

CHAPTER 10
FINANCIAL AND
ECONOMIC ANALYSIS



CHAPTER 10 FINANCIAL AND ECONOMIC ANALYSIS

10.1 Present Financial Situation

10.1.1 Financial Situation of ASA

The present financial situation is laid under difficult condition, owing to the low tariff, undesirable accounting system and legislative constraints. The following are some of the key issues regarding ASA's financial statements¹:

(1) Water Sales

Breakdown of water sales for the year ending December 31, 1999 is shown in Table 10.1.1. Water sales include both metered and non-metered sales. Metered sales are based on the quantity measured by the meter multiplied by the tariff, while non-metered sales are based on the assumed consumption. The volume of water sales in Table 10.1.1 includes this assumed consumption.

Table 10.1.1 Water Sales of ASA (1999)

	Water Volume		Sales Amount	
	1,000m ³	%	1,000 TG	%
I - Drinking Water				
Private customers	17,081	55.77%	209,071	55.07%
Public organization	1,762	5.75%	25,602	6.74%
Enterprises	8,071	26.35%	117,272	30.89%
Total volume of drinking water	26,914	87.87%	351,945	92.7%
II - Technical Water	3,716	12.13%	27,721	7.30%
Total Water Supply	30,630	100.00%	379,666	100.00%
III - Wastewater				
Private customers	15,261	77.11%	132,618	73.66%
Public organization	1,626	8.22%	17,024	9.46%
Enterprises	2,904	14.67%	30,405	16.89%
Total volume	19,791	100.00%	180,047	100.00%

(2) Production Unit Costs

Major components of the cost of water supply and sewerage services are personnel expenses and power costs, which account for around 60 % of the total. The

¹ The Supporting Report E.1 presents the financial data of ASA for the years ending December 31, 1997, 1998 and 1999 and for the six months ending June 30, 2000.

population served by one employee of ASA is 350 as shown in Table 10.1.2. This reveals that the productivity per employee is low when compared to other developing countries, which generally possess less than one hundred employees. The power cost is the cost of electricity needed to operate the relevant water supply and sewerage facilities. Field surveys conducted in this Study reported that a high percentage of the electricity consumption is caused by inefficient pump facilities.

Table 10.1.2 Data of Water Production

Service population (Thousands)	300
Number of employees	848
Population served by one employee	350
Personnel expenses (%)	29.5
Power expenses (%)	30.2

Source: ASA's financial data (1999)

(3) Losses and Cash Ratio (cash + cash-equivalent assets / current liabilities)

ASA has appropriated losses since 1997 as shown in Table 10.1.3. These losses have accumulated and caused a decrease in net assets and accordingly, the cash ratio has become low since 1997. Typically, a cash ratio of more than 0.2 is said to be favorable. This indicates that ASA does not have enough cash or cash-equivalent assets to pay its current liabilities. Under these circumstances, ASA, in a sense, is insolvent as an independent company.

Table 10.1.3 Losses and Cash Ratio

	1997	1998	1999	2000/6
Loss (Million TG)	-261	-1,526	-855	-228
Cash Ratio	0.0082	0.0017	0.0616	0.0352

Source: ASA's financial data (2000)

(4) Inflation Accounting

In spite of the fact that there has been drastic increase in market prices in Kazakhstan from 1997 to 2000, ASA has not revised the acquisition cost of fixed assets. This acquisition cost does not reflect the current costs and the amount of depreciation do not match the current price level so that the present method of depreciation based on the historical acquisition costs cannot reserve sufficient funds to replace the fixed assets.

(5) Accounting System

The Kazakhstan Accounting Standard (KAS) issued by the Department of Accounting Methodology of the Ministry of Finance is mandatory for the

maintenance of accounts by legal entities. The KAS is based on International Accounting Standards (IAS). However, the accounting system applied to ASA does not comply with KAS. The Study Team encountered a lack of transparency in respect to the availability of data for purposes of financial assessment of ASA.

10.1.2 Water Tariffs and Tariff Collection System

(1) Current Tariff

There are only a limited number of water meters (about 26%, according to ASA) in Astana City. This situation makes ASA difficult to introduce usage-based water charge system. Consequently, flat rate water charge is applied for a majority of the users. The current water tariffs are based on the budgetary calculations prepared by ASA as shown in Table 10.1.4.

Table 10.1.4 Tariff Setting Calculation

(Unit: thousands of TG)

	Drinking water	Sewage	Technical water	Total	%
Materials:					
Raw materials	52,080	0	0	52,080	6.8%
Fuel	8,002	12,289	226	20,517	2.7%
Energy	116,158	122,462	13,695	252,315	33.1%
Other	2,980	2,895	625	6,500	0.9%
	179,220	137,646	14,546	331,412	43.5%
Labor costs	128,783	51,774	7,427	187,984	24.7%
Social payments	28,332	11,390	1,634	41,356	5.4%
Depreciation	31,101	23,828	5,386	60,315	7.9%
Other expenses					
Repair costs	69,206	7,308	612	77,126	10.1%
Procured goods	4,824	0	576	5,400	0.7%
Miscellaneous	4,225	920	0	5,145	0.7%
	78,255	8,228	1,188	87,671	11.5%
Periodic costs (General and Administrative Cost)					
Labor costs	8,011	4,259	560	12,830	1.7%
Social payments	1,762	937	123	2,823	0.4%
Taxes	12,944	11,290	1,917	26,151	3.4%
Other	6,631	3,526	464	10,621	1.4%
	29,348	20,012	3,064	52,425	6.9%
Total costs	475,040	252,878	33,245	761,163	100%
Markup (10%)	47,750	25,058	3,309	76,117	
Sales budget	522,790	277,936	36,554	837,280	
Sales volume ('000 m ³)	35,980	26,546	4,900		
Cost per 1 m ³ (TG)	13.20	9.53	6.78		
Tariff per 1 m ³ (TG)	14.53	10.47	7.46		

According to the analysis on the current method of tariff setting, it can be seen that the tariff setting mechanism would not provide full recovery of costs. This is due to the following reasons:

- No allowance for unpaid overdue charges is provided;
- Depreciation charge does not match current price levels;
- Costs of water meters are not included.

As shown in Table 10.1.5, the tariff table has been periodically revised due to a high rate of inflation in Kazakhstan and to the shortage of ASA's cash flows. In order to set new tariffs, a draft of the new tariff is prepared by Akimat, based on a proposal by ASA. The new tariff must also be approved by the local administration of the State Antimonopoly Agency. The tariff setting is carried out in accordance with instructions issued by this Agency, which is valid for all utility services.

Table 10.1.5 Transition of Tariff in Recent Years

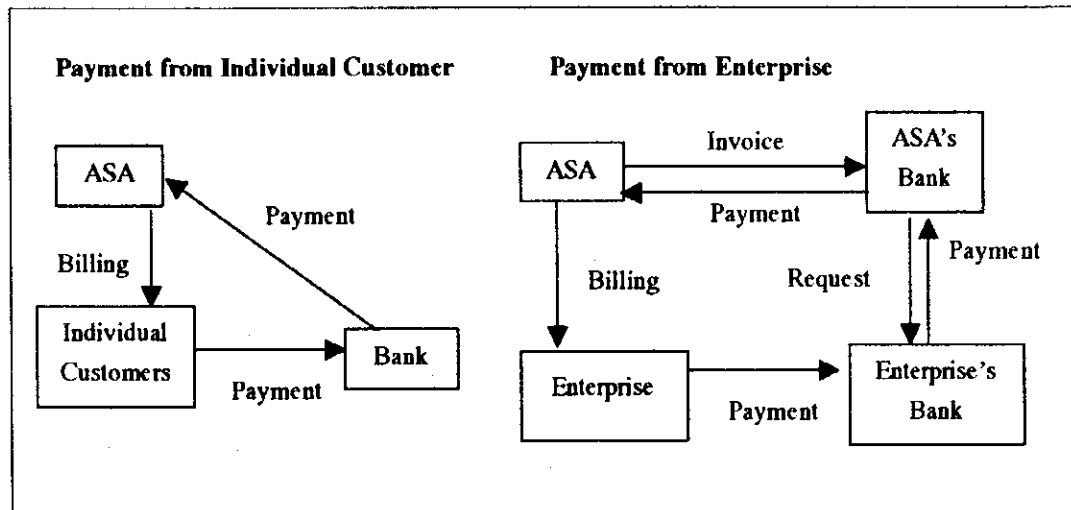
(Unit: TG/m³, excluding VAT)

	1996				1997			1998	1999
	Jan	Apr	Jun	Jul	Feb	May	Oct	Jul	Oct
Drinking water									
Private customers	0.96	1.14	4.00	6.00	11.13	11.13	12.24	12.24	14.53
Budgetary customers	6.00	6.00	6.00	10.00	11.13	11.13	12.24	14.53	14.53
Enterprises	24.02	24.02	21.42	11.00	11.00	11.13	12.24	14.53	14.53
Technical water	10.00	10.00	10.00	10.00	5.33	5.33	5.33	7.46	7.46
Waste water									
Private customers	0.96	1.14	2.89	4.34	7.56	7.56	8.69	8.69	10.47
Budgetary customers	6.00	6.00	6.00	10.00	7.56	7.56	8.69	10.47	10.47
Enterprises	28.08	28.08	25.92	30.88	7.56	7.56	8.69	10.47	10.47

Source: ASA

(2) Present Situation of Tariff Collection

Billing for the water consumed by individual customers is conducted by the Sales Department of ASA at the beginning of subsequent month. For individual customers, ASA sends monthly invoices to collect monthly water charges. For enterprises, requests to the bank for automatic withdrawal are made to collect monthly water charges. The operating cycle for the normal collection procedures should be approximately two months, but according to data as of end of June 2000, the turnover period for accounts receivable of ASA was 18.9 months, resulting in a significant amount of overdue water charges. The present tariff collection system in Astana City is illustrated below.



