- Sources of Centralized Economic – Drinking Water Supply, Sanitary and Technical Requirement and Rules of Selection, (GOST 2761-84) (Agency of Public Health)
- Sanitary Norms and Regulation of Surface Water Protection, (SanPin No. 4630-88) (Agency of Public Health)

8.2.3 Drinking Water

The quality of drinking water is regulated by the following regulation.

- Hygienic Requirement for Water Quality of Centralized System of Water Supply for Drinking Use, (SanPin No. 2.1.4.559-96) (Agency of Public Health)

8.2.4 Wastewater Discharge

Wastewater discharges are regulated by the following regulations.

- Wastewater into Water Bodies (Ministry of Natural Resources and Environmental Protection)
- Resolution for Industrial Wastewater Discharge System of Astana City (Astana City)

8.2.5 Management Framework

The most important laws and charter which affect the manner of management of enterprises providing public utility services like water supply and sewerage services are as follows :

- (1) The Decree of the President of the Republic of Kazakhstan "On State Enterprise"(No.2335 issued on June 19, 1995 and revised on January 1, 2000)

The decree classifies types of state enterprises and in particular Chapter 2 defines basic concepts and criteria and/or principles for the manner of management of natural monopoly enterprises like ASA. This is the most important law for the management of ASA. By the revision of the Decree in January 1, 2000, the Kazakhstan Government substantially shifted the management policy of state enterprises of natural monopolies towards the "self-supporting management" from the old "institutional management". It also relaxed regulations on tariff setting, asset management and alternative sources of revenue. Such policy changes will bring about much change in the management of public utility services like ASA.

- (2) The Law of the Republic of Kazakhstan "on Natural Monopoly" (No. 413-1, revised on July 13, 1999)

It is similar to "anti-monopoly law" as present in many other countries, with the aim to prevent anti monopolistic behavior of natural monopolies and to protect the interest of the population. This law and the Presidential Decree on State Enterprise above make up the framework under which operates the Regulation Agency of Natural Monopolies. This organization has the most direct impact on the management and finance of natural monopolies like ASA.

- (3) Charter of State Municipality Enterprise under self-supporting management contract "Astana Su Arnasy (ASA)" of the Administrative Board of Special Economic Zone of Astana City

This is equivalent to a management contract between Astana City Government and ASA. It has been revised on September 14, 2000 to take into account the revision of the Law of State Enterprise above and defines all of concepts and requirements regarding the management of ASA.

8.2.6 Standards of Design and Construction

The most important national standards regarding construction works were compiled during the Soviet era and have not been modified to take into account modern practices or local conditions. These standards are in two main categories as given below.

(1) GOST

These standards are similar to national standards of other countries such as ANSI, ASTM, BS, DIN, JIS, etc. Like other countries it provides standards for the provision of materials, goods and services.

(2) SNiP

These "Construction Norms and Rules" provides the design criteria and standard practices for the design and construction of most civil engineering and building works.

8.3 Existing Conditions of the Relevant Stakeholders

The main stakeholder for the water supply and sewerage sector is ASA. Details of the relationship between ASA and relevant agencies are presented in the Supporting Report D- 2.

8.3.1 Astana Su Arnasy (ASA)

This section clarifies the status of ASA among major stakeholders within the institutional framework as well as issues to be addressed.

(1) Institutional Status

ASA is one of the State Municipality Enterprises of Astana City Government and is responsible for providing water supply and sewerage services in Astana City. The charter of ASA has been recently changed to an enterprise under self-supporting

management from the previous institutional management. On the same occasion the official name of the enterprise was also changed to "Astana Su Arnasy(ASA) from Gorvodkanal".

(2) Self-supporting Management Concept

With the introduction of this new management concept the managers of the enterprise have more liberty or free hands to consider options for direction of the enterprise. But it also means that the effort to be provided by the managers has to increase to achieve the objective of self-supporting management.

Under the old concept management contract, it was easier to get a financial assistance from government sectors. But under the new rules the enterprise must operate through self-financing.

Another important change is that all operation equipment and facilities have been transferred to ASA through the "Charter Fund", equivalent to equity, subject to approval of asset disposal and transference to third parties by Akimat. The creation of a "Reserve Fund" for the purpose of payment competency improvement in case of management crisis has been effected.

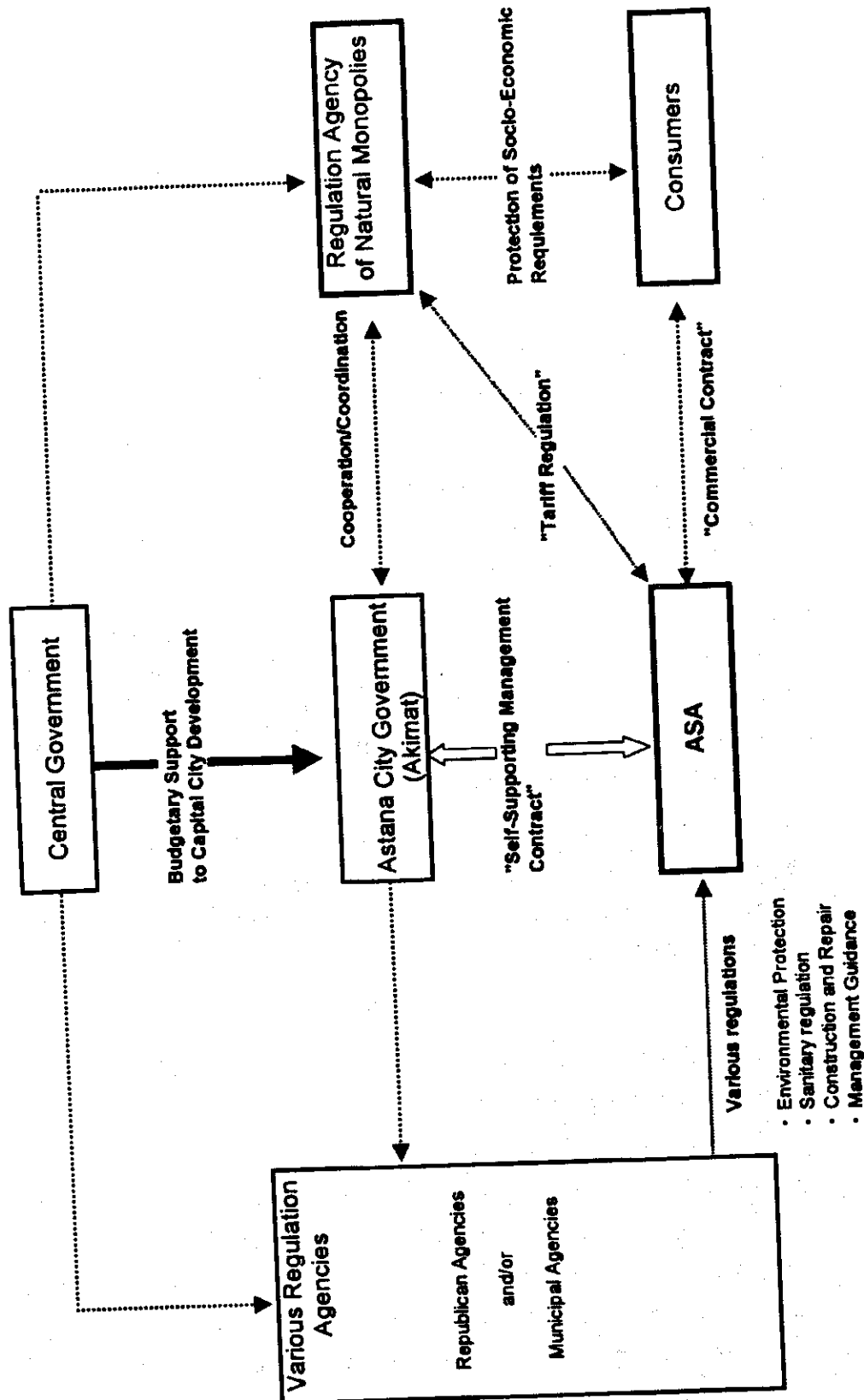
The new regulation also permits ASA to diversify into business other than their core business subject to some conditions. This may provide opportunities for ASA to create other sources of revenue through efficient utilization of idle assets and other available management resources.

(3) Relation with Other Relevant Stakeholders

Relationships between ASA and major relevant stakeholders are presented in Figure 8.3.1 and summarized below.

a) Relationship with Astana City (Akimat)

Akimat is the actual owner of ASA as the sole equity holder, though transference of whole assets as defined in the Charter. Although ASA is free to manage itself on a day to day basis, Akimat still retains some important decision making rights such as in the investment, manning requirement, tariff level and wage and salary of ASA's employees, which remains to restrict the "free-hand options" of ASA. It is recommended that ASA be given more liberty in such matters.



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Figure 8.3.1 Relationships Between ASA and Other Stakeholders

b) Relationship with Customers

The relation between ASA and customers is purely commercial contract based one. ASA is responsible for provision of sustainable and good quality water supply and sewerage services to customers. On the other hand, customers have duties to pay a reasonable tariff, in principle, full-cost recovery tariff, though it has not been realized yet. This relationship is crucial to both parties.

c) Relation with Regulation Agency of Natural Monopolies

The Regulation Agency of Natural Monopolies is the most critical regulatory agency since it has direct influence on the financial situation of ASA. The rulings of the agency affect the revenue as well as the expenditure of the enterprise. Therefore, the reasonable improvement and/or relaxation of the existing regulations by the Agency is the prerequisite for realization of the self-supporting management of ASA as well as modernization of the infrastructure of water supply and sewerage services. The basic laws already admit the new concept of for "self-supporting management" and "full-cost recovery tariff" This is particularly important, since water tariff almost make up the entire revenue source of any enterprise like ASA.

(4) Management Scope and Objectives

a) Management Scope

The scope of management within the concept of "self-supporting management" is similar to that available to private sector enterprises but is limited by the rules set out in its charter and those of the Regulation Agency of Natural Monopolies as described earlier.

b) Management Objectives

The current top management of ASA has formulated the following priority objectives:

- Earliest establishment of sustainable water supply and sewerage services system including modernization of technology to secure the fast growing demands and requirements resulting from Astana Capital City development
- Earliest achievement of "self-supporting management" by setting "full-cost recovery tariff"

In order to achieve such basic management objectives, the ASA management must effect specific improvement on issues such as management communications to staff and employees.

(5) Management Structure

In consultation with Akimat and the Regulation Agency of Natural Monopolies, ASA has undertaken a substantial reorganization in September 2000. As the result of the reorganization, the post of chief engineer was abolished and the responsibilities between the General Manager and three other Deputy General Managers has been clarified and redefined. The total number of staff was decreased from 979 to 902 by reorganization. Components of staffing by job categories are 47% for direct operation sector, 31.7% for indirect operation sector, 2.8% for other technical activity sectors, 14.6% for sales and customers services and 3.4% for management and administration sectors. Major features of management structure of ASA can be summarized as follows :

- a) Staffing of the operation and maintenance activities is substantially high, and is equivalent to approximately 80% of the total employees of 902 persons. This has caused from the obsolete equipment and facilities.
- b) Staffing for planning and construction is very small by only 1.0%, showing a very weak planning capability.
- c) Large number of tariff collectors amounting to 120 persons in the sales and customer service sector.
- d) Very low management staff ratio of only 3.4% which include business and investment planning, legal services to support credit management, human resources management, etc.

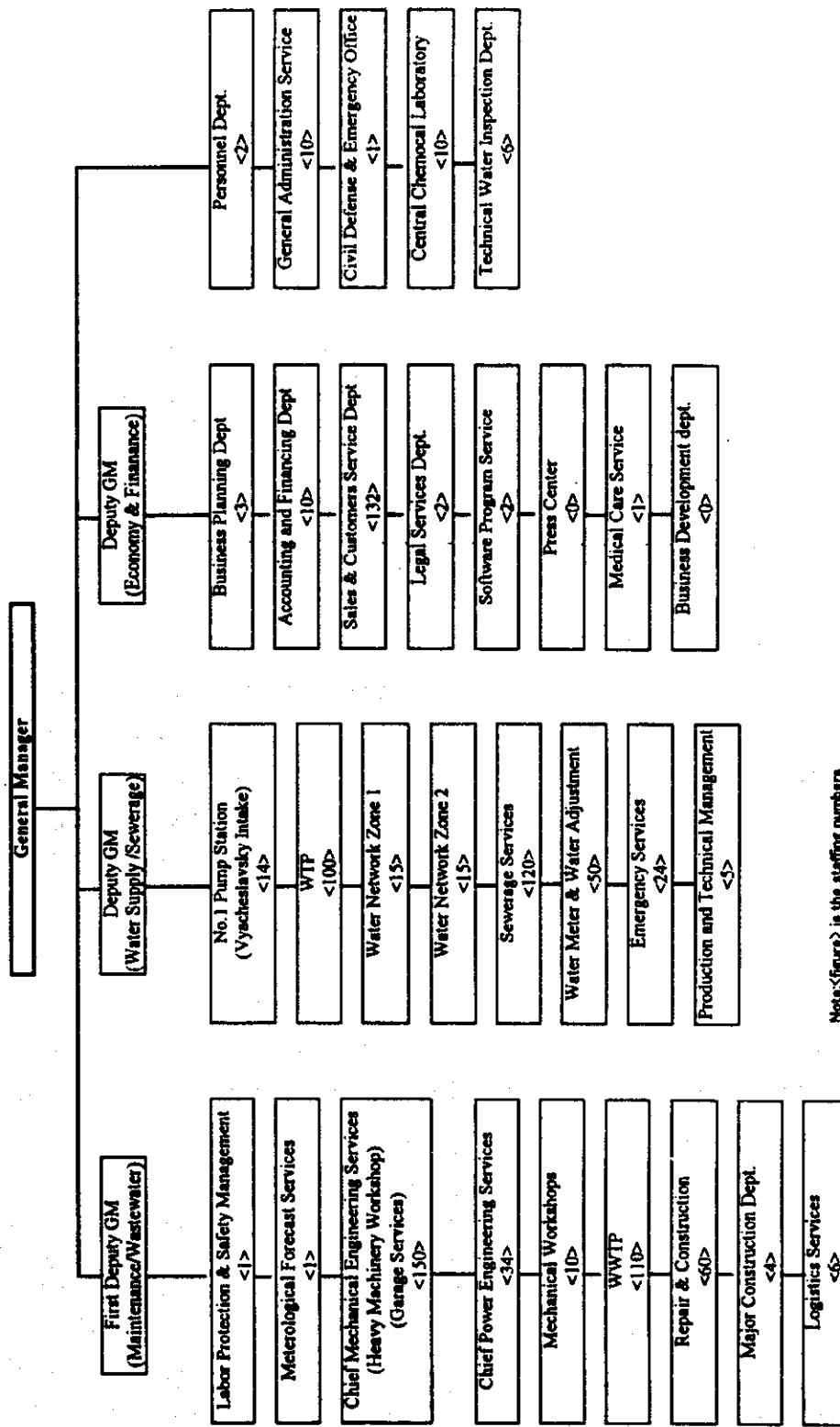
The schematic organizational structure is shown in the Figure 8.3.2.

(6) Decision Making System

Day to day management of ASA is undertaken by the five top managers. The detailed responsibilities of each are provided in Supporting Report D-3.

As stated earlier the most important decisions such as investment plan, tariff setting, financial matters, manning requirement are made the final decisions under attendance of a Deputy Akim in charge of ASA and the Regulation Agency of Natural Monopolies. This is rather constraining for ASA.

In order to improve matters regular weekly meeting among ASA, Akimat and the Regulation Agency of Natural Monopolies has recently been arranged.



Note: <figure> is the staffing numbers

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Figure 8.3.2
Organizational Structure of ASA
(as of September 2000)

(7) Functional Management

Major issues and improvement measures for the functional management of ASA to meet requirements from the Astana City development as well as "self-supporting management" are summarized below.

a) Business and Investment Planning

ASA is weak in business planning and the Regulation Agency is presently providing assistance on this aspect. ASA has built up its own business planning expertise and it may be necessary to recruit additional competent staff to strengthen this function and to train existing staff.

It is only recently in September 2000 that a first 5 Years Investment Plan has been prepared for ASA with the cooperation of the Regulation Agency. Staff will have to be trained to prepare budgets and to work under budgetary controls.

b) Financial Management

Since the middle of 1999 ASA has made much progress in improving its financial management. Achievements can be seen in the improved tariff collection, reduction of bad debts balance (by one fourth between 1999 and 2000), tariff increase (20% in October 1999), etc. The accumulated debts written-off since 1997 are reported to amount to 47 million Tenge. More efforts are still required for further improvements.

c) Sales and Customers Services

The tariff collection ratio is reported to have substantially improved from around 40% to 98% in 2000 according to the Regulation Agency of Natural Monopolies. The total account receivable is also said improved substantially from the beginning of 2000. The population data available to ASA for billing purposes is only 200,000 compared to the latest estimate of population of 300,000. This difference is important to ASA management, because it can mean a large revenue loss.