(3) Ability to Pay for Connected Users

The majority of the unpaid water bills were from low-income consumers including the unemployed.² According to the analysis of affordability in the past water projects in other countries, the percentage of water bill amounting to 4 – 5 % of average household income has been found a good indicator of the ability to pay. The monthly average household income in Astana City in 1999 was 19,152 TG. Assuming the average number of persons per household connected to the centralized water and sewerage system to be 3.4 and the sales amount of 240 l/c/d (assumed by ASA), the average expenditure per month per household amounts to 735 TG, or 3.8 % of the household income. This indicates that the current service charge may not be a burden to the majority of consumers but may be a burden for some low-income customers. In order to eliminate unpaid overdue charges and compensate for low-income customers, Astana City or Republican Government may have to take necessary measures.

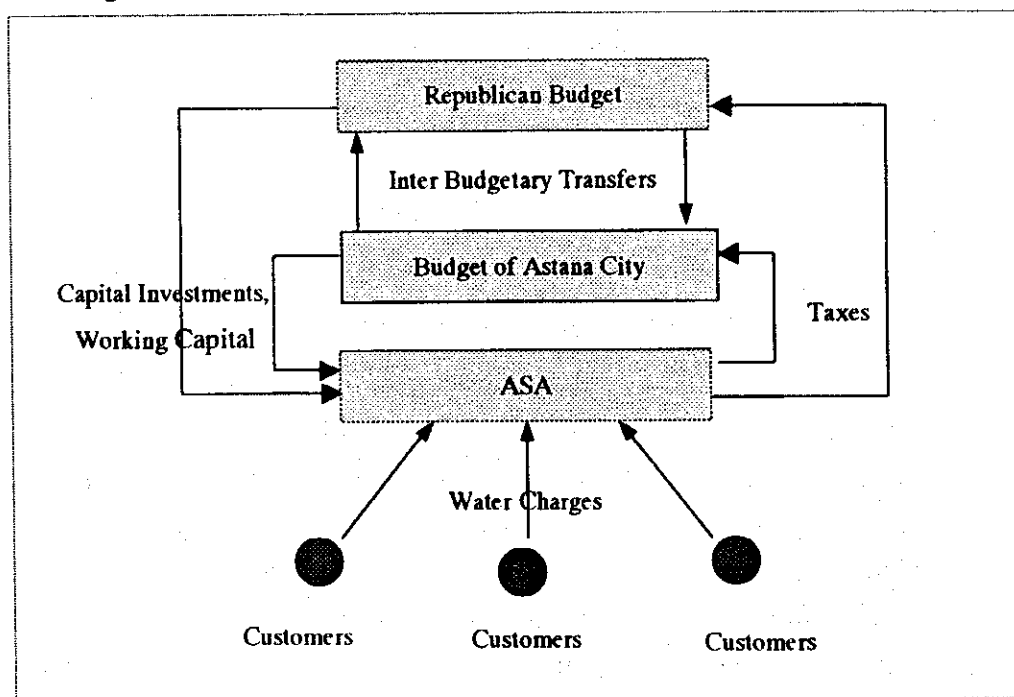
(4) Problems on Tariff Collection

The current tariff collection system has some problems in terms of customers with overdue accounts. Stopping water supply to delinquent users would be an effective countermeasure for overdue bills in principle. However, there is a technical difficulty on stopping water supply, because some apartments share pipes and subsequently all the residents must be stopped with water supply.

² According to the information provided by the Head of the Sales Department.

10.1.3 Governmental Subsidies for ASA

Akimat of the Astana City acting as a subordinated entity of Astana-Finance is currently responsible for financing all the major capital investments of ASA, and the funds necessary for the capital investments are budgeted by Akimat. Financing of the capital investments of ASA is also carried out directly by the Republican Budget or by ASA itself. A simplified scheme of existing cash flows between the two budgets and ASA is shown in the figure below:



According to Akimat, up to TG 80 Million working capital (approximately 550,000 US Dollars) was budgeted for the fiscal year 2000 to reimburse operating losses of ASA. The final decision to pay out this reimbursement however will be made at the end of the fiscal year (year ending December, 2000).

As part of the social safety net, allowances on payments for communal services including water bills should be provided to certain categories of people (e.g. invalids, veterans, etc.) in accordance with the current legislation. For financial accounting purposes, these allowances represent book losses to ASA.

10.1.4 Financial Condition of the City and the Republic of Kazakhstan

Details about the budget of Astana City are not published. In respect to the budget for the year 1999, only summarized data is publicly available as shown in the Supporting Report F.2.

Akimat reported that the City is planning to continue subsidizing ASA in respect to capital investments from its budget in the year 2001. Future perspectives of continuing the existing practice to subsidize ASA depend, first of all, on the general financial condition and in particular the external debt of the Republic of Kazakhstan. A number of macroeconomic indicators in respect of the external debt and the state budget are introduced in Table 10.1.6. As shown in this table, the gross foreign debt of Kazakhstan compared to the GDP has experienced significant increase in the past years, even though the state finances has been improved.

Table 10.1.6 External Debt and Budget of the Republic of Kazakhstan

	1998	1999	2000/3
Government and Government-Guaranteed Debt (Million US Dollar)	4,007	4,056	3,993
Gross External Debt of GDP (%)	36.3	50.5	47.7
Government revenue (Billion TG)	381.2	395.6	116.4
Government revenue of GDP (%)	21.8	21.1	23.4
Government expenditure (Billion TG)	453.3	462.2	101.1
Government expenditure of GDP (%)	25.9	24.6	20.3
Deficit/Profit (Billion TG)	-72.1	-66.6	15.2
Deficit/Profit of GDP(%)	-4.2	-3.5	3.1

Source: Ministry of Finance

Under such circumstance, Central Government budget and the budget of Astana City can be merely available for the new projects, but not for financial support for ASA. Therefore, in order for ASA to continue its water and sewerage services, self-supporting management should be considered.

10.1.5 Recommendations Proposed for ASA

As mentioned in Sub-section 10.1.1, ASA is essentially insolvent as an independent company, and therefore, the managerial situation concerning water and sewerage services should be improved to sustainable. According to the results of the analysis from Section 10.1.1 to Section 10.1.4, the following issues are recommended:

(1) Tariff System

1) Consumption-Based Water Charge System

Water meters should be installed in all households and consumption-based charge system should be introduced. This will, in turn, strengthen the water saving consciousness of the user.

2) Full Cost Recovery

At present, the tariff is not set to recover the overall cost for water and sewerage services. The main components that are not included in the tariff setting calculation are leakage of water and cost of installing water meters. Without including these components into the calculation, the overall cost would not be recovered.

(2) Improvement of ASA's Management

1) Reduction of O&M Costs through Improvement of Facilities

Higher O&M cost than water sales is one of the reasons for ASA's losses and is attributable to the high leakage ratio and deterioration of facilities described in the earlier chapters. In order to decrease the O&M cost, improvement and rehabilitation of existing facilities are needed

2) Complete Application of Inflation Accounting

Since ASA does not apply inflation accounting, the book value of fixed assets does not reflect the current value, which leads to the lack of depreciation charge. Depreciation charges of current price levels have the useful function of retaining enough funds for future investments and rehabilitation of facilities. Therefore, inflation accounting should be applied in a timely manner.

3) Accounting System

The accounting system needs to be further improved for timely provision of the financial data, which is indispensable in assessing the strength of the present management of ASA.

As an element of improving the creditworthiness of ASA, Akimat needs to employ an internationally recognized audit company to carry out a full scope audit of ASA. Audit companies usually conduct consultation for improving the accounting system during the audit.

4) Accountability to Customers

The management of ASA is not adequately accountable to the public for its financial and operating results. Therefore, more transparency to the public in respect to the financial and operating results is required. The following measures are recommended:

- A public hearing on the revision of the tariff should be held.
- A special service to receive customers' comments should be established to improve customer service.

(3) Subsidy for ASA from Akimat

The subsidy from Akimat to reimburse operating losses of ASA should be abandoned in the future, since the revenue from taxes should not compensate the inefficiencies of management. Tariffs should be set at such a level that would allow ASA to operate at least at break-even and any subsidies from the budget should be redirected to the low-income groups. In other words, all customers including invalids and veterans, etc. should pay the full tariff to ASA and be subsidized thereafter, based on their level of income.

10.2 Evaluation of the Project

10.2.1 The Purpose of the Evaluation

ASA had appropriated losses between 1997 and 2000 and thus cannot provide sufficient internal fund to finance the capital investments necessary to operate its business. Therefore, improvement to the financial management, as well as changes in the tariff system and levels are required.

An evaluation of the proposed project is essential in determining whether the support of international funding agencies is justifiable. Financial Internal Rate of Return (FIRR) and Economic Internal Rate of Return (EIRR) calculations were carried out to evaluate the financial and economic viabilities of the project.

10.2.2 Basic Assumptions

The following general assumptions have been made for the economic and financial evaluation of the project:

- i) The cash flows presented are only those pertaining to ASA. Evaluation is carried out in nominal US Dollars at current prices with no adjustments for the effect of inflation and exchange rate fluctuations.
- ii) The average economic life of new assets provided under the project is assumed to be 40 years after completion. Existing facilities will have a reduced production capacity as a result of deterioration and will become unable to provide any services after 2020.