All of ASA services are available to the public at the Head Office making it very inconvenient for many people. Customer access should be improved by opening of branch offices, at least 3 such offices are necessary. ASA should also take an active role in educating customers on the need for water conservation and the promotion of water meters. Promotion of payment through the banking system should also be considered.

d) Accounting

The old system has been changed to the modern accounting standard in 2000 when

the new General Manager was assigned and the introduction of computers has been promoted to improve the management level, but the process is still on-going. The current Deputy General Manager in charge of financial management matters was recruited from the private business sector and she has introduced closer cooperation between the various financial departments.

e) Legal Services and Information Services

The recruitment of a competent legal specialist has greatly contributed to better understanding of legal matters leading to improved debt recovery and promotion of new supply contract including a new late payment penalty of 0.1% per day interest. Furthermore, the establishment of an information technology services section has been also contributing to support maintenance services and database establishment of various management information. Another important function of the department is the dissemination of information for staff improvement. ASA has a plan to promote information services to consumers such as disclosure of information about the enterprise activity and consumer's education about necessity of water resources conservation.

f) Procurement

Procurement of materials for construction and repair works in Kazakhstan is generally a big problem. Another problem is the bidding procedure for procurement as stipulated by the Regulation Agency of Natural Monopolies, which imposes condition on the purchasing of local goods to protect local industries. However, this restriction not only disturbs the quick procurement requirements, but also hinders the acquisition of proper and advanced materials. ASA is strongly in favour of relaxation and/or practical application of the existing policy and instruction by the Regulation Agency of Natural Monopolies. ASA also plans to establish a centralized logistics center in future as well as strengthening of staffing.

g) Technical Management and Construction

The quantity and competency of this sector is not sufficient to ensure an efficient implementation of the investment plans. ASA wants to train staff on construction planning, management and design works through introduction of new technologies.

h) Human Resources Management

The lack of staff and competency in this sector hinders the expected role and function of human resources management and development department. Considering the importance of human resources in the promotion of "self-supporting management", this sector needs to be strengthened substantially by

the introduction of a program for motivation of employees. Such a program will include training program, merit based income, recruiting of qualified staff from other sectors. The manning requirement is heavily regulated by the Regulation Agency of Natural Monopolies, and the level of staff income is decided by Akimat.

i) Auditing

Currently, ASA doesn't have an internal auditing system. Externally the Regulation Agency of Natural Monopolies actually plays the role of auditor to ASA.

8.3.2 Akimat (Astana Municipality)

(1) Administrative Structure

Astana City is administrated under the Akim (Mayor) and mayor's executive office (Akimat), which is managed by six Deputy Akims. Many agencies are organized in accordance with respective Deputy Akim's responsibilities as substructure units as shown in the Figure 8.3.3. ASA belongs to one of sub-structure of Akimat as a state municipality enterprise. The day to day management of ASA is the responsibility of the Deputy Akim in charge of infrastructure, as stated in the management contract of "ASA Charter"

(2) Reform to ASA Management

Astana City Government (Akimat) has started to take actions to reform the management of ASA since the middle 1999 in a joint cooperation with the Regulation Agency of Natural Monopolies. Such actions have been caused by the urgent requirement of Astana Capital City development and the poor capabilities of ASA in terms of technical system and managerial aspects. The most important reform action among all efforts is the shift of management concept of ASA to "self-supporting management" as already mentioned. This is an important step in institutional framework improvement, though there still remains many improvements to realize such a concept change. Akimat has recently taken other actions to reform the management of ASA including transfer of assets to ASA, replacement of General Manager, reorganization of management structure, reduction of personnel, establishment of the first five years investment plan, improvement of tariff collection and recovery of bad credits, etc. The measures taken appear to be bearing fruit with signs of improvement in ASA management. However, further efforts have to be made by Akimat with regard to funding support for the modernization plan of ASA, political commitment to the expected tariff increase, relaxation of manning regulation and income of ASA's employees, etc.

8.3.3 Department of Regulation of Natural Monopolies

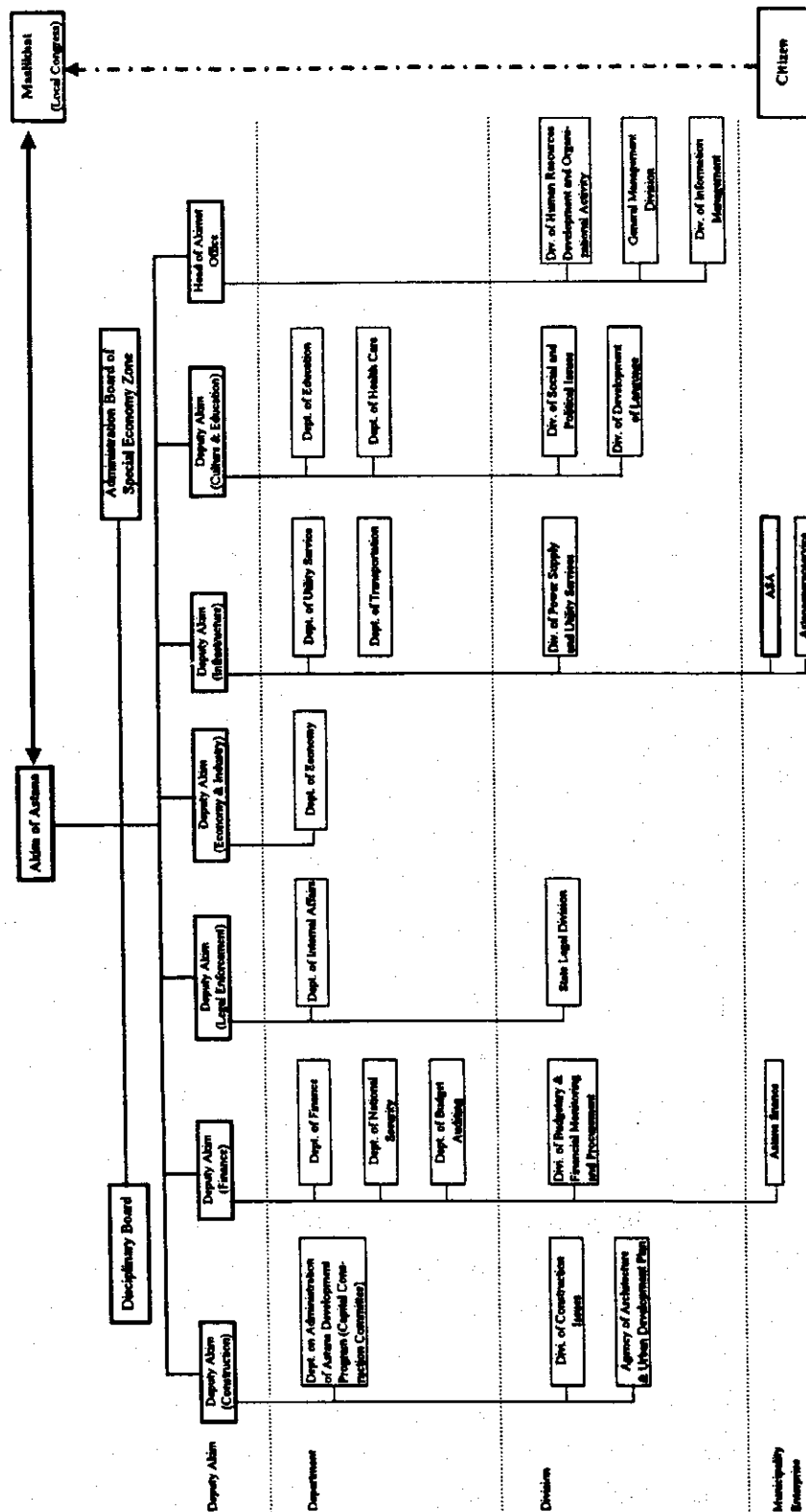
This is a regional republican agency under “National Committee of Regulation of Natural Monopolies” established as an independent authority at the central level to apply and regulate the “Law of the Republic of Kazakhstan on Natural Monopolies. The agency has authority to make decisions on tariffs proposed by natural monopoly enterprises like ASA and therefore has direct influence on ASA management.

Request for a tariff change is initiated by ASA who makes a proposal after consultation with Akimat. An important index considered in any proposal is the reference escalation index used issued by the Ministry of Economy, which is presently 7% per year. This proposal is then submitted to the Regulation Agency of Natural Monopolies who reviews the supporting evidence before giving its final decision. The minimum tariff revision interval is quarterly but semi-annual interval is being considered.

However, the Agency has recognized the importance of rapidly achieving self-supporting management within natural monopolies and it has been changing its regulation policy so as to be more flexible. In practical terms, the Agency has been making joint efforts with Akimat to provide a necessary assistance and suggestions on the various managerial aspects of ASA. Many reforms items by Akimat mentioned in Section 8.4.1 have been carried out with the strong support of the Agency. There are still a lot of regulations to be improved and/or relaxed by the Agency, so that the concept of “self-supporting management” with “full-cost recovery tariff” allowed in the basic laws can be fulfilled in the shortest timeframe.

8.3.4 Capital Development Corporation (CDC)

CDC is a closed joint stock company owned 100% by the Central Government. It was founded in March 1999 with the mission of attracting funding from foreign governments and international donor agencies to develop the infrastructure for the expansion of Astana City. This mission is necessary to expedite development of the city, which would otherwise be slow because of the limited financial resources of Astana City as well as the Central Government. CDC has no particular day to day operational relationship with ASA. However, CDC plays an important role and function in terms of various coordination activities and supervisions, to facilitate necessary studies and/or specific project implementation funded by foreign international donors.



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Figure 8.3.3 Administrative Structure of Astana City (Akimat)

8.3.5 Other Relevant Organizations

(1) Department of Economy

The Department is one of the important agencies within the Akimat and responsible for financial planning of Astana City development and budget allocation for specific development components. It also acts as a coordinator for all agencies within the Akimat as well as providing a financial and economic guidance to all the municipality enterprises like ASA. It has usually an indirect communication with ASA, but has responsibility for assessment of its investment plan and its budget allocation.

(2) Department on Administration of Astana City Development Program (Ex. Capital Construction Committee)

This agency has been created from the old Capital Construction Committee on November 24, 2000. Under the new organizational regime, this agency is expected to be the administrator and coordinator for the development of Astana City. It is also intended that it will also take over the function of Astana Finance, which has been restructured as described later. The Agency has three sub-divisions in the management structure, which are bidding division, construction division and financial division.

(3) Department of Architecture and Urban Development Planning

This is another agency within Akimat structure responsible for managing the required procedures and permissions related to construction activities such as application of development plans from developers, checking design until issuance of construction permission. This agency also plays an important role and function during the project implementation stage.

(4) Astana Finance

This is an open joint stock company whose main shareholder is Astana City Government with equity share of 44% and had the role of financing agent for all the development projects supported by the budget of Akimat. However, this company has been substantially restructured as of January 1, 2000 in accordance with abolishment of "Astana Special Economy Zone" scheme at the end of 2000. The function of financial agent for the Astana City Development Projects has been transferred to the newly established Department on Administration of Astana City Development Program.

(5) Construction Committee

This is a republican committee, which was under the Ministry of Energy, Trade and Industry and under the Ministry of Economy, Trade and Industry due to the recent cabinet reorganization. This committee has regional offices in all of Oblasts level. They have three divisions in their management structure, which supervise construction site inspection, licenses of construction and design, construction process, output quality and performance. This committee will be involved with the expected project management structure at the time of project implementation.

(6) Water Resources Committee

This is a republican agency under the Ministry of Natural Resources and Environmental Conservation and has the authority to issue regulations regarding water resources allocation and resources usage as well as environment conservation of water resources. They have eight Basins Committees in Kazakhstan and also Regional Committee in the Oblasts level. Major roles and functions are the management of water resources allocation, conservation management of water resources and protection management of water reservoir from contamination. Allocation of water resources to ASA is decided and supervised by this committee.

(7) Sanitary and Epidemiological Center

This is also a republican agency under supervision of the Agency of Public Health. They have regional offices in 14 Oblast and 2 Municipalities that are Astana City and Almaty. Their role and function are inspection and monitoring of drinking water and inspection and monitoring of wastewater from the view-point of drinking water resources.

(8) Department of Ecological and Environmental Protection

This is also a republican agency under supervision of the Ministry of Natural Resources and Environmental Conservation. They have regional offices in all of Oblast level and 2 Municipalities including Astana and Almaty. Their role and function are supervising wastewater treatment and discharging water into rivers from the viewpoint not only of drinking water aspect and also more general water usage aspects such as fishery, agriculture and any other use sectors.

8.4 Current Key Issues

The current key issues are summarized in this section

8.4.1 Software Issues

(1) Tariff Issues

The following issues have been identified concerning tariffs

- Short period between tariff revision means production of more documentation
- Low tariff does not generate sufficient revenue to cover costs
- Poor collection ratio has impact on cash flow of ASA
- Existing flat rate structure does not encourage water conservation

(2) Limited Revenue Source and Assets Management

The issues identified concerning maximum utilisation of assets are as follows:

- Revenue base of ASA is limited to sale of water and sewerage services
- Inefficient use of assets by ASA
- Regulation agency prohibits diversification of ASA business

(3) Availability of Funds

Availability of fund issues are as follows:

- City and central government have limited ready funds
- Funds will have to be borrowed and repaid

(4) Customer Awareness

Customer issues include the following:

- Need to pay for full price of water and sewerage services
- Many customers do not pay their water bills
- Public education on water issues is poor

(5) Weakness of Managerial Function

Management issues within ASA can be summarized as follows:

- High staffing level in operation and maintenance
- Low staffing in managerial, human resources, legal departments

(6) Poor Motivation Scheme

- No incentive scheme within ASA
- Complicated procedures discourages staff

8.4.2 Hardware System Issues

The infrastructure facilities also have issues which require attention. Most of the

issues have been covered in detail in the technical sections of the report. A summary of the main issues are presented below:

- Insufficient water resources
- Unreliable equipment
- Loss of tariff revenue through leakage
- Wastage by customers
- Large infrastructure required for rapid city development
- Negative impacts to the surrounding environmental conditions

8.5 Recommendations

8.5.1 Tarriff System

The tariff system has to be reformed on the following basis:

- Level of tariff must be sufficient to recover all O & M costs
- Tariffs must generate sufficient revenue for future investments
- Progressive tariff must be introduced as soon as possible to discourage wastage
- Industries must pay higher tariffs
- Lower income group should be provided with a subsidy to help with cost of water

8.5.2 Tariff Collection System and Customer Services

- Roll out of new supply contract for all customers
- Strengthening of the legal department
- Establishment of branch offices
- Public education regarding wastage and promotion of water meters
- Payment through the banking system
- Survey to determine real population served

8.5.3 Diversification of Revenue Sources

Diversification of revenue sources is a constant preoccupation of any business in order to maximise returns on assets used. However, before any such business can be started a proper business evaluation including market surveys will have to be carried out. Alternative business for water companies can be in such fields as:

- Plumbing and repairs
- Building construction
- Small agricultural or horticultural enterprises
- Sale of treated wastewater to agriculture
- Sale of processed sludge as fuel or as fertilizer

8.5.4 Staff Development

Staff development through training and recruitment are proposed in the following areas:

- Planning for tariff system, business and investment plan, new business development.
- Human resource development, organization development, employee's motivation scheme development.
- Technical management relating to introduction of new technology and procurement of new products.
- Information system based on computerization using local area network (LAN), management information system (MIS).
- Legal service for credit management, various legal issues.
- Supportive engineering service for maintenance competency improvement.

Relaxation of manning regulation by the Regulation Agency of National Monopolies as well as Akimat will be necessary for implementation of the above. Management positions ought to be double the existing number to effectively control an organisation like ASA.

8.5.5 Promotion of "Target Reaching Management"

Any management by any sector and organization needs to set a management target by the most typical numerical indicators as well as the target achievement timetable. In the case of ASA, the following indicators can be recommended:

- Accounted water supply ratio assessing the efficiency of technical operation as well as the total management efficiency in terms of tariff collection.
- Accounted water supply per employee indicating the management efficiency in terms of work performance.
- Frequency of operation trouble on the annual or monthly basis indicating the maintenance efficiency.
- Frequency of customer's complaint on the annual or monthly basis, indicating the quality of services.

These indicators can be used to monitor management by comparison with benchmarks established for other water companies.