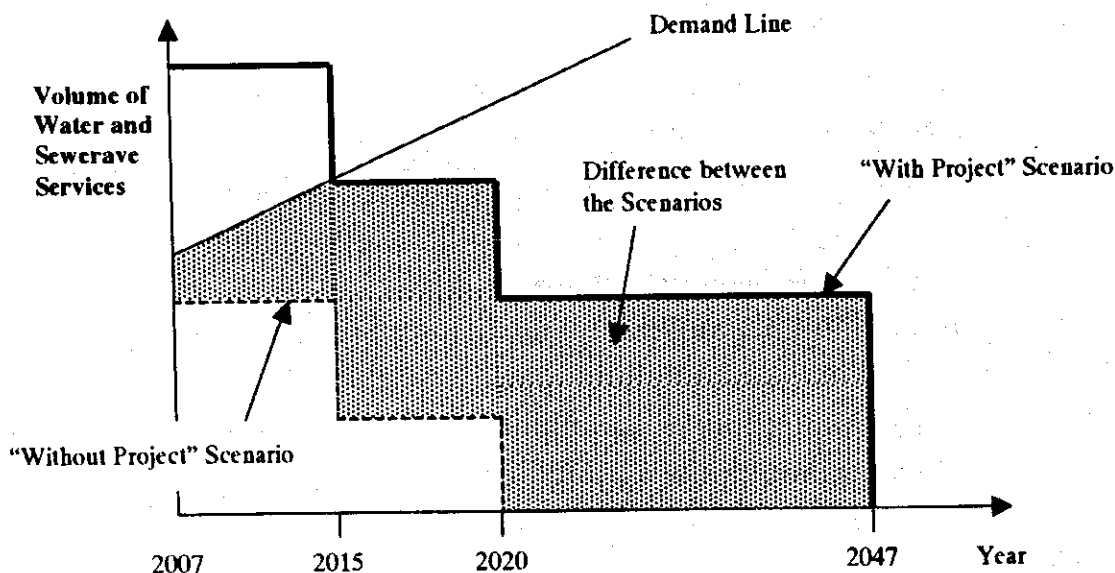
- iii) The project is aimed at providing water supply and sewerage services only for the residents living within the area of the City to be developed by the year of 2010.
- iv) A "Without Project" option, which is basically a "do-nothing scheme", is considered for comparison. This option will assume that the proposed project will not be realised and no further capital investment will be carried out. The existing facilities will be used until the cost of operation and repairs exceed the revenue generated, which is assumed to occur in 2020.

10.3 Financial Analysis

10.3.1 Assumptions and Considerations

The financial analysis collates the two alternatives for development; "With Project" option, and "Without Project" option. In "With Project" option, ASA will be able to supply water and sewerage services with the proposed new facilities and continue to meet the increasing demand in the future until the year 2047 that is the end of the economic life of new facilities. On the contrary, in "Without Project" option, ASA will have to supply water without any new facilities. Until the year 2020, the existing facilities will provide water and sewerage services. After 2020 when the existing facilities deteriorate due to the end of economic life, ASA is assumed not to be able to supply water with existing facility.

The following figure illustrates the capacity of water and sewerage services in both "With Project" option and "Without Project" option.



(1) Financial Revenue

The "With Project" option will have water sales increase and O&M costs decrease. Water sales will increase as a result of better monitoring by the installation of water meters and leakage reduction measures. O&M costs decrease is based on leakage reduction and facilities improvement.

In the "Without Project" option, on the other hand, water sales amount will decrease as the system deteriorates and leakage increases, which would result in the increase of sales cost.

(2) Financial Costs

1) Capital Cost

The financial capital cost for the "With Project" option is estimated at 282.4 Million US Dollars (excluding price contingency).

2) Operation and Maintenance (O&M) Cost

Variable unit O&M cost per m³ in the "With Project" option after completion of construction has been calculated at 0.067 US Dollars on the basis of projected energy consumption and repair costs. They are presented in Table 10.3.1.

Table 10.3.1 O&M Cost Calculation (With Project)

Total Variable O&M Cost (1,000 TG)	Annual Volume of Water Production (1,000 m ³)	Variable O&M Cost per m ³ (TG)	Exchange Rate to US Dollars (TG)	Variable O&M Cost per m ³ (US Dollar)
507,711	52,550	9.66	144.0	0.067

In the case of "Without Project" option, variable unit O&M cost per m³ is estimated at 0.087 US Dollars, assuming that existing energy and repair costs will remain the same, as shown in Table 10.3.2. The annual volume of water production is assumed to decrease due to deterioration of facilities.

Table 10.3.2 O&M Cost Calculation (Without Project)

Total Variable O&M Cost (1,000 TG)	Annual Volume of Water Production (1,000 m ³)	Variable O&M Cost per m ³ (TG)	Exchange Rate to Dollars (TG)	Variable O&M Cost per m ³ (US Dollars)
297,274	23,725	12.53	144.0	0.087

Annual fixed O&M cost is assumed to be 700,000 US Dollars for both options based on the aforementioned financial statements .

3) Costs of Consumer Connection

In order to introduce and operate the consumption-based water charge system, installation of new water meters and replacement of deteriorated water meters are indispensable. The estimated replacement cost of water meters is around 735,000 US Dollars per year. This figure is calculated based on the unit cost of water meter installation(40 US Dollars), the number of customers (147,000) and the economic life of the water meter (8 years).

The installation cost of supply pipes and connection pipes will be carried out after implementation of main pipes under this project. The sum of these costs is calculated at around 28.8 Million US Dollars. This cost is assumed to occur 7 years after the completion of construction.

(3) Financial Management

A simple cash flow analysis shows that present tariff cannot sustain the capital expenditure required for the project. Table 10.3.3 presents the total sales amount assumed for over 40 years, which is insufficient even for covering the capital expenditure. Thus mere reduction of O&M cost will not be sufficient to recover the total costs.

Table 10.3.3 Cash Flow without Change of Tariff

(Unit: Million US Dollars)

Total Sales	Total O&M Costs	Capital Costs	Total Costs
210.4	87.1	282.4	369.5

For the project to be financially sustainable, some crucial measures have to be taken. The following primary measures have been identified:

- 1) Decrease of capital costs
- 2) Increase of sales volume
- 3) Increase of tariff

The first two proposals have certain limitations. The project components are primarily rehabilitation and improvement of existing facilities together with minimal expansion for the future system. Therefore, only limited reduction of capital cost can be achieved. Sales volume is difficult to control since water consumption is rather inelastic and depends mainly on population growth. The

only possible measure that can be adopted is a substantial increase in the tariff to strengthen the revenue structure of water supply.

(4) Tariff Setting

In order for this project to keep financial soundness and sustainability, tariff setting system has to be improved. Such improvement has two types of purposes as depicted below.

- To make the financial situation of ASA improved
- To keep the sustainability of water and sewerage services

In order to make the financial situation of ASA improved, increase in tariff is necessary. Therefore, it should be examined how much increase in tariff is possible considering customers' ability to pay. On the other hand, in order to keep the sustainability of water and sewerage services, water management including the control of volume of water consumption is necessary.

Followings are the proposed concrete measures to improve tariff setting system.

1) Ability to Pay for Domestic Water Charge

The average water charge per household has been estimated at 477 TG/household/month based on the conditions of 156 liters per capita, 3.4 persons/household and a tariff of 30 TG/m³. This is equivalent to 2.6% of the average household income of 19,152 TG in 1999. International experience has shown that the ability to pay for water and sewerage services usually accounts for 4 to 5 % of average household income. This appears to be confirmed by households survey carried out as part of this study which indicated that 47% of the households interviewed do not consider that water charges are causing them difficulties. It is therefore expected that tariffs can be doubled without affecting the ability to pay of the average household.

This increase will be relieved by the expected increase in the Gross Regional Domestic Product (GRDP) which is expected to increase by the time of the completion of the project. In parallel with the increase in GRDP, average monthly income per household is also expected to increase. On the basis of these analytical results, doubling of the tariff should be affordable by the majority of the population. A gradual increase in tariff is recommended to mitigate the impact of the increase.

2) Tariff for Enterprises

Generally speaking, enterprises have greater affordability to pay than individual customers. According to the Public Awareness Survey conducted in the Study, 68.0 % of the enterprises answered that the current water charge is not burdensome. This percentage is higher than the case of individual customer (46.6 % of the interviewees answered that current tariff level is not a hardship). Therefore, it appears reasonable that the tariff level of enterprises could be set at a higher rate than the rate for individual customers.

In most countries where different tariffs are applied between individual customers and enterprises, the tariff for enterprises is generally double that for the individual customer. This means that the tariff for enterprises will be four times the present tariff. Due to the same reason as for domestic customers the tariffs for enterprises should be gradually increased.

3) Basic Water Charge System

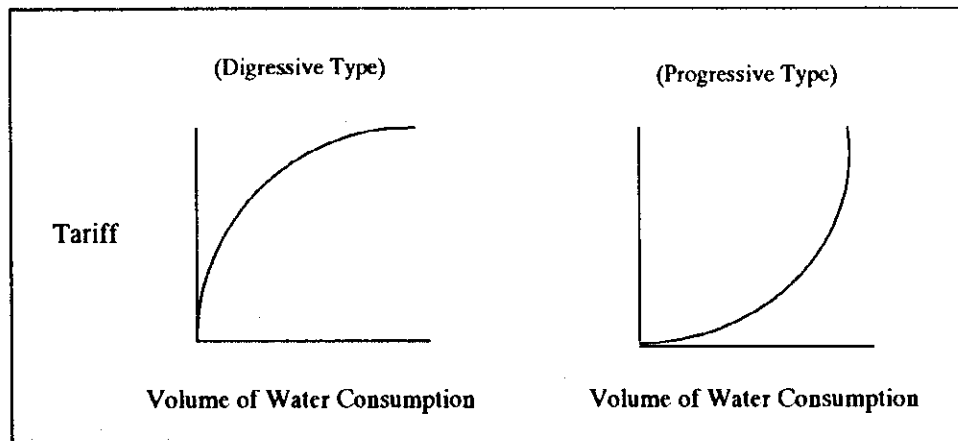
It is proposed that a basic charge be levied to cover the fixed cost for installation of a water meter, meter reading and tariff collection. Preliminary calculations show that this basic charge should be 60 TG (0.42 US Dollars) per connection or 0.3 % of the monthly average household income and should be easily affordable.

4) Other Items for Water Tariff

In addition to a differential tariff system based on customer group, another method of differentiation is by the quantities used. For which there are two approaches as follows:

- Digressive Usage-Based Water Charge
- Progressive Usage-Based Water Charge

The digressive water charge system is applied where high water consumption is promoted. While, the progressive water charge system is applied to discourage high water consumption. With the limited water resources situation in Astana, reduction in demand is strongly recommended, therefore the progressive water tariff is more appropriate.