8.5.6 Motivation Scheme

The following recommendations can be made to help motivate staff:

- Relaxation of regulation discouraging the self-supporting management

- Relaxation of regulation on the wage and salary of ASA's employee
- Necessity to establish the human resource development program
- Improvement of medical and health care

8.6 Action Plan

The new water supply and sewerage disposal system is expected to be fully functional by 2007 on completion of construction works. In order to establish the necessary organizational functions and to achieve sound business management, the proposed recommendations described in Sub-section 8.5 should be urgently implemented and the goals realized. Accomplishment of those proposed actions will be important for international funding consideration, and in some case, will be a prerequisite for funding agreement itself. In this Section, practical actions to be taken by the responsible organizations, starting and completion date are described. The schedule of the action plan is given in Figure 8.6.1.

8.6.1 Establishment of Review Committee and Working Groups

It is recommended, first of all, to establish a review committee and for each main item of the action plan, a working group. The committee will be composed of the core members of ASA, Akimat and Regulating Agency of Natural Monopolies and additional members selected from each working group. The working groups will also include other relevant agencies and NGO's representing professional staffs, manual workers and both household and industrial consumers. The review committee will meet regularly to review the findings of the working groups and provide recommendations to Akimat and ASA to implement.

The agenda for the review committee is as follows:

- Tariff setting
- Tariff collection system and customer services
- Diversification of revenue sources
- Management function
- Staff Motivation scheme

A working group will be arranged for each of the above item and the group will cover all the aspects presented below for each of the agenda item.

Figure 8.6.1 Timetable of Action Plan

Action Item	2001	2002	2003	2004	2005	2006	2007
A. Establishment of Review Committee and Working Groups							
a) Review of working groups findings and recommendations	████████████████████						
B. Tariff System Reform Working Group							
a) Development of a tiered tariff structure	████████████████						
b) Establishment of a new guidelines for tariff reform		██████					
c) Examination of government subsidy for consumers in low income class	████████████████						
C. Revenue Collection and Customer Service							
a) Introduction of new service contracts	████████████████						
b) Strengthening managerial function and information system	████████████████						
c) Establishment of ASA's branch service office	████████████████						
d) Introduction of banking system for tariff collection	████████████████████						
e) Survey of Accurate service population	████████████████						
f) Consumer awareness campaign	████████████████						
D. Business Development							
a) Deregulation of "doing other business"	████████████████						
b) Strengthening business development function		██████					
c) Administrative support and cooperation by Akimat		████████████████					
d) Introduction of private sector partnership		████████████████					
E. Staff Development							
a) Relaxation of regulation on wage and salary of ASA's employees	████████████████						
b) Strengthening human resources and organizational development	████████████████						
c) Introduction of new technology, up to date thinking, methods etc.	████████████████						
F. Management Strengthening							
a) Relaxation of regulation on wages and salaries of ASA employees	████████████████						
b) Strengthening human resources and organizational development	████████████████						
c) Establishment of human resources training programme		████████████████					

8.6.2 Reform of Tariff System

(1) Key Items for Action

Key items to take action are briefly categorized as follow.

- Development of a tiered tariff structure
- Establishment of a new guideline for tariff reforming
- Examination of government subsidy for consumers in low income class
- Preparation of practical time schedule

(2) Details of Practical Actions

Public consultation through interviews, focus groups etc to achieve a consensus among the community is necessary. This action needs to be initiated at the appropriate moment by Akimat in cooperation with ASA and the Regulation Agency of National Monopolies. After establishment of the new tariff, the guideline for tariff reforming has to be made public. The guideline will also provide a timetable for future reviews of the proposed tariff as well as a program for implementation of the decision made..

(3) Schedule for Action Plan

The Action plan needs to be started as soon as possible and completed at an appropriate time as shown in the table.

8.6.3 Tariff Collection System and Improvement of Customer Service

(1) Key Items for Actions

- Introduction of the new service contracts incorporating a penalty to strengthen of legal position.
- Strengthen the managerial function and information system in ASA to support debt management and the establishment of customer data base.
- Establishment of ASA's branch service offices
- Study on introduction of banking system for tariff collection
- Survey of the accurate service population
- Customer awareness campaign

(2) Details of Practical Action

Relaxation of regulation on manning to strengthen the managerial function is needed. Decentralization of tariff collection and customer service from the head office of ASA to branch service offices at three locations distributed in the city.

Customer awareness campaign must be carried out at regular intervals (i.e. 6

months) to sensitize the public to the importance of water and the need to economize water. The same campaign can support the efforts of getting water meters accepted by the population and explain the installation of water meters as a form of control which can be used by the customer to managing the volume of water it uses.

(3) Schedule of Action Plan

The implementation schedule is expected to be in the earlier time frame of 2001 to 2002 except the introduction of banking system. The introduction of branch offices should be completed by 2004.

8.6.4 Diversification of Revenue Sources

The action plan regarding the diversification of revenue sources on “doing other business” is described below.

(1) Key Items for Actions

- Deregulation of “doing other business” by the Regulation Agency of National Monopolies
- Strengthening the functional competency of business development in ASA
- Administrative support and cooperation by Akimat

(2) Details of Practical Actions

Setting up study groups to identify appropriate business opportunities that will complement and not be detrimental to the core business of ASA.

Establishment of joint study and development scheme between ASA and Akimat regarding the recycling business development of treated wastewater and sludge.

(3) Schedule of Action Plan

Identification of new business opportunities is a task that should be carried out regularly in any organization. Since no such task has ever been conducted by ASA, the study groups proposed above should be complete their investigations within six months.

8.6.5 Managerial Function

(1) Key Items to Take Actions

- Strengthening of managerial function through staff training
- Promotion of “target reaching management”

(2) Details of Practical Action

Staff has to be prepared for modern business through training in many aspects including information technology, commercial awareness, financial understanding, legal issues etc.

(3) Schedule of Action Plan

Training for the key managers of ASA should be achieved within three years in order to realize "self-supporting management". Training of all staff at all level is necessary so that equipment is properly operated, new technology and methods can be introduced. New technology will include computers, leakage management and detection.

8.6.6 Motivation Scheme for ASA's staff

(1) Key Items to Take Actions

- Relaxation of regulation on wage and salary of ASA's employees
- Strengthening the human resources management and organization of ASA

(2) Details of Practical Action

In order to create motivation, review of wage and salary should be carried out. At the same time, human resources management and organization reconstruction should be strengthened.

(3) Schedule of Action Plan

Regulation of wage and salary of ASA's employees should be started as soon as possible targeting completion within one year and a half. Strengthening of human resources management should start immediately and completed within three years.

CHAPTER 9
CONSTRUCTION PLAN
AND COST ESTIMATE



CHAPTER 9 CONSTRUCTION PLAN AND COST ESTIMATE

9.1 General

This chapter deals with the implementation plan and cost estimation on the Project based on the design for the target year of 2010 presented in the previous chapters. The project cost is estimated on the basis of a proposed implementation and construction plan. The background and requirement of the Project are 1) urgent realization of the project to allow extension of the water supply system due to the transfer of the Capital to Astana and 2) to utilize invested fund effectively to minimize the total cost. Considering these background and requirement, it is assumed for the purpose of the implementation plan and cost estimation that the Project will require international funding for implementation and contractors for each package of the Project are to be selected through international competitive bidding (ICB).

9.2 Project Implementation

The proposed implementation schedule for the project based on international funding and ICB is shown in Figure 9.2.1.

The implementation schedule can be divided into four stages, 1) Financial Procurement Stage, 2) Detail Design Stage, 3) Contractor Procurement Stage and 4) Construction Stage.

The Project is commenced by Financial Procurement Stage for securing an international financier. This stage includes loan request, appraisal of the Project, approval of the Project by financier and borrower's Government, loan agreement and exchange notice. Upon authorization of Loan Agreement, selection of the Consultant(s) for Detailed Design will be carried out. Selection of the Consultant includes preparation of short list, pre-qualification, preparation of invitation to tender, bidding and evaluation of Consultant's proposal, negotiation, clarification and contract. The Detailed Design includes field and inventory surveys, tests, detail design, preparation of tender documents and construction supervision. After preparation of the tender documents at the end of detailed design, pre-qualification and ICB of contractors will be commenced. It is proposed that the works be divided into seven packages, four for water supply, two for wastewater and one for operation equipment supply as detailed below.