A typical complication is that the present average sales per household are between 15 and 20 m³ per month. An example of 20 m³ can be set such that higher tariffs are applicable to consumption above this threshold. In this case, large families may be penalized in such circumstances.

The application of such a progressive tariff is complicated especially given the lack of reliable information on usage. It is therefore proposed that such a system be considered after installation of meters and collection of sufficient data to devise the most effective tariff level.

5) Connection Fee System

An additional source of revenue is the introduction of a connection fee for provision of a new service connection. Costs related to new facilities other than water charges, introduction of a connection fee system should be considered. The connection fee system will be applied as the part of cost related to new connections from new customers. This fee is often introduced in newly developing areas.

In this project, costs related to the new customers are expected to be significant, due to the expected increase in population. It is proposed that new customers share costs related to new connections. Costs related to new water and sewerage connections, excluding the cost of the water meters are estimated at 23,040 TG (160 USD) per connection. This amount is therefore proposed as the connection fee.

10.3.2 FIRR Calculation

Based on the analysis of tariff setting mentioned in Sub-section 10.3.1, the FIRR calculation with sensitivity analysis is conducted. The following table shows sensitivity of each measure except for introduction of progressive water charge, because this method is premature to conduct due to lack of sufficient metering record.

Case No.	Increasing in Tariff	Basic Water Charge	Connection Fee	FIRR (%)
1	-	-	-	Negative
2	Adoption	-	-	1.7
3	-	Adoption	-	Negative
4	-	-	Adoption	Negative
5	Adoption	Adoption	-	2.1
6	Adoption	-	Adoption	2.2
7	-	Adoption	Adoption	Negative
8	Adoption	Adoption	Adoption	2.6

In case that there is no increase in water tariff (case 1,3,4,7), the values of FIRR become negative. This means that increasing of tariff itself is indispensable to have positive FIRR, and either or both of basic water charge and connection fee is not sufficient to have positive FIRR. Therefore, all the measures should be adopted simultaneously.

Meanwhile, FIRR for various alternative scenarios of tariff increases for both domestic consumers and enterprises have been evaluated in depth. Naturally, all the measures other than progressive water charge system is considered. The result is presented in Table 10.3.4. In this analysis, the O&M costs are assumed to be constant.

Table 10.3.4 Tariff Sensitivity Analysis Table

(Unit: Percentage)

Tariff of enterprise increases \ Tariff of individual customers increased	Tariff of individual customers increased				
	2.5 times	3.0 times	3.5 times	4.0 times	4.5 times
1.0 times	Negative	Negative	0.7	1.4	2.0
1.5 times	Negative	0.7	1.4	2.0	2.6
2.0 times	0.7	1.4	2.0	2.6	3.1
2.5 times	1.4	2.0	2.6	3.1	3.6

Note: The shadow area corresponds to the one of Table 10.3.5.

Following Table 10.3.5 compares the results of the sensitivity analysis with potential source of funding and success for each FIRR.

Table 10.3.5 Success Potential Matrix for Source of Funds and FIRR

Source of Fund	Funding Condition	FIRR	Possibility of Acceptance
Commercial Bank	About 10 %	Less than 10 %	Not acceptable
		10 % or more	Acceptable
Certain International Donor Agency	Less than the interest rate provided by Commercial Bank	0.7 %	Not Acceptable
		1.4 %	
		2.0 %	
		2.6 %	Acceptable
		3.1 %	
3.6 %			

Funding of capital cost from commercial banks normally attract interest rate of about 10%. However, this level of interest rate requires the tariff increasing more than 760% of the existing tariffs. Such a rise is obviously beyond the desire of customers. The lower interest rate by certain international donor agencies is more attractive, since it can easily realize the project feasible.

Meanwhile, Government investment to this project with free interest rate as a form of subsidy can decrease the international funding amount. Table 10.3.6 shows various interest rates and amount of fund for each interest, and necessary amount of the Governmental subsidy is also presented. The average interest rate is maintained to be equal to 2.6% in order to enable to compare with the case of Table 10.3.5.

Table 10.3.6 Sensitivity Analysis about Funding Costs

Interest Rate (%)	Amount of External Fund (Million US Dollars)	Necessary Amount of Subsidy (Million US Dollars)
2.6	282.4	0
3.0	244.8	37.6
5.0	146.9	135.5
7.0	104.9	177.5
10.0	73.4	210.0
12.0	61.2	221.2

In addition to the above analysis regarding tariff increasing and interest rates with those related FIRR, sensitivity analysis with the change of capital cost and O&M costs are also carried out for supplemental analysis as shown in Table 10.3.7.

Table 10.3.7 Capital and O & M Costs Sensitivity Analysis Table

Capital Cost \ O&M Cost	Increase by 20 %	Increase by 10 %	Base Case	Decrease by 10%	Decrease by 20%
Increase by 10 %	1.7	1.9	2.0	2.2	2.3
Base Case	2.2	2.4	2.6	2.7	2.9
Decrease by 10%	2.8	3.0	3.2	3.3	3.5

It is obviously seen that the variation of FIRR depending on increase and decrease of O&M cost is very small, since the amount of O&M cost to capital cost is fundamentally very small.

FIRR calculation shown in Table 10.3.8 is based on the base case, namely increasing of domestic tariff to 200 %, the one of enterprise to 400 % and remaining the capital investment fixed.

Table 10.3.8 FIRR Calculation

(Unit: Million US Dollars)

Year	without			with				Incremental	Capital Cost	Total
	Sales	O&M Costs	Free from Operation	Sales	O&M Costs	Cost of Meter and Connection	Free from Operation	Free from Operation		
2002									5.41	-5.41
2003									5.59	-5.59
2004									48.71	-48.71
2005									116.95	-116.95
2006									81.49	-81.49
2007									24.25	-24.25
2008	9.72	3.86	5.85	26.05	3.98	4.34	17.74	11.88		11.88
2009	9.57	3.86	5.71	26.30	4.02	4.34	17.95	12.24		12.24
2010	9.43	3.86	5.56	27.53	4.20	4.34	19.00	13.43		13.43
2011	9.28	3.86	5.42	28.33	4.32	4.34	19.67	14.25		14.25
2012	9.14	3.86	5.27	29.17	4.45	4.34	20.38	15.11		15.11
2013	8.99	3.86	5.13	30.04	4.58	4.34	21.12	16.00		16.00
2014	8.85	3.86	4.98	30.11	4.59	4.34	21.19	16.20		16.20
2015	4.35	2.28	2.07	20.07	3.62	0.74	15.72	13.65		13.65
2016	4.28	2.28	2.00	20.07	3.62	0.74	15.72	13.72		13.72
2017	4.21	2.28	1.92	20.07	3.62	0.74	15.72	13.79		13.79
2018	4.13	2.28	1.85	20.07	3.62	0.74	15.72	13.86		13.86
2019	4.06	2.28	1.78	20.07	3.62	0.74	15.72	13.94		13.94
2020	3.99	2.28	1.71	20.07	3.62	0.74	15.72	14.01		14.01
2021				13.62	2.65	0.74	10.24	10.24		10.24
2022				13.62	2.65	0.74	10.24	10.24		10.24
2023				13.62	2.65	0.74	10.24	10.24		10.24
2024				13.62	2.65	0.74	10.24	10.24		10.24
2025				13.62	2.65	0.74	10.24	10.24		10.24
2026				13.62	2.65	0.74	10.24	10.24		10.24
2027				13.62	2.65	0.74	10.24	10.24		10.24
2028				13.62	2.65	0.74	10.24	10.24		10.24
2029				13.62	2.65	0.74	10.24	10.24		10.24
2030				13.62	2.65	0.74	10.24	10.24		10.24
2031				13.62	2.65	0.74	10.24	10.24		10.24
2032				13.62	2.65	0.74	10.24	10.24		10.24
2033				13.62	2.65	0.74	10.24	10.24		10.24
2034				13.62	2.65	0.74	10.24	10.24		10.24
2035				13.62	2.65	0.74	10.24	10.24		10.24
2036				13.62	2.65	0.74	10.24	10.24		10.24
2037				13.62	2.65	0.74	10.24	10.24		10.24
2038				13.62	2.65	0.74	10.24	10.24		10.24
2039				13.62	2.65	0.74	10.24	10.24		10.24
2040				13.62	2.65	0.74	10.24	10.24		10.24
2041				13.62	2.65	0.74	10.24	10.24		10.24
2042				13.62	2.65	0.74	10.24	10.24		10.24
2043				13.62	2.65	0.74	10.24	10.24		10.24
2044				13.62	2.65	0.74	10.24	10.24		10.24
2045				13.62	2.65	0.74	10.24	10.24		10.24
2046				13.62	2.65	0.74	10.24	10.24		10.24
2047				13.62	2.65	0.74	10.24	10.24		10.24
									FIRR	2.6%

10.3.3 Financing Procurement and Repayment

A loan disbursement schedule has been prepared in Table 10.3.9. It is assumed that VAT, import duties and administrative expenses will not be funded by the proposed loans, as is usually the case with funding agencies. The 21.6% allowed for such items will have to be funded by the Government or Astana City Akimat.

Table 10.3. 9 Preliminary Loan Disbursement Schedule

(Unit: Million US Dollars)

	2002	2003	2004	2005	2006	2007	Total	
External Loan	4.5	4.6	34.9	92.2	65.6	19.5	221.4	78.4%
Government	0.9	1.0	13.8	24.7	15.9	4.8	61.0	21.6%
Total	5.4	5.6	48.7	116.9	81.5	24.3	282.4	100.0%

An analysis has been carried out to determine whether the cash flow expected from tariffs can cover O&M costs and principle repayment and interest payment. The loan conditions, which are typical for a particular funding agency, assumed for this analysis is presented in Table 10.3.10.

Table 10.3. 10 Assumption of Loan Agreement

Maturity of Loan	30 years (including 10 years grace period)
Interest Rate	2.2 %

The results of the cash flow analysis are presented in Table 10.3.11 and shows that the estimated free cash flows will be sufficient to cover interest payments and repayment of the principal. Sensitivity of cashflow and reserves to interest repayment increases has been verified. Cash shortage happen if interest rate increase to 2.9% as shown in Table 10.3.12.

Table 10.3.11 Cash Flow Table (2.2 % Interest Rate)

(Unit: Million US Dollar)

Year	Free from Operation	Disbursement	Repayment of Principal	Balance of Principle	Interest Payment	Interest and Principal Payment	Cash Flow from Operation and Repayment	Cumulative Cash Flow from Operation and Repayment
2002		4.51		4.51				
2003		4.63		9.15				
2004		34.88		44.02				
2005		92.22		136.24				
2006		65.63		201.87				
2007		19.50		221.37				
2008	11.88			221.37	4.87	4.87	7.01	7.01
2009	12.24			221.37	4.87	4.87	7.37	14.39
2010	13.43			221.37	4.87	4.87	8.56	22.95
2011	14.25			221.37	4.87	4.87	9.38	32.33
2012	15.11			221.37	4.87	4.87	10.24	42.57
2013	16.00			221.37	4.87	4.87	11.13	53.70
2014	16.20			221.37	4.87	4.87	11.33	65.03
2015	13.65			221.37	4.87	4.87	8.78	73.81
2016	13.72			221.37	4.87	4.87	8.85	82.66
2017	13.79			221.37	4.87	4.87	8.92	91.58
2018	13.86		11.07	210.30	4.87	15.94	-2.07	89.50
2019	13.94		11.07	199.23	4.63	15.69	-1.76	87.74
2020	14.01		11.07	188.16	4.38	15.45	-1.44	86.30
2021	10.24		11.07	177.09	4.14	15.21	-4.96	81.34
2022	10.24		11.07	166.03	3.90	14.96	-4.72	76.62
2023	10.24		11.07	154.96	3.65	14.72	-4.48	72.14
2024	10.24		11.07	143.89	3.41	14.48	-4.23	67.91
2025	10.24		11.07	132.82	3.17	14.23	-3.99	63.92
2026	10.24		11.07	121.75	2.92	13.99	-3.75	60.17
2027	10.24		11.07	110.68	2.68	13.75	-3.50	56.67
2028	10.24		11.07	99.62	2.44	13.50	-3.26	53.41
2029	10.24		11.07	88.55	2.19	13.26	-3.02	50.39
2030	10.24		11.07	77.48	1.95	13.02	-2.77	47.62
2031	10.24		11.07	66.41	1.70	12.77	-2.53	45.09
2032	10.24		11.07	55.34	1.46	12.53	-2.29	42.81
2033	10.24		11.07	44.27	1.22	12.29	-2.04	40.76
2034	10.24		11.07	33.21	0.97	12.04	-1.80	38.97
2035	10.24		11.07	22.14	0.73	11.80	-1.55	37.41
2036	10.24		11.07	11.07	0.49	11.56	-1.31	36.10
2037	10.24		11.07	0.00	0.24	11.31	-1.07	35.03
2038	10.24						10.24	45.28
2039	10.24						10.24	55.52
2040	10.24						10.24	65.76
2041	10.24						10.24	76.01
2042	10.24						10.24	86.25
2043	10.24						10.24	96.49
2044	10.24						10.24	106.74
2045	10.24						10.24	116.98
2046	10.24						10.24	127.23
2047	10.24						10.24	137.47

Table 10.3.12 Cash Flow Table (2.9 % Interest Rate)

(Unit: Million US Dollar)

Year	Free from Operation	Disbursement	Repayment of Principal	Balance of Principle	Interest Payment	Interest and Principal Payment	Cash Flow from Operation and Repayment	Cumulative Cash Flow from Operation and Repayment
2002		4.51		4.51				
2003		4.63		9.15				
2004		34.88		44.02				
2005		92.22		136.24				
2006		65.63		201.87				
2007		19.50		221.37				
2008	11.88			221.37	6.42	6.42	5.46	5.46
2009	12.24			221.37	6.42	6.42	5.82	11.29
2010	13.43			221.37	6.42	6.42	7.01	18.30
2011	14.25			221.37	6.42	6.42	7.83	26.13
2012	15.11			221.37	6.42	6.42	8.69	34.82
2013	16.00			221.37	6.42	6.42	9.58	44.40
2014	16.20			221.37	6.42	6.42	9.78	54.18
2015	13.65			221.37	6.42	6.42	7.23	61.41
2016	13.72			221.37	6.42	6.42	7.30	68.71
2017	13.79			221.37	6.42	6.42	7.37	76.08
2018	13.86		11.07	210.30	6.42	17.49	-3.62	72.46
2019	13.94		11.07	199.23	6.10	17.17	-3.23	69.23
2020	14.01		11.07	188.16	5.78	16.85	-2.84	66.39
2021	10.24		11.07	177.09	5.46	16.53	-6.28	60.11
2022	10.24		11.07	166.03	5.14	16.20	-5.96	54.15
2023	10.24		11.07	154.96	4.81	15.88	-5.64	48.51
2024	10.24		11.07	143.89	4.49	15.56	-5.32	43.19
2025	10.24		11.07	132.82	4.17	15.24	-5.00	38.19
2026	10.24		11.07	121.75	3.85	14.92	-4.68	33.52
2027	10.24		11.07	110.68	3.53	14.60	-4.36	29.16
2028	10.24		11.07	99.62	3.21	14.28	-4.03	25.13
2029	10.24		11.07	88.55	2.89	13.96	-3.71	21.42
2030	10.24		11.07	77.48	2.57	13.64	-3.39	18.02
2031	10.24		11.07	66.41	2.25	13.32	-3.07	14.95
2032	10.24		11.07	55.34	1.93	12.99	-2.75	12.20
2033	10.24		11.07	44.27	1.60	12.67	-2.43	9.77
2034	10.24		11.07	33.21	1.28	12.35	-2.11	7.66
2035	10.24		11.07	22.14	0.96	12.03	-1.79	5.88
2036	10.24		11.07	11.07	0.64	11.71	-1.47	4.41
2037	10.24		11.07	0.00	0.32	11.39	-1.15	3.27
2038	10.24						10.24	13.51
2039	10.24						10.24	23.75
2040	10.24						10.24	34.00
2041	10.24						10.24	44.24
2042	10.24						10.24	54.48
2043	10.24						10.24	64.73
2044	10.24						10.24	74.97
2045	10.24						10.24	85.22
2046	10.24						10.24	95.46
2047	10.24						10.24	105.70

10.4 Economic Evaluation of the Project

In order to assess the economic viability of the project, EIRR has been calculated based on the estimated economic benefits in compliance with the comparison between “With Project” and “Without Project”. The economic benefits generally include tangible and intangible benefits that can be quantified and not quantified. The above mentioned EIRR calculation is based on only the tangible benefits.

10.4.1 Economic Benefits

(1) Quantifiable Economic Benefits

The replacement cost approach is adopted to calculate EIRR. The alternative quantifiable items considered in this analysis are set as follows:

- O&M and Expansion Cost for existing WTP operation until 2020
- Cost for purchasing water after 2020
- Compensation cost for water delivery
- Treatment cost of sewage by individual

In the case of “Without Project”, ASA have to continue serving for water supply and sewerage until the year 2020 without any new facilities. After 2020 when the existing facilities terminate their functions, customers have to purchase water by some method or other and also treat and dispose sewage by themselves. When evaluating the economic benefit by alternative methods, degradation of water quality is neglected.

The followings are the estimation of economic benefit for each item as above mentioned.

1) O&M and Expansion Cost for Existing WTP Operation

Until the year 2020 when the existing facilities turns beyond repair, the O&M cost for the existing facilities has to be taken into account. For this purpose, the variable cost is assumed to be 0.087 US\$/m³ and the fixed cost is 0.7 Mil.US\$ annually as the same as those used for the FIRR calculation. Expansion cost for “Without Project” case has been assessed based on locally available unit cost of 3.11 US\$/ m³.

2) Cost for Purchase Water after 2020

After termination of the existing facility’s function by 2020, customers have to purchase water by themselves. In Astana City, 19 liters commercial bottled water of 750 TG/piece or 39,473 TG/m³ (about 274 US Dollars) is

available. However, this bottled water of highly qualified in quality includes large commercial profit of venders and not appropriate as alternative to take place for the "Without Project" case.

Meanwhile, there is another possibility for procurement of water after abandoning of existing WTP by 2020 other than purchasing of bottled water. That is purchasing and transportation of water from the neighboring cities such as Kokshtau, and this alternative method is taken into account for calculation of EIRR for "Without Project" case. The cost of water per m³ and the cost of transportation per m³ between Astana City and Kokshtau are estimated at 400.2 TG (2.8 US\$) and 2.89 US\$ respectively.

3) Compensation Cost for Water Delivery

At present, around 26.8 % of the individual customers are not connected to the centralized water and sewerage system, and the customers have to bring water from communal taps to their homes. This rate is expected to decrease to 15.8 % after 2007 when the improvement works will complete under the "With Project" and continues when the existing facilities terminates under "Without Project" in 2020. The balance between "With Project" and "Without Project" will be counted as the benefit for EIRR calculation. When the existing facilities terminate after 2020, all the customers including enterprises have to carry water by themselves.

Labor cost for the time required to fetch water is converted to an opportunity cost. In this regard, 0.5 hour per day per person in average will be appropriate. Assuming that the average monthly income per household is 19,152 TG, the average hourly income of 120 TG is multiplied to 0.5 hours amounting to 21,900 TG per year.

4) Treatment Cost of Sewage by Individual

When the existing WWTP terminates by 2020, all the customers including enterprises have to treat sewage individually for the case of "Without Project". In this case, cesspit, septic tank and community plant should be indispensable to conserve surrounding environment. The cost for provision of these facilities is estimated at 159.4 Mil US\$.

(2) Intangible Economic Benefits

Other than the quantified economic benefit mentioned in the previous sub-section, intangible economic benefits are not included in EIRR calculation because of lack

of reliable data, technical difficulty or negligibility of benefits. Nonetheless, if those benefits are included in the EIRR calculation, the EIRR will be higher.