Description	year project month	2001 1	2002 2	2003 3	2004 4	2005 5	2006 6	2007 7	2008 8	2009 9	2010 10	Remarks
A. Pre-Construction												
A1 Financial Arrangement												
Loan Agreement		██████████										
Selection of Consultant			██████████									
A2 Detail Design												
Survey & Investigation			██████████									
Detail Design			██████████									
Preparation of Tender Document				██████████								
Construction Supervision					██████████	██████████	██████████	██████████	██████████			
A3 Contractor Procurement												
Prequalification				██████████								
Selection of Contractor				██████████	██████████							
B. Construction												
Water Supply Facility												
Package 101 Water Intake					██████████	██████████	██████████	██████████				
Package 102 Water Treatment Plant(WTP)					██████████	██████████	██████████	██████████				
Package 103 Distribution Network					██████████	██████████	██████████	██████████				
Package 104 Provision of Individual Flow Meter					██████████	██████████						
Wastewater Facility												
Package 151 Wastewater Treatment Plant(WWTP)					██████████	██████████	██████████	██████████				
Package 152 Sewerage Collection Network					██████████	██████████	██████████	██████████				

Figure 9.2.1 Project Implementation Schedule

Contract Packages for Water Supply

- Package 101: Water Intake
- Package 102: Water Treatment Plant (WTP)
- Package 103: Distribution Network
- Package 104: Provision of Individual Flow Meter

Contract Packages for Wastewater

- Package 151: Wastewater Treatment Plant (WWTP)
- Package 152: Wastewater Collection Pipes

Contract Package for Operation Equipment Supply

- Package 190: O & M Equipment

All the above works are planned to commence in 2004 and be implemented in parallel in order to achieve early completion.

9.3 Construction Plan

The construction plan for the major works within each contract package is described as follows. The detailed scope of works and construction schedule is as shown in Table 9.3.1 and Figure 9.3.1, respectively.

(1) Package 101: Water Intake

The most important component of this package is the construction of a new Vyacheslavsky Reservoir intake pump station of 200,000 m³/d including mechanical and electrical works, access road to the pump station, intake channel and pump house building. The site is located approximately 100 m upstream of the existing pump station.

The main structure for the new pump station is planned to be constructed by caisson method, in order to allow construction even when the water level of the reservoir rises above its present level. Alternate methods of construction such as open-cut with cofferdam by sheet pile may be used but will depend on the water level which will require further studies at the detail design stage.

A 400 m long access road will be required between the existing road and the new pump station. The site around the pump station and the new access road is to be built on a platform approximately 2 to 10 m above existing ground.

The intake channel in front of the new pump station will be constructed by open cut method and covered by riprap and concrete on the slope and bottom of channel

respectively.

The transmission pipeline between water intake and WTP is not included in this Study as described in Section 4.4.2.

(2) Package 102: Water Treatment Plant (WTP)

Major works are comprised of construction within a new 100,000 m³/d WTP of new facilities such as rapid sand filtration, drain disposal facility, sludge treatment facility, administration building and interconnection pipes within the plant. The construction site is located within the existing WTP and will be built in a vacant area of the premises.

Precast reinforced concrete piled foundation, available locally are proposed for each concrete basin and building. Geo-technical investigations show that the subsurface layer is comprised of a sandy clay of 1.7 m to 3.4-m thickness, with coarse sand or sandy clay underneath. Groundwater was found 0.95 to 2.4 m below the ground surface. Considering the above, the excavation for deep basins are to be carried out with shoring by sheet pile and dewatering.

For the construction of concrete basins, cast-in-situ reinforced concrete is recommended to assure its water-tightness instead of using pre-cast concrete members.

(3) Package 103: Distribution Network

Major works include replacement of existing pipes, installation of new distribution pipe in the left bank of the Ishim River area and construction of a new distribution pump station.

Replacement of 99 km of existing pipelines will be carried out in several places of present City zone. It is recommended that construction proceed in accordance with the priority of urgent rehabilitation for existing pipes depending on the degree of corrosion and leakage found during an inventory survey to be carried out at the detailed design stage. Based on the above, the construction schedule is proposed in order to proceed the work due to tentatively 3 phases of priority as shown in Figure 9.3.1. Most of the existing pipes are in non-traffic route, such as green belts area. It is assumed that 5 % of the total length to be replaced is in road area, necessitating restoration of the existing road.

Pipe installation in the new development area amounts to 73 km. It is assumed that the construction work will be carried out before the road construction. The construction should be coordinated with proposed development plan and schedule.

At this moment of the Study, construction of the "Government Center" has already begun, therefore earlier construction of distribution pipe is required in this area. The schedule for other areas will depend on area by area city development plan which is still unknown at this stage. It is assumed for the purpose of this Study that development of the city is to take place in 2 areas and in 2 phases. Based on the above, the construction schedule is proposed in order to proceed the work due to the tentatively 3 phases as shown in Figure 9.3.1.

Proposed pipe materials are ductile cast iron pipe (DIP) and carbon steel pipe (CSP). Pipe material is selected based on the technical point of view. CSP is used for pipes of 900 mm in diameter or greater and DIP is for pipes less than 900 mm for a convenience of installation without internal lining at the pipe joint. Both materials are not available locally.

Since the construction site of distribution pump station is located in the existing WTP premises, same construction plan is proposed as mentioned in (2) Package 102 above.

(4) Package 104: Provision of Individual Flow Meter

This work includes procurement and installation of individual flow meters. It will be provided to improve the control of water loss and wastage and subsequent accurate water tariff collection management, therefore the required quantity of meters should satisfy the number of households in principal. It is especially urgent to install meters to households, which currently do not have them. It is estimated that 65,500 pieces of flow meters are required to be installed.

(5) Package 151: Wastewater Treatment Plant (WWTP)

Major works at the WWTP comprise rehabilitation and construction of the inlet pump station No.12, grit channel, primary sedimentation tank, aeration tank, final sedimentation tank, treated effluent pump station No.13 and sludge treatment facilities. The construction site is located within the existing WWTP and new facilities are proposed to be built on the same premises.

Precast reinforced concrete piles are proposed as foundation for each concrete basin and building. The surface layer consists of a solid sandy clay of 1.5 m to 6.5 m thickness, with non-solid silty sand or sandy clay of 1.5 to 3.0 m thickness underneath.

Groundwater was found 0.95 to 2.65 m below ground surface. Considering above, the excavation for basins which is deeper than groundwater is to be carried out with

shoring by sheet pile or other method and dewatering.

For the construction of concrete basins, conventional construction method is recommended as for (2) Package 102 above.

(6) Package 152: Wastewater Collection Pipes

Major works are comprised of 1) construction of a new pump station and a new sewer collection system 2) rehabilitation of existing pump stations and existing manholes and 3) replacement of existing wastewater collection pipes.

The construction of the main structure for the new pump station is planned by caisson method same as for existing pump stations.

Installation of the wastewater collection pipes in the new developing City zone in the left bank of the Ishim River will amount to 35 km and 70 km for main collectors and secondary collectors, respectively. The construction schedule is prepared to divide developing area into 3 phases based on the same assumption as described in above (3) "Package 103: Distribution Network". It is assumed that the construction work will be carried out before road construction. A typical section for excavation is shown in Figure D.8 of the Supporting Report.

There are two crossings between main collectors and the Ishim River. Jacking method is proposed for the construction of these crossings applying approximate length of 200 m for this method.

Proposed pipe materials for gravity flow are polyvinyl chloride pipe (PVC) and reinforced concrete pipe (RCP). For pressurized pipe, DIP is planned. PVC is to be used for pipes of 250 mm in diameter or smaller and RCP is for pipes greater than 250 mm.

Replacement of 23 km of existing wastewater pipes will be carried out in several parts of the present City area. The construction schedule is prepared on the basis of dividing the development area into 3 phases of priority using the same assumption as described in above (3) "Package 103: Distribution Network". It is assumed that 5 % of the total length is required for restoration of the existing road.

Table 9.3.1 Project Component

Package	Work Item	Specification	unit	Q'ty
101	Water Intake	200,000 t/d capacity		
	Intake Pump	Q=35 m ³ /min, vertical type, centrifugal	units	5
	Pump Station	10 m x 30 m x 34 m height	unit	1
	Access Road	asphalt surface	m	400
102	Water Treatment Plant	Rapid Sand Filtration Method		
	Receiving Well	Q=52,500 m ³ /d/unit	units	2
	Rapid mixing Well	Q=52,500 m ³ /d/unit	units	2
	Flocculation Basin	Q=17,500 m ³ /d/unit	units	6
	Sedimentation Basin	Q=17,500 m ³ /d/unit	units	6
	Rapid Sand Filter	Q=8,750 m ³ /d/unit	units	12
	Chlorine Mixing Basin	Q=100,000 m ³ /d/unit	unit	1
	Washing Drain Basin	Q=1,200 m ³ /unit	units	2
	Thickening Tank	7 ton/day/unit	units	2
	Sludge Drying Bed	1.6 ton/day/unit	units	9
	Administration Building	15 m x 60 m x 3 stories	unit	1
103	Distribution Network			
	Replacement of Existing Pipe	diameter of 100 to 500 mm	km	98
	New Distribution Network	diameter of 150 to 1,800 mm	km	73
	Distribution Pump	Q=32.4 m ³ /min, D=450mm, H=55m	units	3
		Q=16.5 m ³ /min, D=400mm, H=55m	units	2
104	Provision of Individual Flow Meter	Supply of Flow Meter	units	65,500
151	Wastewater Treatment Plant	Activated Sludge Treatment Method		
	Inlet Pump Station No.12	replacement of existing pump	units	4
	Grit Channel	new horizontal flow grit trap, 10 m diameter	units	2
	Primary Settling Tank	new settling tank, 28 m diameter	units	2
		rehabilitation of existing settling tank	units	2
	Aeration Tank	rehabilitation of existing aeration tank	units	4
		replacement of air blower	units	5
	Final Settling Tank	new settling tank, 28 m diameter	units	2
		rehabilitation of existing settling tank	units	2
	Sludge Treatment	new belt thickener, 80m ³ /h	units	3
		new sludge storage tank, 500m ³	units	2
		rehabilitation of existing thickening tank	units	2
		new digestion tank, 2,500m ³	unit	1
		rehabilitation of existing digestion tank	units	2
		replacement of existing boiler	units	2
		sludge drying bed, 100m x 70m	units	5
152	Wastewater Collection pipes			
	New Pump Station	14m x 22m x 13mD	unit	1
		11m x 17m x 15mD	unit	1
		11m x 17m x 9mD	unit	1
	Existing Pump Station	replacement pumps	units	48
	New Main Collector	diameter 350 to 1,500 mm	km	36
	New Secondary Collector	diameter 300 to 500 mm	km	71
	River Crossing	diameter 1500mm, L=200m	places	2
	Replacement of Existing Pipe	diameter 150 to 800 mm	km	21
	Existing Manhole	replacement of cover	units	5,300

Description	year project month	2001 1	2002 2	2003 3	2004 4	2005 5	2006 6	2007 7	2008 8	Remarks	
A. Pre-Construction											
A1 Financial Arrangement		██████████							work in winter lesser productivity on field work to be expected		
A2 Engineering Service			██████████								
A3 Procurement of Contractor				██████████	██████████						
B. Construction											
Water Supply Facility											
B101 Water Intake					██████████						
Civil & Building Work					██████████	██████████	██████████	██████████			
M&E and Piping Work				procurement	██████████	██████████	██████████	██████████			
B102 Water Treatment Plant(WTP)					██████████						
Civil & Building Work					██████████	██████████	██████████	██████████	██████████		
M&E and Piping Work				procurement	██████████	██████████	██████████	██████████	██████████		
B103 Distribution Network					██████████						
Procurement of M&E and Pipe					██████████	██████████	██████████	██████████			
Site Installation, Replacement					██████████	██████████	██████████	██████████			
Site Installation, New Development Area					██████████	██████████	██████████	██████████			
B104 Provision of Individual Flow Meter					██████████						
Wastewater Facility											
B151 Wastewater Treatment Plant(WWTP)					██████████						
Civil & Building Work					██████████	██████████	██████████	██████████	██████████		
M&E and Piping Work				procurement	██████████	██████████	██████████	██████████	██████████		
B152 Wastewater Collection Pipes					██████████						
Procurement of M&E and Pipe					██████████	██████████	██████████	██████████			
Site Installation, Replacement					██████████	██████████	██████████	██████████			
Site Installation, New Development Area					██████████	██████████	██████████	██████████			

Figure 9.3.1 Proposed Construction Schedule

9.4 Cost Estimate

9.4.1 Composition of Project Cost

The components for the project cost are as follows:

- 1) Direct Construction Cost
- 2) Land Acquisition and Compensation
- 3) Administrative Expenses
- 4) Engineering Services
- 5) Physical Contingency
- 6) Price Contingency
- 7) Import Tax
- 8) Value Added Tax (VAT)

9.4.2 Conditions and Assumption for Cost Estimate

The project cost was estimated based on the following conditions:

(1) Project Execution Method

All the proposed works will be executed on the contract basis. The contractors will be selected by ICB basis.

(2) Price Level

The price level is in the middle of November in 2000. The exchange rate applied for the estimation is as follows:

US\$ 1.0 = 110 JPY = 144 Tenge

(3) Unit Prices

The direct construction cost is estimated on the unit cost basis, which includes equipment, materials and labor cost as shown in Supporting Report D.1. The unit costs are prepared referring to similar projects in Kazakhstan and nearby central Asian countries. It should be noted that although the unit construction costs are defined by SNiP 4.02-91 and 4.05-91, they have not been revised since 1991 and not applicable for this Study due to drastic escalation during the term.

(4) Foreign and Local Currency Portion

The project cost includes Foreign Currency (F.C.) portion and Local Currency (L.C.) portion. The ratio between F.C. and L.C. was assumed applying certain percentages for each item as shown in Supporting Report D.1. Both currencies were estimated in terms of US Dollar.

(5) O&M Equipment

Total of 10 million US\$ is accounted for the supply of O&M equipment, such as workshop tools, trailers, mobile crane, patrol mobiles, etc. required for the O&M works by ASA. The procurement will be carried out through ICB. List of Equipment is shown in Supporting Report D.6.

(6) Land Acquisition and Compensation

The land needed for the project is located in ASA's premises or the land belonging to the government. It is advised by CDC that the land presently belonging to the state is provided to a public service corporation including ASA without the cost, therefore no cost for land acquisition and compensation will not be occurred both for the government and ASA.

(7) Administrative Expense

The cost for administrative expenses to the government and related agencies is estimated at 2 % of the direct construction cost.

(8) Engineering Services

The cost of engineering services is estimated on a man-month basis including topographic and geological surveys, inventory and reconnaissance surveys, detail design, preparation of tender documents and construction supervision.

(9) Price Contingency

Price contingency is estimated applying an annual escalation rate in Consumer Price Index (CPI) of 2.2 % in US\$ for the F.C. portion referring International Financial Statistics by IMF on Aug 2000 as follows

	1996	1997	1998	1999	average
US\$	2.90 %	2.33%	1.61%	2.15%	2.2%

Price contingency of L.C. is assumed to be the same escalation rate of 2.2 % as F.C. The justification is described as follows.

Based on the inflation rate of Kazakhstan in Tenge and the devaluation rate of Tenge against the US\$, the rated price escalation is calculated below. The average between 1996 and 1999 is determined to be - 0.3%.

	1996	1997	1998	1999	average
Inflation Rate in Tenge	39%	17%	7%	8%	17.8%
Devaluation Rate of Tenge against US\$	15%	3%	11%	65%	23.5%
Rated Price Escalation in US\$	22%	14%	-3%	-34%	-0.3%

However, this rated escalation of - 0.3% is not suitable for the projection of future escalation, because there were unstable fluctuation of values in this period. Additionally, the rated price escalation should be "plus" for a growing economy. That is why same escalation rate as F.C. is adopted for L.C. instead of the recent statistical data of Kazakhstan.

(10) Physical Contingency

Physical contingency is estimated at 10 % of the direct construction cost.

(11) Import Tax and Value Added Tax (VAT)

Import tax of 10% and VAT of 20 % are tentatively applied for imported pipe and equipment and for total cost respectively.

However Import Tax and VAT should be included in direct construction cost which should be total contract cost to the contractor(s), they are accounted separately due to the possibility of tax exemption as advised by CDC.

9.4.3 Summary of Project Cost

The estimated total of the project cost is US\$ 300.1 million, which is comprised of F.C. portion of US\$ 183.8 million (61%) and L.C. portion of US\$ 116.3 million (39%) as shown in Table 9.4.1. Further details are shown in Supporting Report D.2 to D.5.