The added values provided by the project over and above the pre-project situation have been aggregated in the following three groups:

- Health benefits
- Amenity benefits
- Agricultural Benefits

1) Health Benefits

The general health condition of the population is considered to be good as a whole. However, in the "Without Project", deterioration of the water supply and sanitation services will increase and intensify the risks to public health. The risks to public health leads to potential loss in opportunity costs of labor and increase in health insurance costs which means the economic loss in the case of "Without Project".

Health benefits are realized mainly from introduction of improved sanitation and waste disposal facilities. Economic benefit brought by the project is difficult to estimate because the future risks in the case of "Without Project" cannot be easily estimated. However, reduction in the risks to public health leads to the intangible economic benefits.

2) Amenity Benefits

Amenity benefits include increase in real estate value as a result of introduction of the water and wastewater services. The benefits will be mainly in newly developed areas where the real estate value will be orders of magnitude higher than in the pre-project situation. The amount of benefits is included in the overall holistic economic benefits.

3) Agricultural Benefits

Reusing of sludge and treated wastewater for agriculture will create certain economic benefits in the future. The digested sludge can be used as fertilizer and the treated wastewater can be used for agricultural products. However, these economic benefits are premature for the EIRR calculation in this Study.

10.4.2 Economic Costs

The capital costs of the proposed investment of this project are provided in Chapter 9. The project cost estimate have been converted into economic capital costs by eliminating customs duties, VAT and price contingency reserves from the cost estimate. The total economic capital costs are calculated to be 224.9 Million US Dollars as described in Table 10.4.1.

Table 10.4.1 Cost Calculation

(Unit: Million US Dollars)

Capital Cost	Less: Custom Duties	Less: VAT	Less: Price Contingency	Economic Capital Cost
300.1	7.5	50.0	17.7	224.9

O&M and connection costs are the same as mentioned in Financial Costs in Sub-section 10.3.2 .

10.4.3 EIRR Calculation

As previously mentioned, health, agricultural and environmental economic benefits are excluded from the EIRR calculation. The calculated EIRR for the project has resulted in 15.7 %. Details of the economic analysis are presented in Table 10.4.2. Assuming that opportunity cost of capital in Kazakhstan is 10 %, this project is acceptable.

Table 10.4.2 EIRR Calculation

(Unit: Million US Dollar)

Year	The EIRR Calculation						Detail of Benefit					
	Total Benefit	O&M Costs	Cost of Meter and Connection	Total Benefit	Capital Cost	Net Total	O&M Costs	Extra Cost for Expansion	Cost of Purchasing Water	Opportunity Cost of Labor	Cost of Dealing with Sewerage	Total Costs
2000												
2001												
2002					4.51	-4.51						
2003					4.65	-4.65						
2004					35.43	-35.43						
2005					93.71	-93.71						
2006					66.79	-66.79						
2007					19.83	-19.83						
2008	59.04	3.98	2.28	52.79		52.79	7.77	42.71		8.57		59.04
2009	18.88	4.02	2.28	12.59		12.59	7.96	2.25		8.67		18.88
2010	28.07	4.20	2.28	21.59		21.59	8.48	10.81		8.77		28.07
2011	25.17	4.32	2.28	18.57		18.57	8.87	7.03		9.26		25.17
2012	26.23	4.45	2.28	19.51		19.51	9.29	7.36		9.58		26.23
2013	27.36	4.58	2.28	20.50		20.50	9.74	7.70		9.92		27.36
2014	20.83	4.59	2.28	13.96		13.96	9.91	0.65		10.27		20.83
2015	18.02	3.62	0.74	13.67		13.67	7.73			10.29		18.02
2016	15.57	3.62	0.74	11.21		11.21	7.84			7.72		15.57
2017	15.69	3.62	0.74	11.34		11.34	7.97			7.72		15.69
2018	15.82	3.62	0.74	11.46		11.46	8.10			7.72		15.82
2019	15.95	3.62	0.74	11.60		11.60	8.23			7.72		15.95
2020	16.09	3.62	0.74	11.73		11.73	8.36			7.72		16.09
2021	329.93	2.65	0.74	326.55		326.55			84.39	86.10	159.44	329.93
2022	170.49	2.65	0.74	167.11		167.11			84.39	86.10		170.49
2023	170.49	2.65	0.74	167.11		167.11			84.39	86.10		170.49
2024	170.49	2.65	0.74	167.11		167.11			84.39	86.10		170.49
2025	170.49	2.65	0.74	167.11		167.11			84.39	86.10		170.49
2026	170.49	2.65	0.74	167.11		167.11			84.39	86.10		170.49
2027	170.49	2.65	0.74	167.11		167.11			84.39	86.10		170.49
2028	170.49	2.65	0.74	167.11		167.11			84.39	86.10		170.49
2029	170.49	2.65	0.74	167.11		167.11			84.39	86.10		170.49
2030	170.49	2.65	0.74	167.11		167.11			84.39	86.10		170.49
2031	170.49	2.65	0.74	167.11		167.11			84.39	86.10		170.49
2032	170.49	2.65	0.74	167.11		167.11			84.39	86.10		170.49
2033	170.49	2.65	0.74	167.11		167.11			84.39	86.10		170.49
2034	170.49	2.65	0.74	167.11		167.11			84.39	86.10		170.49
2035	170.49	2.65	0.74	167.11		167.11			84.39	86.10		170.49
2036	170.49	2.65	0.74	167.11		167.11			84.39	86.10		170.49
2037	170.49	2.65	0.74	167.11		167.11			84.39	86.10		170.49
2038	170.49	2.65	0.74	167.11		167.11			84.39	86.10		170.49
2039	170.49	2.65	0.74	167.11		167.11			84.39	86.10		170.49
2040	170.49	2.65	0.74	167.11		167.11			84.39	86.10		170.49
2041	170.49	2.65	0.74	167.11		167.11			84.39	86.10		170.49
2042	170.49	2.65	0.74	167.11		167.11			84.39	86.10		170.49
2043	170.49	2.65	0.74	167.11		167.11			84.39	86.10		170.49
2044	170.49	2.65	0.74	167.11		167.11			84.39	86.10		170.49
2045	170.49	2.65	0.74	167.11		167.11			84.39	86.10		170.49
2046	170.49	2.65	0.74	167.11		167.11			84.39	86.10		170.49
2047	170.49	2.65	0.74	167.11		167.11			84.39	86.10		170.49
						EIRR	15.7%					

10.5 Conclusions of Evaluation

The financial evaluation of the project shows that if the finance of international funding agency can be obtained with funding interest less than 2.9%, this project can be financially sustainable. However, tariffs will have to be increased by 200% for domestic consumers and 400% for enterprises. The result of tariff increase will be in the withdrawal of subsidy normally provided to ASA by Akimat.

The financial evaluation of the project shows that the calculated EIRR for the project has resulted in 15.7 %, which prove this project economically feasible.

In addition, water and sewerage services are conducted based on the basic human needs. Furthermore, water and sewerage business is the basis of other industries and indispensable for the development of Astana City. It is clear that development of Astana City is prevented without any improvement of water and sewerage business.

At present, the number of population and enterprise is increasing in Astana City and this increase keeps the high degree of economic development of Astana City. In addition, more increase in inflow into the Astana City is expected in the future. This further increase in population and enterprise will contribute to the economic development of Astana City in the future.

It is expected that there is drastic increase in GRDP per capita, compared to other area in Kazakhstan. Therefore, in the case of "Without Project", there is not enough capacity to meet the future demand of water and sewerage services, and increase in number of population and enterprise might be limited. The shortage of water supply and sewerage services would become one of the major constrains for the growth of GRDP in Astana City. In other words, improvement of water and sewerage system in Astana City prepares the basis of industries and contributes to the economic development of the capital, which might generate the drastic increase in GRDP of Astana City.

CHAPTER 11
IMPLEMENTATION
ARRANGEMENT



CHAPTER 11 IMPLEMENTATION ARRANGEMENT

11.1 Requirements for Project Implementation

The Project's aim is to establish a sustainable self-supporting management system for water supply and sewerage services in Astana City. Therefore, it is necessary to implement improvement plans as recommended in Chapter 8. The main recommendations for the project and for arrangement of financing from international sources are as follows:

- Strengthening of the management of ASA
- Reform of tariffs in order to provide financial security for ASA and to achieve full cost recovery

It is recommended that these recommendations are implemented immediately to show commitment of the Government of Kazakhstan and of Akimat to the project. It is accepted that it can take a long time for such reforms to be complete but such early commitment will be positive contributions during negotiations with funding agencies.

11.2 Project Funding

The project's financing is assumed to be by foreign loan, considering the fiscal constraints of the Government of Kazakhstan. There are usually many requirements, depending on funding agencies which need to be fulfilled prior to loan closure. These requirements can include the following:

- Legal framework for the borrowing agency (Assumed to be the Ministry of Finance)
- Commitment of Government to funding local portion of costs
- A repayment guarantee
- A counterpart agency for project implementation
- Implementation of institutional reforms as recommended in this Feasibility Study

Negotiations with funding agencies may take a long time, it is therefore recommended that such negotiations are started as soon as possible. The above issues as well as others such as interest payment, grace period and other legal matters have to be resolved before loan closure.

11.3 Project Implementation Framework

Figure 11.3.1 shows a conceptual management structure for project implementation and execution. The components are described below.

11.3.1 Project Management Unit for Water Projects (PMUWP)

A new organization with full legal status to enter into contracts in the name of the Government of Kazakhstan shall be created. The board of directors shall be appointed by CDC and Akimat and shall be responsible for appointments of the various agencies and committees within the organization. The Board of Directors is also responsible for the appointment of consultants and contractors. The delegated powers available to these committees and agencies shall be made clear in the charter of the PMUWP in their appointment letters.