Table 9.4.1 Summary of Project Cost

Code	Cost Item	Foreign Portion (x 1,000 US\$)	Local Portion (x 1,000 US\$)	Total (x 1,000 US\$)
100	Direct Construction Cost			
	Water Supply			
101	Water Intake	8,243	1,827	10,070
102	Water Treatment Plant	37,780	9,552	47,332
103	Distribution Network	27,970	7,760	35,730
104	Individual Flow Meter	2,476	275	2,751
	Total of 101 to 104	76,469	19,414	95,883
	Wastewater			
151	Wastewater Treatment Plant	16,622	4,534	21,156
152	Wastewater Collection Pipes	43,226	17,533	60,759
	Total of 151 to 152	59,848	22,067	81,915
190	O & M Equipment	8,000	2,000	10,000
100	Total of Direct Construction Cost	144,317	43,481	187,798
300	Indirect Cost			
301	Land Acquisition and Compensation	0	0	0
302	Administrative Expense	0	3,556	3,556
303	Engineering Services	10,579	1,867	12,446
304	Physical Contingency	15,489	5,638	21,127
305	Price Contingency	13,447	4,240	17,687
306	Import Tax	0	7,468	7,468
307	V.A.T.	0	50,016	50,016
	Total of 301 to 307	39,515	72,785	112,300
	Total Project Cost	183,832	116,266	300,098

9.4.4 Disbursement Schedule

Table 9.4.2 shows the disbursement schedule based on the proposed construction schedule in Figure 9.3.1.

Table 9.4.2 Disbursement Schedule

Code	Cost Item	Project Cost Total			2002			2003			2004			2005			2006			2007			TOTAL			
		F.C.	L.C.	Total	F.C.	L.C.	Total	F.C.	L.C.	Total	F.C.	L.C.	Total	F.C.	L.C.	Total	F.C.	L.C.	Total	F.C.	L.C.	Total	F.C.	L.C.	Total	
100	Direct Construction																									
	Water Supply	76,466	19,416	95,882	0	0	0	743	83	826	16,386	3,299	19,685	31,593	7,449	39,042	21,914	6,364	28,278	5,830	2,221	8,051	76,466	19,416	95,882	
	Wastewater	59,842	22,070	81,912	0	0	0	0	0	0	6,261	1,529	7,790	26,077	9,601	35,678	21,521	8,517	30,038	5,983	2,423	8,406	59,842	22,070	81,912	
	O&M Equipment	8,000	2,000	10,000							2,000	500	2,500	6,000	1,500	7,500							8,000	2,000	10,000	
100	Total of Direct Constructio	144,308	43,486	187,794	0	0	0	743	83	826	24,647	5,328	29,975	63,670	18,550	82,220	43,435	14,881	58,316	11,813	4,644	16,457	144,308	43,486	187,794	
300	Indirect																									
	Land Acquisition and Compe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Administrative Expenses	0	3,556	3,556	0	0	0	0	17	17	0	550	550	0	1,494	1,494	0	1,166	1,166	0	329	329	0	3,556	3,556	
	Engineering Services	10,579	1,867	12,446	3,336	766	4,102	2,923	461	3,384	1,080	160	1,240	1,080	160	1,240	1,080	160	1,240	1,080	160	1,240	10,579	1,867	12,446	
	Physical Contingency : L1	15,489	5,638	21,127	334	77	410	367	56	423	2,573	1,089	3,662	6,475	2,282	8,757	4,452	1,621	6,072	1,289	513	1,803	15,489	5,638	21,127	
	Price Contingency : L2	13,447	4,240	17,687	0	0	0	33	4	37	1,528	326	1,854	5,245	1,551	6,796	4,993	1,711	6,704	1,648	648	2,296	13,447	4,240	17,687	
	Import Tax : L3	0	7,468	7,468	0	0	0	0	0	0	4,854	4,854	0	2,614	2,614	0	0	0	0	0	0	0	0	7,468	7,468	
	V.A.T. : L4	0	50,016	50,016	0	902	902	0	937	937	0	8,427	8,427	0	20,624	20,624	0	14,700	14,700	0	4,425	4,425	0	50,016	50,016	
300	Total of Indirect	39,515	72,785	112,300	3,670	1,745	5,414	3,323	1,475	4,798	5,181	15,406	20,587	12,800	28,725	41,525	10,525	19,358	29,882	4,017	6,075	10,093	39,515	72,785	112,300	
	Total	183,823	116,271	300,094	3,670	1,745	5,414	4,066	1,558	5,624	29,828	20,734	50,562	76,470	47,275	123,745	53,960	34,239	88,198	15,830	10,719	26,550	183,823	116,271	300,094	

L1 : 10%

L2 : 2.2% per year

L3 : 10%

L4 : 20%

9.4.5 Operation and Maintenance (O&M) Cost

Table 9.4.3 shows the summary of annual O&M cost at 2010.

Table 9.4.3 Annual Operation and Maintenance Cost
(Unit: 1,000 TG)

Item	O&M cost (1999)		O&M cost (2010)		Reference
Power Cost	202,238	37.7%	185,278	36.5%	202,238-16.96 per D.7
Wage & Salaries of ASA personal	220,485	41.1%	206,437	40.6%	220,485-14,048 per D.7
Chemical Cost	21,400	4.0%	30,450	6.0%	per Table 4.5.3
Fuels	9,089	1.7%	8,422	1.7%	
Other Material	14,628	2.7%	13,555	2.7%	
Repairs	44,295	8.3%	41,046	8.1%	
Purchased Water	5,577	1.0%	5,168	1.0%	
Other Expenses	18,729	3.5%	17,355	3.4%	
Total	536,441	100%	507,711	100%	

The power cost was estimated based on the power consumption in 2010 year and the present electric tariff of 3.84 Tenge per kWh. The breakdown of the power cost is shown on Supporting Report D.7.1. The wage & salaries of ASA personal was estimated based on the proposed future organization of ASA and averaged salary reported by EBRD. The breakdown of the wage & salaries is as shown in Supporting Report D.7.2.

The chemical cost was estimated based on the chemical consumption in 2010 year as described in Chapter 5 and Table 5.3.3.

For other operation and maintenance costs, Fuels, Other Material, Repairs, Purchased Water and Other Expenses were estimated based on the percentage of the expenses record of ASA in 1999.

It will be noted that reduction in operating and maintenance costs has been achieved through reduction in leakage, reduced volume of repairs, improved efficiency of new pumps and other efficiency gains as a result of implementation of a new management structure.

9.4.6 Alternative Project with Reduced Scope

The alternative project cost estimate has been prepared for a smaller project area, which only includes expansion areas for which funds have been committed by the Kazakhstan Government at the moment of this Feasibility Study. This area consists mainly of Government City on the left bank of the Ishim River. This alternative cost is presented in Table 9.4.4 together with the project cost for whole development area as shown in Table 9.4.1. Supporting Report D.9 and D.10 show the water

distribution network and wastewater collection pipes, which are excluded for alternative project cost estimate from whole development area.

Table 9.4.4 Comparison of Alternative Project Cost

Unit (1,000 US\$)

Code	Cost Item	Whole Project Cost			Alternative Project Cost		
		F.C.	L.C.	Total	F.C.	L.C.	Total
100	Direct Construction Cost						
	Water Supply						
101	Water Intake	8,243	1,827	10,070	8,244	1,827	10,071
102	Water Treatment Plant	37,780	9552	47,332	37,779	9553	47,332
103	Distribution Network	27,970	7,760	35,730	25,996	7,242	33,238
	-for area in committed plan	(25,996)	(7,242)	(33,238)	(25,996)	(7,242)	(33,238)
	-for other area	(1,974)	(518)	(2,492)	(0)	(0)	(0)
104	Individual Flow Meter	2,476	275	2,751	2,476	275	2,751
	Total of 101 to 104	76,469	19,416	95,882	74,495	18,897	93,392
	Wastewater						
151	Wastewater Treatment Plant	16,622	4,534	21,156	16,622	4,534	21,156
152	Wastewater Collection Pipes	43,226	17,533	60,759	30,469	11,398	41,867
	-for area in committed plan	(30,469)	(11,398)	(41,867)	(30,469)	(11,398)	(41,867)
	-for other area	(12,757)	(6,135)	(18,892)	(0)	(0)	(0)
	Total of 151 to 152	59,848	22,067	81,915	47,091	15,932	63,023
190	O&M Equipment	8,000	2,000	10,000	8,000	2,000	10,000
100	Total Direct Construction Cost	144,317	43,481	187,798	129,586	36,829	166,415
300	Indirect Cost						
301	Land Acquisition and Compensation	0	0	0	0	0	0
302	Administrative Expense	0	3,556	3,556	0	3,556	3,556
303	Engineering Services	10,579	1,867	12,446	10,579	1,867	12,446
304	Physical Contingency	15,489	5,638	21,127	13,909	4,781	18,690
305	Price Contingency	13,447	4,240	17,687	12,075	3,596	15,671
306	Import Tax	0	7,468	7,468	0	6,333	6,333
307	V.A.T.	0	50,016	50,016	0	42,414	42,414
	Total of 301 to 307	39,515	72,785	112,300	36,563	62,547	99,110
	Total Project Cost	183,832	116,266	300,098	166,149	99,376	265,525