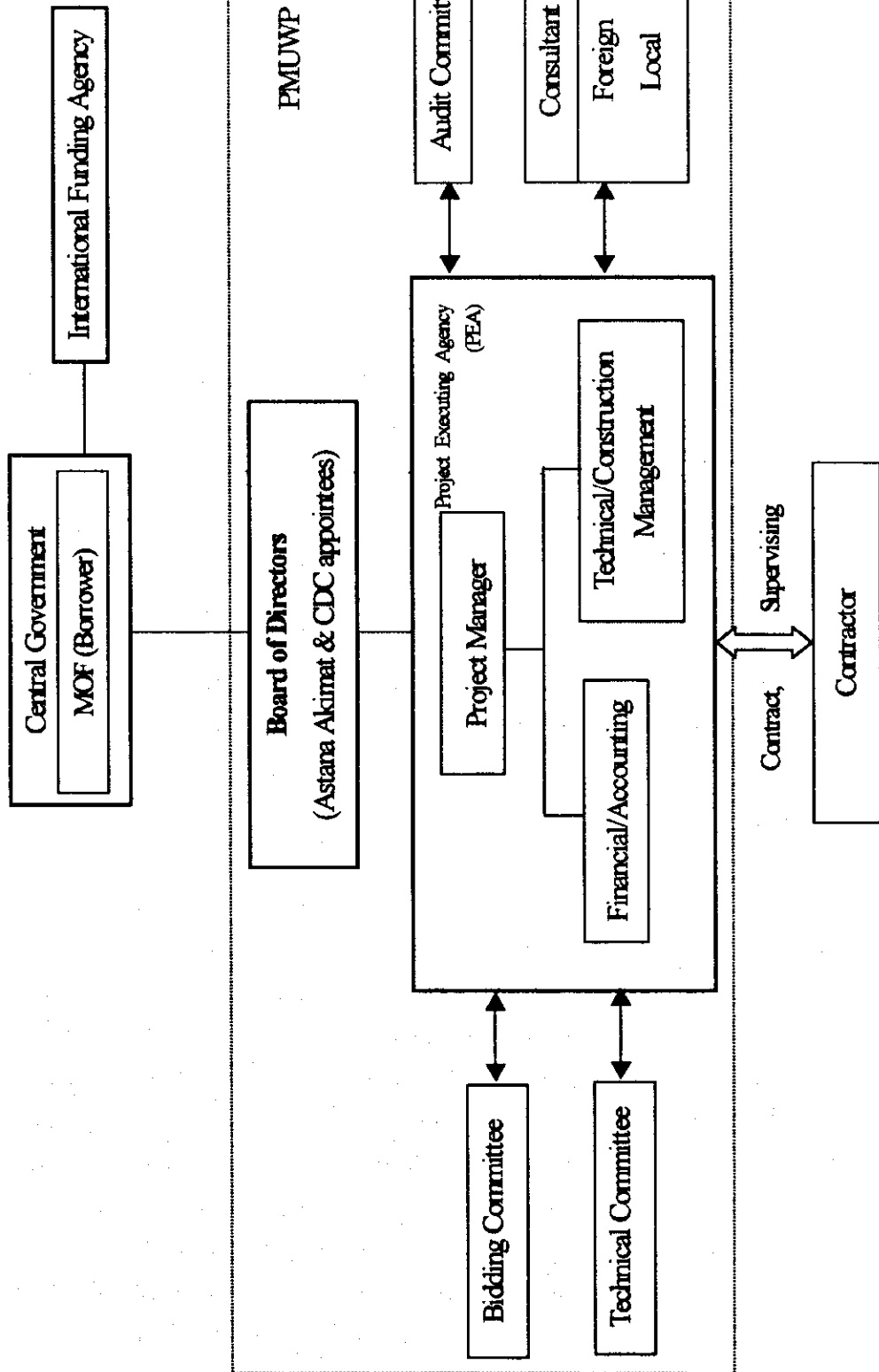
This organization shall regroup staff from the Implementation Counterpart i.e. CDC and Akimat as well as consultants to be recruited.

11.3.2 Project Executing Agency (PEA)

Within the PMUWP an executing agency shall be created to implement the project, manage the finance and negotiate new contracts. This Project Executing Agency shall be responsible for the day to day management of the project and its duties shall be as follows:

- Coordination of government and city agencies, consultants, contractors
- Scheduling of tasks
- Setting up of procedures
- Preparation of budgets
- Financial and cost control
- Approval of disbursements
- Budget and cash flow control
- Issue of tender documents

The agency will be headed by a Project Manager supported by two departments, financial and engineering. It is recommended that the consultants appointed for detailed design and supervision of the project are integrated into the two departments. This approach will bring to the PEA all the expertise available within the consultant organization and avoid misunderstanding and potential conflicts.



Feasibility Study for Water Supply and Sewerage in the City of Astana

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Figure 11.3.1
Conceptual Management Structure for Project Implementation

11.3.3 Supervision and Control

Supervision and Control of the activities of PEA is to be carried out by three committees to be appointed by the Board of Directors of PMUWP. The three committees are as follows:

- Audit Committee
- Tender Committee
- Technical Committee

The Audit Committee will be responsible for verification of the accounting procedures and correct application of normal accounting standards for this project.

This committee should include an accounting firm with international experience.

The Tender Committee will be responsible for application of bidding procedures and recommendation on the preferred bidder. The members of this committee can include appointees from Ministries as required by Kazakhstan law or regulations.

The Technical Committee will be responsible for the expertise of technical and contractual documents produced in the course of the project. The members of the committee could include appointees from ASA, Construction Committee, Sanitary and Epidemiological Department etc.

11.4 Financial Control

A project account is to be arranged with the Ministry of Finance for exclusive use of the project and into which project funds either from International Funding Agencies or from the Government are to be deposited.

Funds are to be disbursed for payment to consultants, contractors and suppliers on the presentation of payment certificates approved by the PMUWP. Funds for the running costs of the PMUWP are also to be disbursed from the same account.

The Project Manager and his accounting department are responsible for all usual financial management including fund disbursements, expenditures, accounting and monitoring. The actual delegated powers will be defined in the charter of the PMUWP or in the letter of appointment of the Project Manager.

All financial activities should be subject to periodic examinations by the Audit Committee who is responsible directly to the Board of Directors.

11.5 Implementation Schedule for Pre-construction Activities

The following activities are considered essential during the period prior to construction:

- Implementation of Tariff Reforms
- Strengthening of ASA management
- Establishment of the PMUWP
- Loan negotiations
- Selection of consultant
- Appointment of Project Manager, Tender, Technical and Audit Committees
- Detailed design and preparation of bid documents
- Selection of Contractor

Figure 11.5.1 presents a tentative schedule for implementation of all the above activities. The duration of each activity has been based on experience acquired on similar projects. However some of the activities can be shortened with rapid implementation of some of the measures. The schedule is based on the recommendations in Chapter 9.

Activity	2001				2002				2003			
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Implementation of Tariff Reforms	█				█							
Strengthening of ASA management	█				█							
Organization of PMUWP		█										
Loan Negotiations	█											
Loan Closure				▼								
Selection of Consultant			█									
Appointment of Project Manager			█									
Appointment of Tender Committee				█								
Appointment of Technical Committee				█								
Appointment of Audit Committee				█								
Detailed design					█				█			
Preparation of bid documents									█			
Selection of Contractors									█			

Figure 11.5.1 Pre-construction Activities Schedule

CHAPTER 12
CONCLUSION

CHAPTER 12 CONCLUSIONS

12.1 Basic Policy of Development

The Republic of Kazakhstan has been investing a great deal of national budget to the City of Astana for its development in recent years. Taking into account the tight financial situation, the water supply and wastewater disposal system development in this Feasibility Study was achieved in compliance with the basic policy of cost saving and maximum use of existing facilities, a great many of which were envisaged to be functional till around the target year of 2010.

The facility plans, therefore, were focused mainly on the rehabilitation of the existing facilities and minimum expansion was considered particularly on the left side of the Ishim River.

12.2 Water Supply

On the basis of the above basic policy, sound management of water supply system for 2010 was targeted on technical, operational and managerial aspects. On the technical aspect, first of all, facility plan starting with replacement of pipes is to be carried out because current non-revenue water due to leakage from pipes amounts to more than 26%. At the same time, meter installation was considered as one of the most effective remedial measures for leakage protection and water consumption control by each consumer, and more than 65,000 units are to be installed. This meter installation is expected to show benefits not only for water management from the technical viewpoint, but also financial savings, financial management and operation and maintenance aspects.

Secondly, future population that will reach about 500,000 by 2010 and the great majority of the new residents will live on the left side of the Ishim River. At present few people reside in the area which has little infrastructure. Therefore, construction of new facilities or expansion of the existing facilities will inevitably become necessary. Furthermore, in the initial stage of development at around 2003, a large part of the government city on the left side of the Ishim River is expected to be constructed, and subsequent provision of facilities will also become necessary. However, the extent of facility expansion in this Study is limited to a minimum requirement.

As for the new facilities, construction of new water treatment plant of 100,000 m³/d

and simultaneously construction of intake facilities and expansion of distribution facilities are planned. The transmission line between the intake and the treatment plant is to be constructed urgently, and funds for this facility has already been committed within the domestic budget of Kazakhstan. The Feasibility Study and subsequent detail design are therefore required to be implemented as soon as possible.

In parallel with the project implementation, Kazakhstan Government should, as one of the significant issues, review the design and planning criteria of SNiP. Especially, the design criteria that are applied for water demand should not be general criteria that are used country wide, but be the particular criteria to Astana City that reflects regional characteristics. Further, the criteria for construction method should be also modernized to reflect modern construction method or technology used worldwide. In order to achieve this objective, a committee consisting of relevant organizations key persons should be established to take prompt action.

Furthermore, the development of the left bank is still under the master plan level except the government city area and none of practical reclamation plan has been implemented. Due to this reason, the design in this Feasibility Study is only a preliminary level. Therefore, appropriate review of this Feasibility Study should be carried out at the time of the subsequent detail design stage and substantial examination by the Kazakhstan side is inevitably necessary before commencement of the detail design.

12.3 Wastewater Disposal

The wastewater disposal facilities currently being in operation for collection and treatment have not been suffered from serious problems and only rehabilitation and up-rating of them are required to meet the target requirement. The targeted development for 2010 is largely divided into two categories. The one is improvement of deteriorated collection pipes, pump facilities, manholes and wastewater treatment plant and the other is the expansion of collection pipes to the left bank of the Ishim River.

The improvement and rehabilitation works of the collection pipes were selected primarily based on the existing data compiled by ASA and the pump facilities identified in the reconnaissance survey in this Study were determined to replace with a modern type due to inefficiency of the pumps resulting in excessive energy consumption. While, as for the wastewater treatment plant, improvement of grit

removal facilities, sedimentation pond and sludge digesters as well as expansion of sludge drying bed were planned. There is at present no examination of sludge quality. It is recommended that sludge produced at the WWTP be examined regularly to determine its characteristics, especially the concentrations of heavy metals. This characterization will help towards management of the disposal to agriculture of the sludge.

One of the key issues for wastewater plan is the disposal of treated wastewater. Consequent to the study result of treated wastewater reuse for agricultural purpose, a large potential of utilization was verified and subsequently treated wastewater reuse for agricultural development was proposed. However, the practical study for the agricultural development itself has not been implemented, verification by executing feasibility study under the authority of Kazakhstan side should be carried out as soon as possible. Due to the fact that implementation of a feasibility study is a prerequisite of treated wastewater reuse for agricultural development, pipe and pump facilities necessary for this purpose are not included in this Study.

Finally, as mentioned in section 12.2 Water Supply, improvement of the current design criteria and construction standards for wastewater will be necessary

12.4 Environmental Impact Assessment (EIA)

There is a provisional standard for procedure regarding EIA, which was stipulated in 1993 in Kazakhstan. However, neither concrete method for assessment has been shown nor implementation of public hearing by means of mass-media is included in the scope of work of this Study, EIA was carried out based on JICA EIA guideline that satisfactorily covers the Kazakhstan guideline.

As for water supply related aspects, no particular EIA problems appeared except minor problems of noise and vibration. These will be easily solved by selecting appropriate construction method to be proposed at the time of the detail design.

While, wastewater disposal related aspects, increase of treated wastewater amount was only taken up as a problem. This problem will be solved after conducting reuse of treated wastewater for agriculture as aforementioned. As for the minor problems, noise and vibration at the construction period, this will be solved just as the case of water supply.

12.5 Organization and Institution

All the major organizations necessary for the management and control of the water cycle are present, however some rules and regulations are constraining the ability of ASA to achieve the objective set out in its charter, namely provision of a financially sustainable and efficient water supply and sewerage system.

The tariff system is a major such constraint. Amongst the many difficulties are the low tariffs levels and collection ratio, the inability of ASA to correctly support a request for tariff increase and the over zealous application of rules by the Regulation Agency for Natural Monopolies. A new tariff schedule based on ability to pay is proposed and designed to achieve cost recovery. Direct subsidy to low income population is proposed to compensate for tariff increases. Relaxation and practical application of some rules by the Regulation Agency are necessary to enable ASA to achieve its self supporting objectives.

ASA's problems originate mainly from its managerial weakness, lack of commercial awareness and poor information availability at most level within ASA resulting from lack of training in new technology, and techniques as well as inadequate motivation or rewards. Debt management and collection has improved recently through strengthening of the legal department but further improvements are still necessary through the roll-out to all customers of the new service contract with inclusion of a non-payment penalty clause. A program of staff training, recruitment of competent managers and the introduction of a motivation scheme is recommended to achieve ASA's self-management target.

Customer service is poor with little done to inform the customer and to make payment of water tariffs easier. Additional education program and 3 new branch offices are proposed. Prior to tariff increases public opinions are to be assessed through surveys and focus groups.

Project implementation capacity within existing organizations is practically non-existent. A Project Management Unit for Water Projects is proposed for the implementation of this project.

12.6 Cost Estimate and Construction Plan

On the assumption that the priority projects proposed in this Feasibility Study is expected to be financed by international funding agencies, cost estimate and construction plan were performed. Keeping in mind the past particulars that the

Kazakhstan Government previously requested financing for the project from the Japanese Government, the method of cost estimate and financing and implementation procedures were based on Japanese guidelines.

The total project cost estimate amounted to 300 Million US Dollars and can be divided into the categories of foreign and local portions. The foreign portion can basically be considered as the base amount of the loan, but the details will have to be finalized after discussion between the Kazakhstan Government and the donor agency. As for the cost estimate, no up to date unit cost are presently available in Kazakhstan and the organization responsible for providing unit rates is not familiar with international tendering procedure. Therefore updating and review of the unit costs are inevitably necessary at the time of preparation of tender document.

The implementation schedule for the pre-construction stage with three years was prepared based on the method hitherto. This period, however, can probably be shortened after the discussion between the responsible Kazakhstan organization and the donor agency.

The construction was targeted to be completed within a short period of time. The project has therefore been packaged such that the water supply project are divided into four packages, intake, treatment plant, distribution pipes and meter installation and the wastewater disposal project into two packages, wastewater treatment plant and collection pipes.

An alternative project with reduced scope was considered. The reduced scope takes into account the areas of expansion for which funds have been committed by the Kazakhstan Government to date, namely the Government City of the left bank of the Ishim River. For this scenario, the project cost was estimated to be 265 Million US Dollars.

12.7 Economic and Financial Evaluation

ASA, the water supply and wastewater disposal operation and management organization body has been currently suffering from the problem of water loss due to leakage. This loss of revenue from water leakage is compounded by financial deficit due to inappropriate tariff collection, inadequate asset management and poor managerial strength. All these make it difficult to procure funds for project implementation.

ASA has many problems, which have to be solved before establishing a sound

water and wastewater management for the target year 2010 through national or city government with the help of international funding aid. In order to achieve this, the following improvement program should be performed covering economic and financial aspects in parallel with the improvement program currently managed by ASA

The first is the establishment of tariff system comprising of progressive water charge system and self-supporting financial system. The second is the improvement of ASA's business management capability including O&M cost reduction through facility improvement, asset management, implementation of an audit to international standards and improvements in customer services.

In this Study, a financial and economic project evaluation was performed, taking into account the funding for the project from the international donor agencies in parallel with ASA's self-supporting efforts for economic and financial improvement currently being carried out. The evaluation was conducted by a 'With Project' and 'Without Project' approach.

In the financial evaluation, as capital cost always exceeds present water sales a deficit will always occur. The only remedies available are decreasing of capital cost, increasing of sales amount and increasing of tariff. In real terms, tariff increasing is the only way to improve the financial situation and thus the Financial Internal Rate of Return was tabulated.

Five alternative methods of increasing tariff were examined: 1) increasing of domestic water charge, 2) introduction of basic fixed cost water charge, 3) increasing of enterprise water charge, 4) introduction of progressive water charge, 5) introduction of a connection fee. Herein, the introduction of progressive water charge is highly recommended for the future tariff system, but it is still premature to apply this method to Astana city at present, further detailed tariff study is required before starting this method. Therefore, progressive water charge is not included in the calculation for FIRR. The tariff increase was by two to domestic consumers and by four for enterprises, resulting in a FIRR for the project of 2.6% which is considered viable if the financing is from international donor agency.

Economic influence of this project is calculated based on the comparison of economic growth between "with project" and "without project". At present, the number of population of enterprise is increasing in Astana City and this increase in population and enterprise keeps the high degree of economic development of Astana City. The population and economic growth in Astana City is forecasted in

the Draft Final Report of JICA Master Plan, March 2001 as follows:

- Expected population in the year 2030: 800,000
- Expected annual growth of GRDP from 2001 to 2030: 8.3%

In the case of “without project”, there is not enough capacity to meet the future demand of water and sewerage services, and increase in number of population and enterprise might be limited. The shortage of water supply and sewerage services would become one of major constraints for the growth of GRDP in Astana City.

Other than the benefit brought by the increase in GRDP, benefits specific to the water supply and sewerage project are discussed below, comparing “with project scenario” without project scenario”.

Water and sewerage services are conducted based on the basic human needs. Furthermore, water and sewerage business is the basis of other industries and indispensable for the development of Astana City. It is clear that development of Astana City is prevented without any improvement of water and sewerage business. At present, development of Astana City as a capital is one of the most important issues for Kazakhstan. In order to strengthen the function of Astana City as a capital and promote the economic development of Astana City, improvement of water and sewerage system of Astana City should be implemented.

12.8 Implementation Arrangement

The main institutional and organizational recommendations for the project and for arrangement of financing from international sources are: 1) strengthening of the management of ASA, 2) reform of tariffs in order to provide financial security for ASA and to achieve full cost recovery. It is recommended that these recommendations be implemented immediately to show commitment of the Government of Kazakhstan and of Akimat to the project.

Given the fiscal constraints of the Government of Kazakhstan, it is expected that financing for the project will be through International Funding Agency, who usually has conditions to be fulfilled prior to loan closure. It is recommended that negotiations with funding agencies be started as soon as possible.

The existing organizations do not have the capacity to take on the management of a project of this nature. A new agency, Project Management Unit for Water Projects (PMUWP) shall be created by statute to have all the legal status to enter into contracts in the name of the Government of Kazakhstan. This organization and its board of directors will be responsible for appointment of consultants, contractors

and other supervisory agencies. Day to day running of the PMUWP shall be carried out by a Project Executing Agency (PEA) headed by a project manager.

Supervision and control of the activities of PEA is to be carried out by three committees to be appointed by the Board of Directors of PMUWP.

A project account is to be arranged with the Ministry of Finance for exclusive use of the project and into which project funds either from International Funding Agencies or from the Government are to be deposited.

Funds are to be disbursed for payment to consultants, contractors and suppliers on the presentation of payment certificates approved by the PMUWP. Funds for the running costs of the PMUWP are also to be disbursed from the same account.

The Project Manager and his accounting department are responsible for all usual financial management including fund disbursements, expenditures, accounting and monitoring. The actual delegated powers will be defined in the charter of the PMUWP or in the letter of appointment of the Project Manager.

All financial activities should be subject to periodic examinations by the Audit Committee who is responsible directly to the Board of Directors.

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